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Informação**
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Novos Desafios e Oportunidades”**

**Proceedings of 17th Brazilian Symposium on
Information Systems**
**“Intelligent and Ubiquitous Information Systems: new
challenges and opportunities”**

Sociedade Brasileira de Computação - SBC
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Special Committee of Information Systems (CESI) of Brazilian Computer Society (SBC)

Dear attendees of the XVII Brazilian Symposium on Information Systems (SBSI),

On behalf of the Management Committee of the Special Commission on Information Systems of the Brazilian Computer Society (CESI/SBC), we would like to welcome another edition of the SBSI. CESI brings together IS researchers and professionals and manages this area in Brazil in the context of the SBC. Its work consists of articulating policies for the dissemination, strengthening, consolidation and improvement of the quality of education, research, innovation and performance in IS in Brazil, promoting and proposing important activities for the development and consolidation of this area in our country. The SBSI itself is one of CESI's main actions. For this reason, we are happy that authors submit their work, that evaluators strive to give the best possible feedback on their reviews and that coordinators are able to hold memorable moments so that the community can be strengthened, attract more participants and consolidate in the country. In this sense, CESI calls on the IS community to be increasingly active and SBSI participants to get involved and bring new researchers to the event, making the community grow and solidify their research..

The SBSI is Brazil's most important forum on IS and annually brings together researchers from all over the country. This year, SBSI takes place online for the second time under the general coordination of professors Rafael Araújo and Fabiano Dorça, from the Federal University of Uberlândia (UFU). After several months of intense work and unparalleled dedication by the professors and their local organization team, we made available to the IS community a rich, diversified, comprehensive and solid program, communicating the latest research results in the IS area in Brazil. The event has grown considerably in recent years. This achievement is a reflection of the consolidation of the area, which has only been possible due to the growing support of the entire IS community. SBSI 2021 is composed of several parallel events, which include technical sessions, lectures, short courses and master classes, and the traditional IS Education Forum (FESI), Scientific Initiation Workshop in IS (WICSI), Thesis Workshop and IS Dissertations (WTDSI), IS Innovation Meeting (EISI), IS Research Quality Workshop (WQPSI), IS Thesis and Dissertations Competition (CTDSI) and IS Course Conclusion Paper Competitions (CTCCSI), in addition to the Innovative IS Development Competition (CoDeSil) and TechDay. All works accepted at SBSI satellite events are published in the SBSI Extended Annals and also made available to the community.

The Program Committee, coordinated by Professor Renata Araujo (UPM/EACH-USP) and Professor Sean Siqueira (UNIRIO), worked hard and expertly so that the most mature and highest quality works could be brought to the Brazilian IS community. Such rigorous selection work yielded full confidence in the quality of the papers presented at this symposium in 2021. In addition, the partnership with the

ACM Digital Library continues to emphasize the association with the ACM Interest Groups (SIGMIS). This is a differential of SBSI in relation to several other SBC events, given the relevance of this association in the world context. Such partnerships enormously intensify the impact of the work carried out by the program committee and by the authors of the articles, enhancing the scope and reach of the production of the SBSI, which is also indexed and accessible worldwide by the DBLP database. In time, it is important to emphasize that the annals of the SBSI and its member events are also being indexed and made available on the SBC Publications and Digital Content Portal - SBC OpenLib - SOL.

Finally, we thank all the participants, collaborators, coordinators, sponsors, supporters and organizers who made the event possible once again, especially in yet another difficult and challenging period for humanity.

We wish you all a great SBSI 2021!

Profound regards,
Rodrigo Santos (UNIRIO) - CESI/SBC Coordinator - 2020-2021
Davi Viana (UFMA) - CESI/SBC Vice-Coordinator - 2020-2021



Rodrigo Pereira dos Santos is an Adjunct Professor at the Department of Applied Informatics (DIA) and an effective member of the Graduate Program in Informatics (PPGI) at the Federal University of the State of Rio de Janeiro (UNIRIO). He leads the UNIRIO Complex Systems Engineering Research Group (Lab ESC). Doctor and Master in Systems and Computer Engineering from COPPE/UFRJ, where he also held his Post-doctorate. He served as a visiting researcher at University College London. He was Coordinator of the Master's Degree at PPGI / UNIRIO (2019-2020). He acted as a consultant in research and development projects in systems engineering in the national industry for the Coppetec Foundation (2008-2017). He works as a journal reviewer in the areas of Software Engineering and Information Systems. He is editor-in-chief of *iSys: Brazilian Journal of Information Systems* and has organized special issues in journals such as *iSys*, *JBCS* and *JISA*, as well as a volume in the Springer CCIS series. He has been a member of the Brazilian Computer Society (SBC) since 2006, acting as Coordinator of the Management Committee of the Special Committee on Information Systems (CE-SI), member of the Management Committee of the Special Committee on Games and Digital Entertainment (CE-Jogos) and effective member of the Computer Education Interest Group (GIEC). He is an evaluator of higher education courses in Computing and Informatics and an institutional evaluator (IT Profile) by the Ministry of Education (MEC) since 2011. He has experience in the field of Computer Science, with an emphasis on Software Engineering and Information Systems. Its main fields of expertise are Complex Systems Engineering (especially software ecosystems and systems-of-systems) and Computer Education. He was scientific coordinator of more than 20 events (symposiums, tracks and workshops) in Brazil and abroad and delivered communications (lectures, short courses and tutorials) in more than 30 national events. He has published more than 200 articles in journals and conferences, some of which have been awarded, and received academic distinctions as a distinguished reviewer at conferences and as a supervisor of works in SBC thesis and dissertation competitions.



Davi Viana dos Santos has a degree in Computer Science from the Federal University of Amazonas (UFAM), Master and Doctor in Informatics from the Graduate Program in Informatics at the Federal University of Amazonas. He has a technical course in information technology from Fundação Nokia de Ensino. He is currently an Adjunct Professor at the Federal University of Maranhão (UFMA). In addition, he is a permanent member of the Graduate Program in Computer Science (PPGCC) at UFMA and permanent member of the Doctorate in Computer Science Association UFMA / UFPI (DCCMAPI). He is deputy coordinator of the Steering Committee of the Special Information Systems Commission (CESI) of SBC and Regional Secretary of SBC in Maranhão. He is interested in the areas of information systems, software quality, software process improvement (MPS), implementing MPS programs with an emphasis on adopting maturity models,

software engineering education, experimental software engineering. Finally, he also works in the application of software engineering methodologies in the context of: internet of things; software startup; and computing applied to health.

Program Committee

The Information Systems (IS) research area seeks to understand computing as a means or instrument for solving problems in the real world, society and organizations. The Brazilian Symposium on Information Systems (SBSI) is the annual meeting of the IS community of the Brazilian Computer Society (SBC), constituting an event for the exchange of academic, scientific and professional knowledge and experiences, the presentation of scientific papers, discussion of contemporary issues in the IS area and alignment of the community's strategy and actions, bringing students, researchers, professionals and entrepreneurs closer to the community interested in IS.

In its 17th edition, SBSI 2021 takes place online, under the coordination of the Faculty of Computing (FACOM) of the Federal University of Uberlândia (UFU) and will have as its theme "Intelligent and Omnipresent Information Systems: new challenges and opportunities". The chosen theme refers to the challenges and opportunities that information systems have brought to the various areas of society not only to "inform", but to provide intelligent tools to support decision-making and that are always present in people's daily lives, providing relevant and quality information, processed from heterogeneous data.

Especially in times of crisis, information systems play a fundamental role in society to help face difficulties. In addition to enhancing and leveraging businesses, they are able to anticipate and provide subsidies to deal with unexpected situations and promote more efficient and transformative management in the most diverse areas, such as health, education, logistics, agribusiness, finance, public management, among others. The purpose of SBSI 2021 is to discuss the new challenges that the ISs have been facing and the opportunities that unexpected and emergency situations bring for the application of technology and the promotion of quality information as an ally in our day-to-day, with the use of a computational apparatus that the different areas of computing make available.

This year, we received 179 submissions of scientific articles for discussion at the event, 119 of which were evaluated in a second stage. Submitted articles received 3-4 reviews from 140 program committee members and 18 external reviewers. In the end, 56 articles were accepted for presentation and debate during the SBSI, with 31.84% acceptance.

Along with the communications of scientific articles, the event has a robust program and a very high academic-scientific level, in the form of lectures and masterclasses. We will receive two international speakers: Prof. Dr. Alan R. Dennis (Indiana University), with the lecture entitled "Digital Humans: Putting a Face on AI Agents" and Profa. Dr. Yu-Ru Lin (University of Pittsburgh) with the lecture entitled "Linking Collective Attention to Collective Actions". In the national research scenario, we have Profa. Dr. Aline Paes (UFF), with the lecture entitled: "The art of making oneself understood: the challenges of producing explanations in AI applications for social well-being" and with Prof. André Lemos (UFBA), with a lecture entitled "Dataficação da vida". Aiming to consolidate theoretical and practical bases for research and technological development in IS in Brazil, we will have two masterclasses: "Entrepreneurship in an Academic Environment: Opportunities, Challenges and Lessons Learned" taught by Prof. Dr. Leandro Nunes de Castro (Mackenzie) and "Qualitative Analysis with Grounded Theory in Information Systems", given by Prof. Dr. Davi Viana (UFMA).

We would like to thank the Brazilian Computer Society, the general coordinators of SBSI 2021 and other coordinating colleagues of the events that make up the SBSI. We thank and congratulate the colleagues who made up the program committee and review body for their excellent contributions to the authors in their articles and discussions. To the researchers-authors of the articles submitted to the

event, we would like to thank you for your interest in the event and in the collective development of the Information Systems area in Brazil. Finally, our sincere thanks to the speakers, masterclass teachers, and participating community for the success of this seventeenth edition of SBSI. Let's all have an excellent event!

Renata Araujo (UPM/EACH-USP) and Sean Siqueira (UNIRIO)
Technical Program Committee Chairs



Renata Mendes de Araujo is a Professor at the Faculty of Computing and Informatics at Universidade Presbiteriana Mackenzie. Innovation and Entrepreneurship Representative of the Faculty of Computing and Informatics in the Development and Innovation Coordination of Universidade Presbiteriana Mackenzie. Researcher at the Graduate Program in Information Systems at EACH-USP and at the Professional Doctoral Program in Public Policy Governance at the National School of Public Administration (ENAP). Guest researcher at LUDES-Laboratory of Ludology, Engineering and Simulation at COPPE/UFRJ. She has a degree in Computer Science from the Federal University of

Rio de Janeiro (1992), a Master's (1994) and a Ph.D. (2000) in Systems Engineering and Computer Science from the Federal University of Rio de Janeiro. She has experience in research, technological development and innovation in the field of Computing, with an emphasis on Information Systems, working mainly on the following topics: government and digital democracy, innovation management, business process management and collaborative systems. She coordinates the Research and Innovation Group in Cyber Democracy (CIBERDEM) (ciberdemack.com.br). She has continuously worked to consolidate the teaching and research community in Information Systems in Brazil, in particular with the Brazilian Computer Society (SBC). She occupied the Education Board of the Brazilian Computer Society (2017-2019).



Sean Wolfgang Matsui Siqueira is Associate Professor at the Department of Applied Informatics at the Federal University of the State of Rio de Janeiro (UNIRIO). Graduated in Computer Science from the Federal University of Goiás (UFG, 1996), Master's in Informatics from the Pontifical Catholic University of Rio de Janeiro (PUC-Rio, 1999) and Ph.D. in Informatics from the Pontifical Catholic University of Rio de Janeiro (PUC- Rio, 2005). He did postdoctoral studies at the Federal University of Alagoas (UFAL, 2016). in experience in the field of Computer Science, with an emphasis on Web Science, Information Systems and Informatics in Education. He was the coordinator of the Graduate Program in Informatics

(PPGI) at UNIRIO from July/2012 to September/2014, he was coordinator of the program committees of SBIE 2012, SBIE 2014, SBSI 2015 and SBSI 2021, as well as being part of the organizing committee of CBIE 2015, be one of the editors-in-chief

of iSYS: Brazilian Journal of Information Systems (2012-2016) and of RBIE: Brazilian Journal of Informatics in Education (2016-2018), member of the Special Committee on Informatics in Education (CEIE) (2014-2018, 2021) and the Special Committee on Information Systems (CESI) (2015-) (coordinator 2017-18 and vice-coordinator 2018-19), both from the Brazilian Computer Society (SBC).

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