UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Engineering, Built Environment and Information Technology

Fakulteit Ingenieurswese, Bou-omgewing en Inligtingtegnologie / Lefapha la Boetšenere, Tikologo ya Kago le Theknolotši ya Tshedimošo

Department of INFORMATICS

Newsletter August 2021

Information systems developed for people by people

This phrase captures the belief and ideals - the motto - of the Department of Informatics and represents the intention of Society 5.0, the human-centered society.

From left to right: Prof Hanlie Smuts, Prof Norman Duncan, Vice-Principal: Academic of the University of Pretoria and Prof Alta van der Merwe, Deputy Dean Teaching and learning of the EBIT faculty. On screen: Prof Miguel Goede, author of the book "Society 5.0: We and I".

In this issue:

Prof Alta van der Merwe hosted a panel discussion regarding Society 5.0: Humanising Technology that was streamed to more than 100 concurrent viewers. The guest panellist, prof Miguel Goede, joined the panel from Curaçao, and island in the South Caribbean Sea and a constituent country within the Kingdom of the Netherlands. In this book, Society 5.0: We and I, he explains the current global crisis, and how we should reconstruct society in response to it, and why.

The concept of Society 5.0 was introduced in Japan in the 5th Science and Technology Basic Plan. It follows the hunting society (Society 1.0), agricultural society (Society 2.0), industrial society (Society 3.0), and information society (Society 4.0) (CAO, 2020). Society 5.0 is defined as "*A human-centered society that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space*."

More research to understand the situation of humans in the digital world, should be considered as humans is defined by different needs and digital technology allows us to respond to the need for knowledge if we know how to make use of the tools in the digital world.

Continued on page 3

From Prof Carina's desk

How does one reflect on so many years of touching lifes—colleagues, friends, students, international delegates and peers? With difficulty! Here is just a glimpse of a remarkable person who is leaving a huge legacy in the Department of Informatics.

Carina de Villiers is full professor and Head of the Department of Informatics at the University of Pretoria, South Africa. She obtained a BSc (Computer Science and Mathematics), Higher Education Diploma, Diploma in Tertiary Education, MEd (Didactics) cum laude, Honours degree in Computer Science and PhD (Informatics) degree. She has co-authored 9 books, 35 articles in peer-reviewed international journals and delivered more than 100 international and national conference papers on different topics in IS Education. She is a member of several international bodies and serves on a number of editorial and advisory boards for journals. Carina was a junior lecturer, lecturer and senior lecturer at the School of Computing, UNISA from 1979 until 1995 (17 years). She then joined the Department of Informatics, University of Pretoria as Associate Professor and Professor from 1996 to date (24 years). During 2001 and 2002 she was the project manager responsible for the transfer of the compulsory Computer and Information Literacy courses for first year students at the University of Pretoria from the external provider to the School of IT. This project involved budgeting, the establishment of computer laboratories that can handle 6000+ students per week, appointment of administrative staff and lecturers, planning the curriculum and ensuring that the necessary technological infrastructure is in place. The project was completed on time and within the budget and the new courses started on the 1st of February 2003. During 2005 the Computer and Information Literacy courses were re-curriculated under her guidance and the new courses were implemented in 2006. She has again re-curriculated the courses in 2009 and the new courses were implemented in 2010, now serving more than 8000 students per year. Carina started the process to get international accreditation from ABET for BCom (Informatics Information Systems) in 2004. The accreditation team visited the department in October 2007. This was the first ABET accredited program in Africa and one of only three outside the USA at the time of the accreditation in 2008. The third evaluation was done in November 2019 and ABET accreditation is still maintained. She is also part of the task team that is busy developing a South African Computing Accreditation Body (SACAB) to do accreditation of computing degrees in South Africa. Currently she is a member of the international taskforce IS 2020 of the ACM and AIS busy developing the new Information Systems curriculum. ■

As we are moving fast towards the end of 2021, I am writing my last From Prof Carina's desk. After nearly 25 years at the University of Pretoria and in the Department of Informatics, it is now time for me to enter a new phase of my life. I will certainly miss the people and the work (yes, I love my job!), but I want to focus for a while on enjoying my family and spending time exploring our country with my husband.

We are now in the second year of the COVID-19 pandemic and I am proud to say that the Department of Informatics has proved that we can take on a challenge and make a success of it. We had a steep learning curve in 2020 to change to online teaching, but we successfully completed the year and 2021 has been smooth sailing so far. Despite the pandemic we managed to publish more research units than ever before and added a new NRF rated researcher, Dr Sunet Eybers to our team. Prof Alta van der Merwe and Prof Aurona Gerber both received higher NRF ratings, namely B3 and C1 respectively. All graduation ceremonies from 2020 were virtual events where we delivered 8 PhD students. In 2021 we delivered 4 PhDs so far.

We were fortunate to appoint three new permanent lecturers in the department – you can read more about them in this newsletter. At the end of 2019, we had a successful international accreditation visit – more on page 5.

Thank you to Prof Hanlie Smuts for compiling this newsletter!

Prof Carina

Information systems developed for people by people : from page 1

Salgues (2018) conducted a SWOT analysis regarding this aspect. The first and foremost strength in the digital world is the access to information. Humans now have access to information as needed when needed with the only limitation the applicability of the information as provided by search engines. Researchers are constantly improving context relevant searchers using techniques such as frequency for relevance where search engines provide information according to popularity. The access to information also links to the opportunities for skills training where humans can now not only have access to unlimited online courses, but institutions are constantly renewing curricula to be more relevant in a changing world.

One key weakness that we are currently experiencing in this digital world is information overload. We often find ourselves asking what should I do next – at what should I look next – what are the most important – how do I distinguish what to spend time on and what not. Information overload, also known as infobesity, is where we struggle to make decisions since we have too much information pertaining to an issue. As a result of access to information across national boundaries, there are also an disappearance and reduction of the influence of Nation-States. Lastly, a concern is the time spend by humans on media – new phenomena's emerge such as gamification and social media addiction.

One of the biggest concerns that we have currently in a changing world is the threat of manipulation of information for propaganda purposes. Fake news is a reality and one can not believe what you read on many of the forums on the Internet. A lot of attention is given to the fact that some of the larger platforms do not respect the use of personal information for personal use. Mail platforms use special software to protect our mail boxes to be overflowing with offers based on searches done within our browsers. There are a blur between the real world and the virtual world – often we find ourselves engage in activities in the virtual world for hours – especially the gaming world has made use of exploring this phenomena to create software that engage you in real world activities but are focusing on participation through virtual world activities.

https://www.youtube.com/watch?v=Fe8bIyG8sBI

The overload of information may cause a threat that we are so focused on what is out there that we don't distinguish between information and knowledge. Knowledge more focus on understanding while information is just data. Obtaining information does not necessary mean that there are a level of understanding of the meaning of the information. Lastly, in the digital world it is easy to reproduce – this is a threat to existing businesses such as the production of books for instance – where new business models needs to be considered to be still economically feasible.

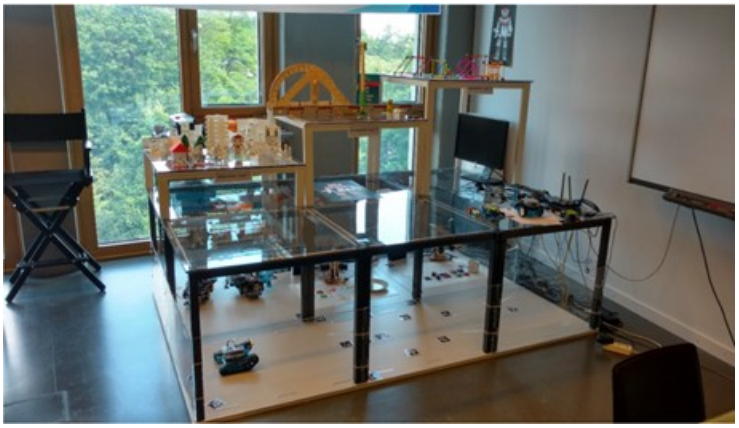
The digital world has created many opportunities both in the business world and in our personal world. In many sectors such as health, the digitization and use of technology have given us access to a mass of information previously not available. We are also now able to use all the information more effectively and educate in a more effective and efficient way. Access to information is not anymore a big obstacle; rather making sense of the information and presenting it in such a way that it is accessible are the focus of new teaching models.

We are living in a fast changing world – technologies are being used more innovative and business models needs to change and be agile to make provision for all the disruptors while still conducting business on a daily basis. Humans needs to adapt to the digital world both at work and in our home environment – we need to understand how living in the digital age will impact us. It is necessary therefore for humans to be aware of the change, look at the opportunities, and use these opportunities to educate ourselves and also be ready for the digital change. ■

Extract from Prof van der Merwe's introduction to the panel session

International Pilot Program

Open Models Initiative Laboratory (OMiLAB)



OMiArm2—dobot arm with vacuum suction cap and the mBot with display, accelerometer and gyro sensor

The University of Pretoria has been successfully participating in this project with funding supported from Switzerland to sponsor this collaboration between the University of Pretoria, FHNW (Switzerland) and CPUT (South Africa). The funding will be used to sponsor students to attend a three week program in the area of Modeling and Prototyping Enterprise Solutions.

The aim of the International Pilot Program (IPP) is to teach Information Systems in the area of Modelling and Prototyping Enterprise Solutions. In a 3-week intensive learning program for Masters students, they will learn how to apply Enterprise Modelling and Design Thinking to conceptualise and develop cyber-physical systems. Students (30) will be selected and included in the programme from three locations (also the teaching locations): UP (Enterprise Modelling) in Pretoria, CPUT (Design Thinking) in Cape Town and FHNW (Modelling and Prototype Development) in Olten, Switzerland.

This three-week intensive learning program is an example for teaching in the modern society. It supports to balance economic advancement with the resolution of social problems by integrating cyberspace and physical space. The students from South Africa and Switzerland have different education and cultural background, but share exposure to diversity. The three weeks will be offered in a project based environment where students from business and information systems apply enterprise modelling and Design Thinking to develop cyber physical systems. The course shall follow a design thinking approach based on the installation of OMILAB (https://www.omilab.org) at FHNW. In the first part in South Africa the students learn how to create a conceptual solution using OMILAB's modelling tools. In the second part the students create a prototype using the robots and vehicle of OMILAB's physical layer to simulate and test their solutions.

From the University of Pretoria, Informatics Department, Prof Aurona Gerber, Prof Hanlie Smuts and Prof Alta van der Merwe will be involved in the project.

International accreditation for BCom (Informatics) for a 3rd time!

The BCom (Informatics) with specialisation area Information Systems was first accredited in 2007, then again in 2013, and after the third visit from 24 – 26 November 2019, we have again a clean accreditation until 2025. **We are still the only Information Systems program in Africa that is internationally accredited!**

ABET is a nonprofit, non-governmental agency that accredits programs in applied and natural science, computing, engineering, and engineering technology. ABET accreditation provides assurance that a college or university program meets the quality standards of the profession for which that program prepares graduates. They accredit programs, not institutions. ABET provides specialized accreditation for post-secondary programs within degree-granting institutions already recognized by national or regional institutional accreditation agencies or national education authorities worldwide.

The accreditation is voluntary, and to date, 4,144 programs at 812 colleges and universities in 32 countries have received ABET accreditation. Over 100,000 students graduate from ABET-accredited programs each year, and millions of graduates have received degrees from ABET-accredited programs since 1932. ABET accreditation is proof that a collegiate program has met standards essential to produce graduates ready to enter the critical fields of STEM education. Graduates from an ABET-accredited program have a solid educational foundation and are capable of leading the way in innovation, emerging technologies, and in anticipating the welfare and safety needs of the public.

Institutional support

One of the eight criteria that the program must adhere to is Institutional support:

- Institutional support and leadership must be adequate to ensure the quality and continuity of the program.
- Resources including institutional services, financial support, and staff (both administrative and technical) provided to the program must be adequate to meet program needs.
- The resources available to the program must be sufficient to attract, retain, and provide for the continued professional development of a qualified faculty.
- The resources available to the program must be sufficient to acquire, maintain, and operate infrastructures, facilities, and equipment appropriate for the program and to provide an environment in which student outcomes can be attained.

Student outcomes

The BCom (Informatics) with specialisation area Information Systems students should be able to do the following when they graduate:

- Analyse a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Support the delivery, use, and management of information systems within an information systems environment.

The computing topics must include:

- Techniques, skills, and tools necessary for computing practice.
- Principles and practices for secure computing.
- Local and global impacts of computing solutions on individuals, organizations, and society.

In addition:

- Information systems: At least 30 semester credit hours (or equivalent) that include coverage of fundamentals and applied practice in application development; data and information management; information technology infrastructure; systems analysis, design, and acquisition; project management; and the role of information systems in organizations.
- Information systems environment: At least 15 additional semester credit hours (or equivalent) of a cohesive set of topics that provide an understanding of an information systems environment.
- Quantitative analysis or methods must include statistics.

Programme strength commented

We were commended on the strength of our program, including the final undergraduate year real-world project!

The INF370 project is a substantial year-long group-based project requiring the students to deliver professional standard deliverables while working with a real client. The project is unique in the South African context and requires substantial work on behalf of the students and the faculty members delivering the course. The course brings together the concepts taught throughout the program and gives the students a competitive advantage when seeking employment. The project has a very positive reputation amongst the local industry which actively seeks students from the University of Pretoria on the strength of this project and the positive experiences it provides the students.

UP Teaching and Learning Excellence Laureate Award

Dr Marié Hattingh, a senior lecturer in the Department of Informatics, received the EBIT Faculty award for Teaching and Learning and also the University teaching and Learning award in 2020. Dr Hattingh spearheaded the development of a knowledge conversion platform in the form of a BA Bot in the second-year Informatics (INF 271) module to create an environment of continuous learning.

In the Information System Design (ISD) stream, in which she lectures second- and third-year students, she applied her teaching philosophy of continuous learning to create an environment in which students are not just acquiring content knowledge, but are also developing graduate attributes and a professional skill set. One of the initiatives she used to create a continuous learning environment was to create the BA BOT for ISD students to access content and feedback on ISD topics.

The idea of a knowledge conversion platform was born from Dr Hattingh's own need to note information that was not captured in any textbook, but was required to complete the third-year capstone project. This platform was initiated through the integration of a commercially available BOT platform and Google Drive. It allowed her to improve the second-year curriculum by making authentic case studies available that not only suited the teaching strategy of the Department, but were easily accessible and contextualised within the South African environment. It could also be continually updated as more relevant case studies became available.

The knowledge conversion model ensured that BA BOT was populated with content to support scaffolded learning, starting at the data level, where key concepts and definitions were explained, working up to integrated examples. This platform enabled the teaching team to provide students with various learning activities that cater for the different types of learning required by the context so that students can learn at their own pace. It also has the functionality to provide feedback, which is essential for effective learning.

Department of Informatics user experience labs

Create the human experience you require, evaluate the user experience you designed

We live in a ubiquitous computing society, where digitalisation and technology are integrated into everyday activities such as banking, on-line shopping, consuming news, engaging with friends and family, and smart home applications.

Technology is used in healthcare procedures and nanobot treatments; human operational and repetitive tasks are automated through artificial intelligence (AI) and robotic process automation; big data applications collect information about us that are used by retailers to create unique consumer profiles and value propositions. Our responsibility should be to design technology so that it is better for humans, and better at interacting with humans.

Even our interface with technology has evolved, with features such as conversational interfaces (chatbots), natural language processing and voice recognition. Augmented reality (AR) and virtual reality (VR) allow us to immerse ourselves in a computer-simulated reality – supporting commercial and learning experiences such as product and service design and promotion, immersive computer games, digital twins used for teaching (such as in the case of medical students) and real-time representations of machine production and sensor networks, which collect real-time data. All changing our paradigms and how we experience society, culture, engagement and behaviour.

Unlike machines, we experience the world through our five senses, which enable us to better understand our surroundings. Human experience in this context means that technology – both applications and devices – should attempt to communicate with us in a way that we recognise. Advances in conversational interfaces, voice recognition and natural language processing technologies enable personable and delightful interfaces, without trying to convince us that the technology is human.

By considering ergonomics or softer aesthetics and by moving the focus away from pure technological functionality (such as the algorithm, the code and the application) to the quality of the experience and user engagement. Furthermore, by using technology for intelligent automation and repetitive work, humans are unconstrained to engage in creative work, which is a unique human capability.

So, whether you are a researcher designing a new or optimising an existing user interface, or whether your organisation requires to evaluate your user interfaces, contact the Informatics design labs for assistance!

Hanlie Smuts hanlie.smuts@up.ac.za

Kalley Coleman kalley.coleman@up.ac.za

The state-of-the-art eye tracking equipment—evaluating human computer interfaces!

The mobile application (MAD) lab. Creative spaces where designing technology for people, by people happens!

Meet our (new) team members

Zola Mahlaza (MSc, BSc(hons)) is a Lecturer with the Department of Informatics, University of Pretoria (UP).

"Joining the University of Pretoria feels like a `home-coming', in a way, since I was initially interested in pursuing a degree in mathematics at the University after high school. However, due to a variety of reasons, I eventually chose the University of Cape Town for undergraduate studies. I am glad that I finally found my way back to Pretoria, even if it is after so many years and during a pandemic!

Ordinarily, joining a department under a pandemic would be unthinkable. However, we have all had to adapt and face the various challenges head on. Such adaptations would be virtually impossible, however, without support from one's colleagues. As such, I am thankful of the welcoming environment and support I received thus far from colleagues from the Department of Informatics and other parts of the University, especially the Department of Education Innovation."

Before his employment at UP, Zola was doing a doctoral degree at University of Cape Town on a full time basis. Before that, he did a Masters degree with Assoc. Prof. Keet's KnowledgE ENgineering team at the University of Cape Town. He has also worked as a Software Engineer for Zapper (Pty) Ltd. and has done internships with Vastech (Pty) Ltd. and Mxit Lifestyle (Pty) Ltd. in Stellenbosch."

Aloha everyone, I am Ridewaan Hanslo, a child, husband, father, teacher, and learner. I enjoy travelling, problem-solving, and trying out new things, with the latter resulting mostly in positive outcomes ☺. What I value most in life is surrounding myself with individuals that have my best interest at heart, and contributing to improving the lives of others, no matter how small. A small intro into my life's journey is as follows. As a young and inspiring cricketer, it was always my dream to represent South African cricket. The closest I came to that dream was representing Western Province in cricket in my scholarly days. The passion for the sport still draws me every now and again back to watching and playing it, although with less drive ☺.

After my sporting days, I found a new interest, that of the wonder of everything around me, including myself. As a result, during my student days, I spent a lot of time reading up on topics of interest on matters as diverse as technology to philosophy. This interest in learning led me to pursue postgraduate degrees while working as a software engineer and research scientist in the industry. The other passion I developed (besides cricket) while being a university student and industry professional was the passion for teaching. This passion led me to constantly be involved in developing others, whether they be fellow students doing an assignment, to coaching entrepreneurs on creating business solutions.

Teaching followed me during my working career and this led me to invest a lot of my time in tutoring, mentoring, advising, and facilitating often within a volunteering capacity. I do not foresee this passion dying out any time soon. This pleasure in transferring knowledge and collaborating with others took me from a sportsman, knowledge seeker, software engineer, researcher and at present, a lecturer. This journey has been well worth it with its ups and downs, and if someone were to ask would I changed anything of it, the answer would be, of course, yes, wherever it would have made sense too. ☺

I completed my BSc Computer Science at the University of Pretoria and started working for the Atomic Energy Corporation (AEC), who sponsored my Honours degree at Rhodes University. The work at the AEC was varied and interesting, including modelling of the geology of the Vaalputs nuclear waste disposal site in the Northern Cape. A number of years later, I worked as an independent contractor on a variety of projects such as costing software for the building industry, policy quotation systems for the insurance industry, software used by Spoornet for testing of a telecommand and control system, and an Early Warning Air Defense Software system for the SA Air Force.

During this time I completed a Masters at Unisa and years later started to work part-time at UP while completing my PhD. I am delighted to be properly "on board", even if it means working from home and not being able to chat with colleagues other than via a screen. It is a relief to slowly start getting "back to normal".