Preface

ICT4S 2023

Welcome to the 9th edition of the International Conference on ICT for Sustainability (ICT4S'23), which is the premier international conference aimed at bringing together leading researchers in ICT for sustainability with government, industry, and community representatives, including decision-makers and end-users with an interest in using ICT for sustainability, as well as artists and researchers focusing on ICT effects on sustainability, and developers of sustainable ICT systems or applications. ICT4S is devoted to covering all types of research, developments, and applications of ICT to support sustainability.
The conference was held as an in-person event at the beginning of June in Rennes, France.

Submission and Reviewing
Overall, the main conference attracted 93 abstract submissions, including 56 abstracts submitted to the Research Track, 12 to the Doctoral Symposium, 21 to the Demonstrations and Posters Track, and 4 to the Journal-First Track. The Doctoral Symposium and the Demonstrations and Posters Track are published with the joint workshops proceedings, so we are not reporting on them in detail here.
In the Research Track, from the 56 papers, none were withdrawn by the authors, none were never followed up with a full paper, and none were desk-rejected resulting in 56 papers for evaluation. Each paper was independently reviewed by at least three members of the program committee (PC) and was subject to online discussion by its reviewers and other members of the PC. The PC carried out a virtual discussion phase during March 2023. In the end, 18 papers were accepted (acceptance rate of 32%) and two went into shepherding in order to revise the paper and strengthen the community by bringing two topics into the discussion at the conference that were considered highly relevant. These two papers were accepted after shepherding and checking in an additional gatekeeping review. The Journal-First chairs accepted all 4 submissions for presentation.

Program
Together with the organizing committee, we developed an exciting and diverse program. Monday, June 5, 2023 offered three workshops and the doctoral symposium. The main conference was held from Tuesday to Thursday, June 6-8, 2023. On Friday, June 9, 2023, four workshops were held. The seven workshops covered topics such as methodologies and frameworks to assess sustainability impacts, sustainability education, involvement of human actors in sustainable computing, the sound of sustainability, sustainability trade-offs in AI, sustainable energy-aware technology, and radical prototyping for ICT4S.
In addition to the academic program, ICT4S'23 featured an extensive OFF! Program including a debate about sustainability and open-source run by The Eclipse Foundation; a quiz by the CNRS GDS EcoInfo group on the environmental impacts of ICT; art performances by Disnovation and Jan van Esch; a panel bringing together scientists, engineers, as well as policy and decision makers; and a hack-a-thon leveraging the synergy of the conference to foster the emergence of new innovative and sustainable solutions under the prism of low-tech technologies.

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The conference included three exciting keynotes. On Tuesday, a keynote by Hugues Ferreboeuf from The Shift Project shed light on "*Sustainable digitalization: Why we need to shift away from Big Tech business models*".

The unsustainable growth of the digital environmental footprint over the last decade is due to the rapid growth of digital "volumes", which have outpaced efficiency gains. This growth is a result of the business models of the dominant players of the digital economy, namely the largest digital platforms (GAFAM, BATX) and their derivatives (Netflix, TikTok etc.). To make digitalization sustainable, a transition away from these digital superpowers is necessary, and alternative, sustainable business models must be adopted. The initiation and acceleration of this transition requires the implementation of appropriate public policies that will reduce the attractiveness of current Big Tech business models and promote and support the development of a new digital economy.

Dr. Anne-Kathrin Peters discussed sustainability education in her talk "*On the complexities and possibilities of ICT education for sustainability*".

Education is widely recognized as important to achieve the urgent and unprecedented societal transformation towards sustainability that is needed. As research on ICT and sustainability grows, also education on ICT and sustainability is developed and researched. To what extent do these initiatives engage with the fact that university education at large is complicit in reproducing the unsustainable status quo? Even well-intentioned work on education for sustainability has been critiqued for limiting possibilities for change. In this keynote, I present research on how university education reproduces unsustainable norms, values and power structures, focusing on the field of computing and engineering education. I give an overview of ongoing efforts to transform computing and engineering education for sustainability and discuss their possibilities and limitations. I argue that in order to utilise the potential of education for large-scale and fundamental change, education needs to be reimagined and developed with recognition of its complexity, various roles and purposes. I present recent research on education for paradigm shifts, decolonial futures, or "the end of the world as we know it" as well as education activities building on this research. This keynote hopes to inspire new discussions and educational activities for sustainability within the ICT4S community and beyond.

On Thursday, Prof. Jean Jouzel, a prominent French glaciologist and climatologist and former vice-chair of the Intergovernmental Panel on Climate Change (IPCC), shared his insights on "*Global Warming: The need for a new model of development and the key role of higher education*".

If nothing were done to manage the increase of the greenhouse effect tied to human activity, we should see, at the end of this century, a minimum average 4°C increase in temperature worldwide which will increase well beyond 2100. The impacts of such a « business as usual » scenario would be difficult if not impossible to handle. And these difficulties will hold true for a +3 °C climate change, a level which could be reached in the current context of the Paris agreement. After briefly examining the causes and consequences of this ongoing global warming in the light of recent IPCC reports, we will conclude on the absolute need to keep global warming well below 2°C, and much better around 1.5°C, if we want today young generations be able to adapt to future climate change in the second part of this century and beyond. We will argue that research, innovation and creativity are essential for going towards this low carbon society but that this « ecological transition » also requires large dedicated teaching efforts in higher education and all along our life.

The academic program also included two Demonstrations and Posters sessions, awards for the Best Research Paper and Best Reviewers of this conference, and a celebration for Lorenz Hilty

as Honorary Member of the Standing Committee. The winners were selected by dedicated committees.

Acknowledgements
We express our appreciation to the entire organizing committee and to our excellent Program Committees who spent many hours reviewing and discussing papers. Our 43 PC members spanned a diverse collection of researchers who have served on the PC many times as well as younger members joining the PC for the first time.
We thank the authors who submitted to the various tracks of ICT4S'23. Without them, the conference would not be possible. We also thank the members of the Organizing Committee. Their assistance has been invaluable. We thank in advance the student volunteers who will help us run the conference. Finally, we also thank our academic and corporate sponsors and donors, as well as the entire local committee taking care of all the local logistics to run an exciting week about ICT and sustainability.
We hope that the ICT4S'23 participants will benefit from an intellectually stimulating and enriching experience and will enjoy the conference to their fullest.

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