Newsletter
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ICCSSA
INSTITUTE FOR PRACTICING STATISTICIANS

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Message from the Chairperson

Dear ICCSSA members,

ICCSSA would like to congratulate Professor Riaan de Jongh, Dr Vince Micali and Dr Pravesh Debba on their appointment to the ICCSSA Body of Trustees (BoT). The Board of Institute (BoI) looks forward to the guidance and interaction from the BoT to ensure that ICCSSA grows from strength to strength. The rewriting of the ICCSSA Bye-laws and work on the capturing of CPD activities onto the member profiles are presently underway. ICCSSA co-hosted further breakfast seminars during September and October 2018 with highlights of these events appearing later in this newsletter. On behalf of the ICCSSA board, I take this opportunity to wish the membership well over the festive season.

Stats day at CSIR: The gold rush of the information age

Statistics are centre-stage in almost every aspect of human endeavour and the environment including sport, climate, health, population dynamics, agriculture, housing development, education, labour dynamics, finance and the economy. At the centre of statistics lies data. Therefore, the production of statistics entails designing ways to collect, summarise, visualise, present and draw inferences from data. Statistics produced from these data are then used for better planning for the purpose of achieving efficient delivery of services and increased productivity. All these concepts were unpacked at the World Statistics Day, an open day recently hosted by the CSIR and jointly organised with the South African Statistical Association, the Institute of Certificated and Chartered Statisticians of South Africa, the Operations Research Society of South Africa, the Department of Science and Technology-National Research Foundation Centre of Excellence for Mathematics and Statistical Sciences and the Statistical Analysis System.

Speaking at the event, Dr Daniel Visser, CSIR Research and Development Strategy Manager, said statistics is an extremely important field because it is used every single day, whether it is census data, crime statistics or financial statistics. The event was attended by representatives from industry, academia and the public sector. Daniel highlighted that "From a government point of view, we rely on statistics and data to plan better for the country." He emphasised that the advent of concepts such as big data, data analytics and artificial intelligence will have an enormous impact in the context of a rapidly evolving technological world and on the field of statistics. He stated that "We are gaining the ability to work with extremely huge data sets now, make sense of them and define trends out of these data sets, effectively helping us to make decisions faster and sometimes autonomously."

Prof Pravesh Debba, CSIR's manager of Spatial Planning and Systems competence area, spoke about the future of statistics. "The flood of data is now accompanied by a flood of questions, perhaps thousands of them, many of which are complex. This flood of data led to a big data revolution. Interest in the discipline of statistics and the analysis of data is booming. It is estimated that 90% of the world's data have been created in the last two years." Pravesh added that initiatives such as the National Development Plan, Data Revolution, the Fourth Industrial Revolution and the Sustainable Development Goals are creating the need for people with skills in handling and analysing data. This would create further demand for such people in both industry and government departments. "The role of higher education in producing data analytics skills needed for the market is vital and this would also lead to the development of new statistics curricula at universities."

Statisticians in Pravesh's group use statistical methods to, for example, predict election results, urban growth and electricity demand. The motivation underlying most of the work that the group undertakes is the provision of information that could influence policies and aid in the formulation of interventions where needed.

Kelly Lu, from Statistical Analysis System (SAS), touched on the importance of data and analytics as key drivers to success outside of the business world. Since analytics has an impact in transforming the way people conduct their business, it has the potential to make a positive impact on the environment and people's lives in the same way.

Dr Christine Khoza gave a status update on the planning for the South African Census 2021, emphasising the objectives and new strategies for data collection and highlighting the lessons learnt from previous censuses.

CSIR senior researcher Nontembeko Dudeni-Tlhone spoke about the use of census data as key building blocks in segmenting households into clusters of homogeneous groups that are expected to behave in a similar way at the neighbourhood level. This provides a framework for predictive modelling at the neighbourhood scale, which has the potential to enhance ongoing long-term planning efforts and decisions.

Quintin van Heerden, a CSIR senior researcher gave an overview of the different uses of census data within the urban growth modelling and simulation endeavours of the CSIR.

Dr Mathetha Mokonyama, CSIR's manager for transport systems and operations competence area made a presentation on how large-scale household surveys, including census, are critical for this specific type of analysis; and further makes a case for improved integration of survey instruments in order to optimally address socioeconomic challenges that are unique to South Africa.

CSIR senior researcher in the spatial planning and systems area, Dr Sibusisiwe Makhanya, demonstrated how census data were used in mapping particulate matter concentrations and in calculating indicator 11.6.2 of Sustainable Development Goal 11. This indicator measures the population-weighted exposure to ambient concentrations of $PM_{2.5}$; that is, concentrations of airborne particles measuring less than 2.5 microns in diameter. This information is important to monitor progress in achieving the goal of reducing adverse per capita environmental impacts of cities by 2030.

SASA – Gauteng Chapter Meeting

This was the first event of the Gauteng Chapter of the SASA in 2018 which was conducted jointly with ICCSSA, DST-NRF CoE-MaSS and ORSSA on 6 September 2018 at the IBM Research facility in Johannesburg. The meeting was attended by 12 delegates and generated a very lively event with the delegates enthusiastically engaging with the speaker and amongst themselves, discussing various emerging technical questions and applications. The event also provided a wonderful opportunity to network with delegates from a variety of institutions. After the talk titled "Natural Language Processing and Machine Learning Approaches for Parsing Pathology Reports" by Gciniwe Dlamini from IBM Research SA, there was light finger lunch sponsored by SASA and also the option to tour the IBM Research facility. We thank the speaker for her very insightful presentation and thank IBM Research SA for providing the venue and welcoming the delegates formally to the event at the start of the talk.

ORSSA 2018 Conference

The 47th Annual Operations Research Society of South Africa (ORSSA) Conference was held from 16 – 19 September 2018 at the CSIR's International Convention Centre in Pretoria. The conference encourages delegates

to share their experience using advanced analytical techniques to solve problems in any area of application. Ninety seven delegates from industry and academia attended the conference, and there were 53 talks organised in three parallel sessions.

The topics ranged from applications of operations research in a number of different fields such as education, energy, healthcare, and transportation, using a range of techniques such as optimisation, machine learning, data analysis, and predictive modelling.

Prof Liezl van Dyk, Executive Dean of Engineering at North West University gave the opening plenary address on "Industry 4.0 - Strengthening the Marriage between Operations Research and Industrial Engineering", where she gave an overview of the history and overlaps of the two fields and posed some thought provoking questions in terms of our identity as operations researchers. The President of AFROS (African Federation of Operations Research Societies), Charles Malack Oloo, was the closing plenary speaker. His address dealt with "Reconciling and Redeeming Africa through Operations Research" and he challenged the delegates to come up with innovative solutions using operations research to overcome typical challenges faced by developing countries.

The conference also included a tutorial session on Implementing Customer Churn Probability Models in R by Carmen van der Merwe (RMB FOUNDeRY), and an interesting panel discussion was held on the topic of diversity and inclusion in operations research, and how it can improve problem solving abilities. Delegates also enjoyed networking with each other during a number of social activities held throughout the course of the conference, including gin tasting and pairing as well as the banquet dinner and awards ceremony.

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Chairperson: Mrs Yoko Chhana; **Chief Executive:** Mr Philip Steyn; **Financial Director:** Ms Valentina Litvine;
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The 4th Industrial Revolution

The Deep Learning Indaba (www.deeplearningindaba.com) took place at Stellenbosch University in September 2018. The first Indaba took place in 2017, hosted by WITS. It was very successful with around 300 delegates, mostly students hungry to learn more about deep learning as it takes over artificial intelligence. The 2018 Indaba continued to grow and was an inspiring event. A very enthusiastic team including researchers at Google DeepMind as well as young researchers within South Africa started the Deep Learning Indaba. It exists to celebrate and strengthen machine learning in Africa through state-of-the-art teaching, networking, policy debate, and through our support programmes, such as the IndabaX and the Kambule and Maathai awards. It works towards the vision of Africans becoming critical contributors, owners, and shapers of the coming advances in artificial intelligence and machine learning.

This type of event highlights the growth of machine learning in research and industry. The Indaba is structured as a week-long workshop, including practical work in labs. It upskills students, researchers and industry players to be able to tackle the problems in their environments with advanced, current science. The talks presented at the 2018 Indaba highlighted strongly the role statistics has to play in this field. Statisticians have been trained in a way that can really contribute to understanding the black-box nature of deep learning and can truly compete with the computer scientists in this field.

It is evident that industry is employing many statisticians for roles involving machine learning. This field will continue to grow. Statisticians have an opportunity to enter this field and really contribute theoretically and practically, and should do so knowing that the need is there and extends across academia and industry. Enter the 4th Industrial Revolution and become a player as it is evident that it will impact the way we do things. For further discussion on the impact of the 4th Industrial Revolution, see report on the future of jobs which can be accessed from the following link: https://www.weforum.org/reports/the-future-of-jobs-report-2018

SASA 2018 Conference

The 60th Annual Conference of the South African Statistical Association (SASA) 2018 was hosted by the University of South Africa from 26 - 29 November 2018 at the Florida campus, Johannesburg. Professor Riaan de Jongh who serves on the ICCSSA Body of Trustees delivered the keynote address at the opening ceremony. His talk was entitled "Professional Statisticians / Data Scientists: Who are they and how can we train them?" The conference provided a platform for delegates including statisticians, researchers and scientists from industry and academia to share their research and innovations in various statistics disciplines. Interactions and collaborations were also fostered through SASA committee meetings and interest group discussions involving Data Science, Multivariate Data Analysis Group (MDAG) and Bayes. Several international guests from the UK, USA and Australia also shared their expertise during workshops and plenary forums.

Awards and recognitions of ICCSSA members

Paul Mokilane, the member of ICCSSA board and a senior statistician at the CSIR won the Best Track Paper Award at the 2018 First African International Conference for Industrial Engineering and Operations Management, held in Pretoria, recently. Paul's paper titled: *Long-term electricity demand forecasting using a generalised additive mixed quantile averaging (GAMMQV) model* forms part of his PhD research and was presented in the Energy Track of the conference. The paper is co-authored with his industry supervisor Prof. Pravesh Debba, Manager for CSIR Spatial Planning and Systems and Chairperson of the ICCSSA Body of Trustees; Prof. V.S.S. Yadavalli, a co-supervisor from the University of Pretoria and Dr Caston Sigauke from the University of Venda who is also a member of the ICCSSA board. The paper can be accessed from the following link: http://ieomsociety.org/southafrica2018/proceedings/

Forthcoming Events

Look out for further details on forthcoming seminars which will be part of the joint seminar series between ICCSSA and ORRSA, SASA, SAS, CSIR and CoE-MASS.