

## “Advancing Research in Information and Communication Technology”

### Now Available

#### *Download the Second of Two IFIP Jubilee Books*

The second of the two planned Jubilee Books to celebrate IFIP’s 60th Anniversary is now available for free download.

Its title “Advancing Research in Information and Communication Technology — IFIP’s Exciting First 60+ Years, Views from the Technical Committees and Working Groups” reflects IFIP’s aim to foster exchange and development with regard to the scientific and technical aspects of information processing. To achieve this aim IFIP established soon after its foundation, Technical Committees (TCs) and related Working Groups (WGs). IFIP TCs are as diverse as the various aspects of information processing, but they share the aims such as:

- To establish and maintain liaison with national and international organizations with allied interests and to foster cooperative action, collaborative research, and information exchange.

- To identify subjects and priorities for research, to stimulate theoretical work on fundamental issues and to foster fundamental research which will underpin future development.

- To provide a forum for professionals with a view to promoting the study, collection, exchange, and dissemination of ideas, information, and research findings and thereby to promote the state of the art.

- To have special regard for the needs of developing countries and to seek practicable ways of working with them.

- To encourage communication and to promote interaction between users, practitioners, and researchers.

TCs and WGs are very active and reflect their research work in more than 100 events IFIP organizes every year. Considering the aims and the corresponding activities and competencies of IFIP’s TCs, it seems natural that they were invited to contribute high quality ICT Research publications with insights from the breadth of their entire work on a global/worldwide scale. Consequently, the editors of AICT 600 were lucky enough to receive 17 contributions from nine TCs and several of their WGs. These contributions describe the scientific, technical, and further work in the TCs and WGs and in many cases also assess the consequences of the work’s results. They will help IFIP and their readers to explore the developments of IFIP and the profession now and over the next 60 years. The contributions are arranged per TC and conclude with the chapter on the IFIP code of ethics and conduct as a joint IFIP endeavour and achievement.

Besides giving valuable insights into important and upcoming topics of information processing, all the con-



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tributions show the rich diversity of the international work being done in IFIP and how it represents the global research and application of information processing. They also document the essential role of IFIP as a platform for this work.

The book and also its individual chapters can be downloaded for free via the IFIP Digital Library. Please go to <https://hal.inria.fr/IFIP/> and from there to SpringerLink via the AICT 600 link. Through this route you reach the version of the SpringerLink page that allows free download. There is (at this point in time) an issue with some versions of Chrome and related browsers, but with e.g. Firefox it works. It is also advisable to not go via a VPN of an institution that has a subscription with Springer, as this sometimes gets in the way.

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## News from ACM

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### Collective Intelligence

A New Journal from ACM, Co-published with SAGE

<https://cola.acm.org>

*Collective Intelligence*, co-published by ACM and SAGE, with the collaboration of Nesta, is a global, peer-reviewed, open access journal devoted to advancing the theoretical and empirical understanding of collective performance in diverse systems, such as:

- human organizations
- hybrid AI-human teams
- computer networks
- adaptive matter
- cellular systems
- neural circuits
- animal societies
- nanobot swarms

The journal embraces a policy of creative rigor and encourages a broad-minded approach to collective performance. It welcomes perspectives that emphasize traditional views of intelligence as well as optimality, satisficing, robustness, adaptability, and wisdom.

Accepted articles will be available for free online under a Creative Commons license. Thanks to a generous sponsorship from Nesta, Article Processing Charges will be waived in the first year of publication.



## Government and professional association join forces to improve information management

**On Wednesday 7 July, the cooperation agreement was signed by the SG of OCW, Marjan Hammersma, and the Royal Dutch Association for Information Professionals (KNVI). At the heart of the collaboration is improving the information management of the government through the use of future-oriented information professionals.**



The information management of the Empire is undergoing a major change operation. The Royal Dutch Association for Information Professionals (KNVI) will support this.

The KNVI professional association represents approximately 4,000 information professionals, has an active recruitment policy at universities and colleges (the Young professionals) and provides training with its partners. The cooperation is in line with the objectives of both the Central Government and the KNVI, namely to contribute to the personal development of information

professionals in general and to further develop the field and the associated competencies in particular.

The collaboration takes shape in various ways. By sharing their knowledge and using each other's networks to publish important relevant events and events. As a knowledge and network partner, the KNVI will also contribute to the further development of parts of the state-wide support programme.

The KNVI will also support the Government in compiling advisory and sounding board groups, for example for assessing selection criteria for trainers, thinking along in competence elaborations or part of the function building.

The following joint topics have now been addressed:

1. Free support for Government organisations in the recruitment of the necessary additional information professionals by posting vacancies that are vacant within the Government and interesting trainees and graduates.
2. Improving processes and solutions for good information management.
3. Raise awareness of how to handle government information well, and strengthen skills of all involved.
4. Professionalizing information specialists by paying attention to competencies, training and place in the organization.

[The joint agenda of and bringing to the attention of the most important issues in the field through, among other things, publications in professional journals.](#)

These topics have the warm attention of both the Government and the KNVI and are also the subject of discussion in various interest groups within the association. They touch on the mission and vision of the KNVI to help advance the field in content, and the themes that are part of Smart Humanity and the social contribution that every information professional makes.

## Women in IT kicks off with advice to ‘own your space’

[The Institute of Information Technology Professionals South Africa \(IITPSA\) Women in IT \(WIIT\) chapter celebrated its relaunch and the launch of its new website with a special Women’s Day webinar on personal and professional coping strategies.](#)

[The special Women’s Month event allowed participants to compare notes on how women IT professionals are juggling the work from home environment, looking at how they can better own their time, master their headspace and make remote working work for them so that they can show up powerfully to themselves in life and business.](#)

TEDx speaker, coach, trainer, and author from Beyond the Dress, Lori Milner, who also co-authored ‘Own Your Space: The Toolkit for the Working Woman’ in conjunction with Nadia Bilchik, CNN’s Editorial Producer, outlined coping mechanisms like saying no and managing procrastination – which are particularly important for people struggling to achieve a work-life balance during challenging times.

“Make time for yourself so you can be fully charged and show up powerfully,” she said.

Milner advised people to invest in themselves and embrace self-compassion. “We need to allow ourselves to be imperfectly perfect – it’s ok.”



On achieving goals, she said: “Replace the habit of putting off something with the habit of starting, and aim for progress instead of perfection. Change the lens, rather than seeing what you’re doing as not being perfect, see it as making a contribution and adding value.”

Zandile Mkwanazi, Chairwoman and founder of GirlCode, said working from home tended to mean she was always on and felt obligated to respond to client mails and WhatsApps at all hours of the day and night. “We give people permission to reach us at 9pm when they could have waited for the next day. I’m too quick to jump out of bed and respond to emails, but boundaries are necessary for living a balanced life,” she said.

Senele Goba, Director of 4IR Innovations, founder of Ososayensi Education Advancement and non-Executive Director of the IITPSA, said running her business from home and having children attending school from home during the lockdown had been challenging at first. However, her family had developed a time slot every evening when they put down their devices and prepared dinner together, making a chore double as valuable family time. “Saying no graciously and learning to manage expectations are also important for not becoming overwhelmed,” she said. “It’s ok to not be ok sometimes. I find people are quite understanding, and we build harmony and better relationships by allowing ourselves to be vulnerable to each other.”

The Institute of Information Technology Professionals South Africa (IITPSA) has revived its Women in IT (WIIT) chapter, with additional committee members and a new website.

WIIT aims to encourage and empower young women who are seeking a career within the IT sector, as well as to uplift women who are already established in IT careers.

Ulandi Exner, Non-Executive Director of the IITPSA and chair of the Women in IT chapter, says: “Women are not as visible in the IT sector as we would like them to be. Among IITPSA’s membership, for example, women account for only around 17% of the total. Through the IITPSA’s Women in IT chapter, we want to promote and highlight women in IT and create a pipeline for more girls to enter the IT sector through initiatives such as our Computer Olympiads, scholarships and bursaries. The Women in IT chapter aims to help close the gender gap.”

WIIT has a limited number of scholarships and funded bursaries available each year for girls and young women wishing to study towards careers in IT. WIIT will also match experienced women in IT as mentors with new IT professionals to support them with advice on career options, further study directions, and overcoming challenges.

For more information and to join WIIT, visit [www.womeninit.org.za](http://www.womeninit.org.za)



## David O' Leary Award

Don Gotterbarn received this award at IFIP General Assembly 2021.

IFIP IP3 acknowledges an individual or organization that has promoted and demonstrated Professionalism (Professional Practice), has worked as an Ethics Evangelist, and/or has made strides in fostering diversity among ICT practitioners. An individual or organization can be nominated.

Don was Chair of the Association for Computing Machinery (ACM) Committee on Professional Ethics (from 1997). He is a Director of the Software Engineering Ethics Research Institute, East Tennessee State University, USA. Don is Chair of IFIP SIG9.2.2 Framework for Ethics and served on the IFIP Code of Ethics Task and Finish Group.

Don has been a leading, and influential, academic and practitioner promoting computer ethics since the mid 1980's, with a focus on professional practice. He is a Professor Emeritus at East Tennessee State University and has authored a prolific number of books, journals, and articles. He has been heavily involved with professional societies representing computing such as ACM and BCS.

The values and mission of these organisations aligns with IFIP which "aims to achieve the worldwide professional and socially responsible development and application of information and communication technologies." (IFIP Mission).

His contribution to the field has been recognized by various professional bodies

ACM "Making a Difference" award (2002)

ACM "Outstanding Contribution" award (2005) for promoting ethical behavior of professionals and organizations

INSEIT (International Society for Ethics and Information Technology) "Joséph Weizenbaum" award (2010) for his contributions to the field of information and computer ethics

Finalist for the World Technology Summit Awards 2011.

Don will receive a cash prize of USD1000 and will be funded to travel to GA in 2022.

## Congratulations

IP3 congratulates Anthony Wong (IP3 Deputy Chair) for being elected President-elect of IFIP. He will take office in 2022.

## Women's Problems: Can FemTech Offer Relief?

This article is by Robin Raskin, GIC Director. It first appeared on [teconomy.com](https://teconomy.com) and is shared with Robin's permission.

[Jane Sarasohn-Kahn](#), who writes regularly about the health care ecosystem on her site, [Health Populi](#), has been focused on the "She-cession"—how women who have left the workforce in record numbers during the pandemic have been impacted economically. Unlike in the 2008 crisis, she says, when men bore the economic brunt of the downturn, this one particularly affected women, who were more likely to work out of the home and often unable to work remotely. Their jobs were frequently hands-on, "up-close-and-personal," and less likely to part of the work-from-home knowledge economy that so quickly transitioned to Zoom-life. According to [The19th](#), a news site on gender, politics and policy, the pandemic brought

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women double-digit unemployment, increasing hours of child care and more home-bound tasks. In just a few months, the 19th calculated, women lost a decade of economic advancements.

All of this is what Sarasohn-Kahn calls “the new home economics.” It means, she says, major change in how women are caring for themselves and their families. In terms of health care, Sarasohn-Kahn sees less reliance on traditional face-to-face, real-time doctor visits and more demand for community-based services (like at retail pharmacies or grocery stores) along with increasing self-care at home.

And women have taken to social networks for managing health conditions. For example, Health Union recently acquired the patient activist community WEGO Health and built its first patient community on [Migraine.Com](#), largely focusing on women who deal with headache pain. In the wake of COVID-19, women began to self-organize, into things like the [patient-led long haul Covid study](#) or the 42,000-member [Facebook Covid Group](#). Susannah Fox says women are engaging in “[peer-to-peer healthcare](#)”.

## Welcome The Femtech Revolution

Femtech is loosely described as software, diagnostics, products and services that use technology to support women’s health. The term is attributed to an early founder, Ida Tin. She coined the term to help her talk to mostly male investors about her product, [Clue](#), a period tracking app. The bulk of Femtech companies focus on fertility, maternal health, reproduction, and birth control. But women who track Femtech feel many other issues are ignored or pooh-pooed by doctors, especially issues that affect older women, like menopause. It’s well known that [women’s symptoms are different than men’s](#) even for things like heart attacks, yet doctors often disregard the difference.

That might change as the health care industry begins to recognize a missed opportunity. Women, it turns out, live longer, spend more on health, make 90% of the family health decisions, and on and on. Frost & Sullivan predicts Femtech has a market potential of \$50B by 2025, while [FemTech Focus](#), a not-for-profit that tracks such products, estimates this number could be much vaster over time—closer to \$3 trillion. But they define the femtech universe of products much more broadly, to include things like bone health, oncology and brain health.

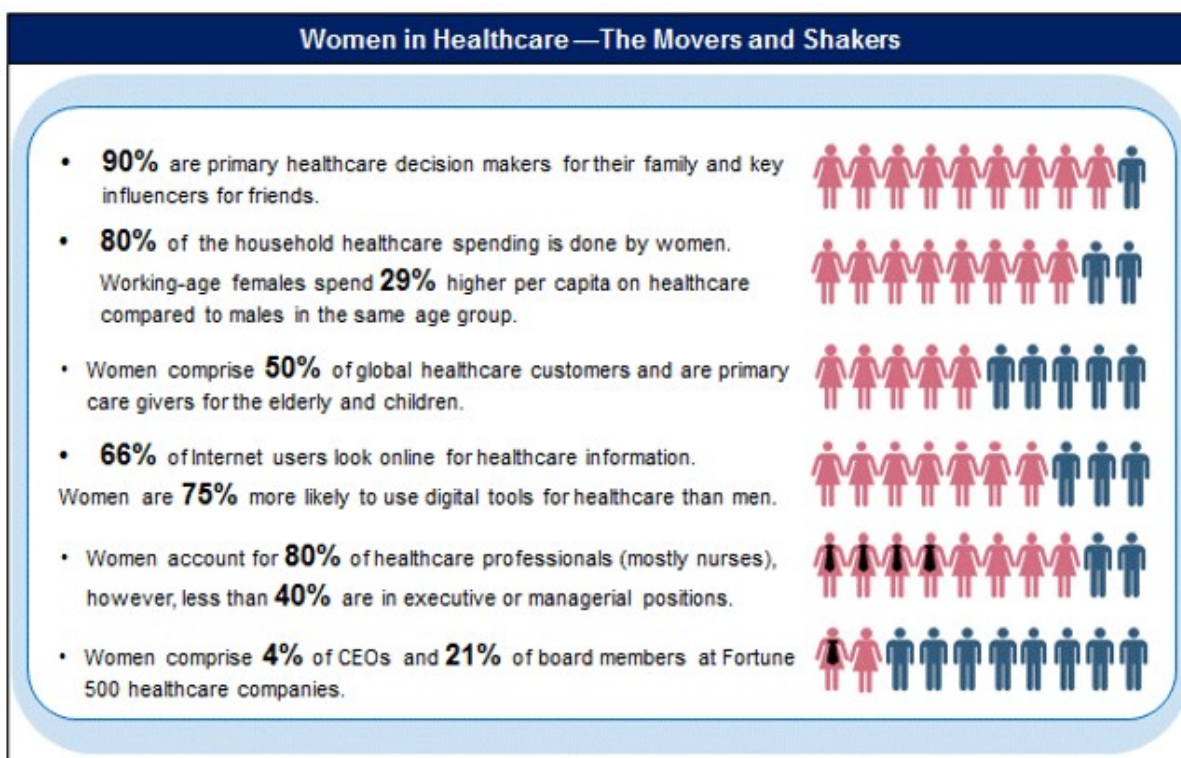


Image courtesy of Frost and Sullivan.

You can read the rest of the article [here](#).

Email [editor@ipthree.org](mailto:editor@ipthree.org) for more information about any IP3 news item.

## CHINA: The Second "Duo Duo Agricultural Research Science and Technology Competition" was Officially Launched

The competition will invite young agricultural research teams from all over the world to join the competition. They will use cutting-edge nutrition science, precision agriculture and other technologies to challenge to grow high-quality and high-yield tomatoes within 6 months, and evaluate the key nutritional elements in the index. The total prize pool of this competition is over 1 million RMB, which will be used to support the winning team.



What kind of imagination will the exploration of young scientists and the next generation of farmers bring to agriculture?

Prof. Daoliang Li from China agricultural university was invited as an expert on online reviews (see the third position in the first row above ).

Prof. Li points out in the book of "no farm" that China's Labour force and agricultural R&D talents is a big gap, currently engaged in agricultural labor common aged between 55 to 60, 80 farmers after accounting for less than 5%. The digitalization of agriculture has become an urgent issue.

Although mechanization, water conservation, composition and electrification have been gradually popularized in the agricultural field in recent years, China's agriculture is still inefficient compared with some developed countries. Agricultural experts point out that to solve these problems, we must vigorously develop smart agriculture with cloud computing, big data, Internet of Things, artificial intelligence and other advanced technologies as the main means.

Prof. Daoliang Li judged that in the next 30 years, China's agriculture will undergo a great change, and will also realize the leap from traditional agriculture to modern agriculture. "Duo Duo Agricultural and Research Science and Technology Competition explores artificial intelligence to solve the problem of human labor force. Next, we should encourage more social forces and scientific research institutions to join us in research and tackle key problems, and truly promote the industry to keep moving forward."

## PhD colloquium at EGOV 2021

Can Artificial Intelligence be used to predict premature births and improve public services for pregnant women? What impact can IT artefacts have on digital global governance and international reporting aimed to deal with the climate crisis? What factors determine government organizations' performance in managing cyber crises? These questions, and more, were discussed at the PhD colloquium organized as part of the IFIP WG 8.5 International Conference on Electronic Government (EGOV 2021) on September 6, 2021. Six PhD students from various countries and continents, shared and discussed their research proposals on topics related to government organizations' use of digital technologies. The participants presented each other's work and senior scholars were assigned as expert reviewers of each research proposal; resulting in an interactive seminar where both the PhD students and senior scholars in the field of digital government gave feedback on how the participants' research can be developed. The colloquium ended with open discussions on the life and workings of academia, on how to bridge academia and practice, and the process of writing a dissertation. "The colloquium is a nice way of welcoming new scholars to the field of digital government and building the network. Our aspiration is to create a welcoming and open environment for discussing the participants' research proposals and want all participants – students and senior colleagues alike – to leave the colloquium with a feeling of having learnt something new", says Ida Lindgren, one of the organizers. The participating PhD students reported that it was valuable to get feedback on their work from experts and fellow students but were also pleasantly surprised by how much they learned from listening to the feedback to other participants, as expressed by one of the students; "great management and program, I learned a lot from the various PhDs and the feedback they received".

The colloquium was organized by Gabriela Viale Pereira (Danube University Krems, Austria), J. Ramon Gil-Garcia (University at Albany, SUNY, USA), and Ida Lindgren (Linköping University, Sweden). The next PhD colloquium will be held on September 5, 2022, prior to the IFIP WG 8.5 International Conference on Electronic Government (EGOV 2022) held in Linköping, Sweden, September 6-8, 2022.

Participating PhD students / senior scholars:





## ***IFIP WG 8.3 Virtual Panel October 11<sup>th</sup>, 2021*** *Decision Making for a Sustainable Global Society*

To celebrate 60 years of IFIP, IFIP WG 8.3 on Decision Support in collaboration with Cork University Business School at University College Cork, are pleased to invite you to our virtual seminar entitled "*Decision Making for a Sustainable Global Society*".

The aim of this session is to explore individual, organisational, governmental, and societal decision making and how the decisions made by each of these stakeholders' effect global sustainability. With the 17 sustainable development goals (SDGs) at the heart of the conversation, our aim is to reflect on decision making, decision support and decision support systems (DSS) over the last 60 years and consider new opportunities to innovate and disrupt using emerging technologies such as Big Data and Analytics can help us to enable and achieve a more resilient, sustainable society.

We will be joined by a panel of international academic and practitioner experts who will reflect on and share their own experiences. Panellists include:

Xavier Dubuisson, RetroKit and XD Sustainable Energy Consulting Ltd.  
Sara Goulartt, Energias de Portugal S.A.  
Prof. Patrick Humphreys, London School of Economics.  
Dr. Karen Neville, University College Cork.

**Date:** Monday Oct 11<sup>th</sup>, 2021 at 01:00 PM in Amsterdam, Berlin, Rome, Stockholm, Vienna

**Duration:** 70 mins

**Register:** [https://meetgi.zoom.us/webinar/register/WN\\_eZJqWEoRSBeA0SRcMQ7qv](https://meetgi.zoom.us/webinar/register/WN_eZJqWEoRSBeA0SRcMQ7qv)

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## **AICA, Italy: Annual National Conference DIDAMATiCA**

DIDAttica e inforMATiCA – (Informatica per la Didattica) has been the point of reference on the digital innovation of the education sector for students, teachers, educational institutions, ICT professionals, companies, and public administration since 1986.

Didamatica will be held on 7 and 8 October 2021 in Palermo at the CNR.

The mixed format provides for online participation. The Congress can be followed live >> <https://didamatica2021.itd.cnr.it/>

DIDAMATiCA 2021 aims to open a debate on how the rapid advances in the field of "Artificial Intelligence" (AI) could affect learning and teaching processes and the world of Education in general.

The notion of 'Artificial Intelligence' might seem like something very far from the world of Education. However, the theme requires a reflection in the world of Education and training.

DIDAMATiCA 2021 aims to take a picture of the current state in integrating these two worlds and start a theoretical and methodological discussion on how to think about learning and teaching to benefit from these innovations and will also be an opportunity to discuss ethical issues that are closely related to the theme AI in Education.

The objective of the debate will be the definition of a research agenda for all those involved in educational innovation who are interested in exploring the issues related to AI.

DIDAMATiCA 2021 "Artificial Intelligence for Education" indicates a challenge and an opportunity to make the school and the world of work productive and smart, to make students, teachers, professionals aware and able to implement safe behaviours and ready to face the challenges and threats of the future in a world "increasingly smart".



## Preliminary program now available on

<http://ifip-iotconference.org/index.html>

The conference will be virtual only and start both days at 14.00 CET – Central European Time

The IFIP Domain Committee on IoT is proud to present the preliminary program of its' fourth conference. The program offers a rich spectrum of topics with two keynotes, 15 refereed papers and two panel sessions.

The two keynotes and their topics are professor Schahram Dustdar of the University of Technology in Vienna, Austria who will talk about “**Edge Intelligence - Engineering the Fabric of IoT, Systems, and People**” and professor Saraju P. Mohanty of the University of North Texas, USA who will talk about “**Secure IoT by Design**”. Short descriptions of the talks are on the website, and we had also an interview with professor Dustdar, see <https://www.youtube.com/watch?v=S-IXebx68ps>

The 15 refereed papers are clustered in themes: Modernizing agricultural practice using IoT, Cyber-physical IoT systems in wildfire context, IoT for smart health, Security, and Methods. Within these themes the papers cover a wide range of topics.

And finally in the two panel sessions the starting point for discussion with panel members and participants are some key questions.

### - Panel on IoT Applications:

- ◆ What are the main engineering challenges in IoT development?
- ◆ What are the critical success factors in advanced IoT applications?
- ◆ Which futuristic application scenarios do you envision for next 5-10 years?

### - Panel on Research directions in IoT:

- ◆ What are current IoT research challenges?
- ◆ What are promising approaches to face such challenges?
- ◆ Which emerging technologies are likely to have an impact in the next 5-10 years?

The conference is free, registration is required, follow <http://ifip-iotconference.org/registration.html>

## INTERACT 2021 report

The 18th IFIP TC13 International Conference on Human-Computer Interaction, INTERACT 2021 (<https://www.interact2021.org>), was held in Bari (Italy) from August 30th to September 3rd, 2021, in cooperation with ACM and under the patronage of the University of Bari Aldo Moro. INTERACT is one of the most important conferences in the area of Human-Computer Interaction at world-wide level.



Due to the COVID-19 pandemic, INTERACT 2021 was a hybrid conference: about 150 people participated in-person and 275 participated on-line. This required much more work than either a traditional conference in presence or a full virtual one. Indeed, most conferences held in the summer were only virtual. It was very challenging for the Bari organizing team to opt for the hybrid modality. The team was formed by the researchers of the IVU Lab of the University of Bari (<http://ivu.di.uniba.it>). IVU is the acronym of Interaction, Visualization, Usability and UX; these words indicate the main HCI topics addressed in the lab. The IVU Lab was founded about 20 years ago by Prof. Maria

Francesca Costabile and her collaborators, at that time PhD students of hers and now associated professors. IVU members hold the main roles of INTERACT 2021, including general Co-chair (Prof. Paolo Buono), Technical Program Co-chairs (Prof. Carmelo Ardito and Prof. Rosa Lanzilotti), Long Paper Co-chair (Prof. Antonio Piccinno), Short Paper Co-chair (Prof. Giuseppe Desolda) and others. The Bari team worked hard for this conference, in 2018 to make a proposal for having Bari and its University be selected to host INTERACT 2021, and in the last couple of years to organize it in a very difficult situation determined by the COVID-19 pandemic.

All the work was eventually rewarded by the success of the event. People manifested a huge appreciation for including the physical part of the conference. Participants enjoyed the scientific program as well as the venue, the nice weather of the beginning of September in Bari, the food, the walking tour in the medieval part of the city. Several on-line participants also remarked that the overall conference went very smoothly.

The scientific program was very rich and interesting thanks to a careful selection operated by the Program Committee and the Chairs. A total of 680 submissions, distributed in 2 peer-reviewed tracks, 4 curated tracks, and 3 juried tracks, were submitted by 1470 different authors from 55 countries.

The selected works were presented in five parallel sessions and are included in the proceedings published by Springer. The program was enriched by three keynotes that focused on very hot topics. Marianna Obrist (University College London) presented “Multisensory Experiences: Where the Senses meet Technology”. Indeed, the user experience can be further enhanced by exploiting multisensorial technologies, not only the traditional human senses of vision and hearing, but also senses of touch, smell, and taste, as well as emotions are to be taken into account when designing for future interactions.



as well as emotions are to be taken into account when designing for future interactions.

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Ben Shneiderman (University of Maryland) presented “Human-Centered AI: A New Synthesis”. Human-Centered Artificial Intelligence was very much discussed at INTERACT 2021, also in two very participated panels. This topic recently emerged because of the emphasis on technology heavily based on Artificial Intelligence (AI). The novel intelligent systems should be supertools which amplify, augment, empower, and enhance human performance; they employ AI/ML algorithms to provide high levels of automation but emphasize human control. Luca Viganò (King's College of London) presented “Don't Tell Me The Cybersecurity Moon Is Shining... (Cybersecurity Show and Tell)”. With this intriguing title, he addressed important aspects of usable security, showing how different kinds of artworks can be used to explain complicated concepts of cybersecurity to non-technical people. The talks of two IFIP invited speakers, Geraldine Fitzpatrick (TU Wien) and Philippe Palanque (University Toulouse 3 “Paul Sabatier”) were also very much appreciated.

Strong gratitude goes to all the people whose passionate and strenuous work ensured the quality of INTERACT 2021: the chairs, the reviewers, the participants, the sponsors, the student volunteers, and especially the authors, who chose INTERACT 2021 as the venue to publish their research and enthusiastically shared their results with the INTERACT community.

In two years time (August 2023), the next INTERACT Conference will be held in York in the UK. We hope the coronavirus will be fully over by then, but we plan to continue the excellent work by Bari of hosting a hybrid conference. We hope this will enable greater participation of delegates from all over the world and promote innovative use of technology to support this.

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## SA ICT sector navigates pandemic unscathed; skills gaps remain



South African ICT employers and practitioners appear to have adapted well to the COVID-19 pandemic and associated lockdowns, with little to no negative impacts on working conditions or ICT skills demand and supply. However, significant digital skills gaps remain.

This emerged in the 2021 ICT Skills Survey carried out by Wits University's Joburg Centre for Software Engineering (JCSE) in partnership with the Institute of Information Technology Professionals South Africa (IITPSA). The survey, the 11<sup>th</sup> since 2008 and the first since the start of the Covid-19 pandemic, assessed what impact the pandemic and lockdown have had on working conditions and skills supply and demand in South Africa.

Report co-authors Adrian Schofield, production consultant at the IITPSA, and Professor Barry Dwolatzky, Director of the JCSE, said in releasing their findings: “The surprising finding is that there are no surprising findings! The survey shows that the ICT industry has coped well in these disruptive times without needing to change much or re-invent itself. ICT companies and ICT professionals have coped well with new working conditions. They have not needed to scurry around hunting for new technologies and skill sets. Everything required for the “new normal” was already in place.”

Almost 60% of employer respondents felt that the pandemic had not affected skills availability, and overall respondent sentiment about the impact of work from home arrangements was positive. Employees have adapted to work from home, and many companies report an improvement in productivity, saying this model would likely remain in place in the long term.

Professor Dwolatzky said: “If there's any profession that should lend itself well to making digital transformation of the workplace possible and dealing with it comfortably, it is the ICT community. It is interesting to speculate that a ‘job’ has changed – where it was once attendance at a workplace for a number of hours a day, people working from home now need to be managed in a very different way and jobs no

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longer mean attendance by numbers of hours a day, but rather completing a collection of tasks or 'gigs'. This raises the question of whether the 'Gig Economy' becomes possible. One of the things we probed was whether we are beginning to see the emergence of a 'Gig Economy'. The conclusion is that this is not happening."

However, he noted: "It's still early days in terms of the changes we've seen since 2019, and the next few years may see new trends emerging."

### **Skills Survey reveals most in-demand IT skills**

Reported in the latest MICT SETA Sector Skills Plan, the top occupations with hard to fill vacancies in the MICT sector are Software Developers, Computer Network Technicians, Developer Programmers, ICT Communications Assistants, Computer Network & Systems Engineers, ICT Security Specialists, ICT Systems Analysts and Web Technicians.

The same report indicated the programming languages most in demand were found to be .NET, C#, C++, Java and VB, with a decline in demand for people to maintain legacy systems, such as COBOL developers. The report noted that many companies were adopting the agile project management methodology, resulting in scrum masters being in demand. However, there are very few people in the country that have certified qualifications to work with the method. The Survey report listed Java, Python, Javascript, C# and PHP as the top five languages.

The report noted that while the MICT sector includes over 30,000 companies, more than half of ICT practitioners work in other non-MICT sectors.

According to the report, the top occupations with hard to fill vacancies in the MICT sector (and the quantity needed) were:

- Software developer (2 434)
- Computer Network Technician (1 948)
- Developer Programmer (823)
- ICT Communications Assistant (755)
- Computer Network & Systems Engineer (731)
- ICT Security Specialist (713)
- ICT Systems Analyst (676)
- Technician (514)
- Systems Administrator (405)
- Programmer Analyst (397)
- Management Consultant (Business Analyst) (359)
- Advertising Specialist (224)
- Telecommunications Network Engineer (164)
- Database Designer & Administrator (114)

Schofield noted the increase in vacancies since the 2019 report and highlighted the challenge of relating an occupation to the core skills required to carry out the tasks thereof. He emphasised the comparison with the top priority skills listed by employers participating in the survey overall, which were:

- Information security/cyber security
- Big data design/ analyst
- DevOps
- AI/ML
- Application development
- Data management
- Test automation/performance testing
- Internet of things
- Connectivity

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## Skills gap persists

On the question: is there a digital skills shortage? Schofield said: “Yes, there is and it’s ongoing. From the practitioners’ perspective, the skills gaps are real, measured in thousands locally and millions globally. We are still not seeing sufficient numbers coming through the skills pipeline.”

“The future is still about the foundations: education, getting more people comfortable with STEM subjects, ensuring that people have the aptitude for STEM and ICT subjects, ensuring that people gain practical experience, and we must approach the question of gender equality in the sector much more robustly,” he said.

Schofield noted that Continuing Professional Development would remain critical. “Employers consistently say they need to reskill employees, and vendors must identify competencies that will be replaced so they can also show where practitioners can be moved to new areas. All the practitioners participating in the survey say they want to learn new skills, but they need to know how and where, and how to choose from the menu.”

“Skilling is an investment for employers and practitioners, for long term sustainability. Government’s challenge is the industry’s challenge: funding the investment required in education and training to support the investments in infrastructure and services. We need to combine thinking and resources in government and industry to ensure these investments are channelled, coordinated and productive.”

## Future-proof qualifications

The report noted growing concern among young people about what to study to prepare for 4IR careers. Professor Barry Dwolatzky said: “Learning ‘coding’ seems to have become something of an obsession in recent years. We have also seen a mushrooming of coding academies and “Coding Bootcamps”. I would question whether the mass acquisition of skills in coding and robotics should be our priority in preparing South Africa for 4IR. Coding is hard to master and frustrating if you only learn it superficially.”

His advice for future-proof qualifications was to first strive to complete a university degree – any university degree. “Over the three years of an undergraduate programme you will learn to learn, communicate and sell. With a degree under your belt, learn the foundational skills required in the 4IR-related job you may wish to be doing. These foundational skills can be acquired via a good set of online courses or other alternative learning pathways. But remember that technical skills such as software development require many hours of practice,” he said.

The full report can be downloaded [here https://www.iitpsa.org.za/jcse-iitpsa-skills-survey/](https://www.iitpsa.org.za/jcse-iitpsa-skills-survey/)  
Ends

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Some of forthcoming IFIP events. For a full list of events, please look at <http://www.ifip.org>

International Conference on Very Large Scale Integration <a href="http://www.vlsi-soc.com/">http://www.vlsi-soc.com/</a>	VLSISoC	04/10-08/10 2021 Virtual Conference	IEEE
DRW workshop on behavioral cybersecurity <a href="https://ifip.byu.edu/2021_RoodeWorkshop_CFP.pdf">https://ifip.byu.edu/2021_RoodeWorkshop_CFP.pdf</a>	DRW	08/10-09/10 2021 San Antonio, US	IFIP WG8.11 / IFIP TC8
International Conference on Research and Practical Issues of Enterprise Information Systems	CONFENIS	16/10-17/10 2021 / Suzhou, CN	IFIP WG8.9 / IFIP TC8
The Second International Conference on Industrial Information Integration Engineering	ICIIE	16/10-17/10 2021 Suzhou, CN	IFIP WG8.12 / IFIP TC8
19th International Symposium on Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks <a href="http://wi-opt.org">http://wi-opt.org</a>	WiOpt 2021	18/10-21/10 2021 Philadelphia, US	IFIP / IEEE Control Systems Society, IEEE Information Theory Society
13th IFIP Wireless and Mobile Networking Conference <a href="http://www.cnsm-conf.org/2021/">http://www.cnsm-conf.org/2021/</a>	IFIP WMNC	20/10-22/10 2021 Montreal, CA	IFIP / IEEE, IEEE ComSoc
17th International Conference on Network and Service Management <a href="http://www.cnsm-conf.org/2021/">http://www.cnsm-conf.org/2021/</a>	CNSM 2021	25/10-29/10 2021 Izmir, TR	IEEE ComSoc (requested) / ACM In-Cooperation (requested) / IFIP WG6.6
7th European Lean Educator Conference <a href="https://www.sintef.no/en/events/elec2021/">https://www.sintef.no/en/events/elec2021/</a>	ELEC	25/10-27/10 2021 Trondheim, NO	NTNU
International Workshop on Enterprise Integration, Interoperability and Networking <a href="http://www.in4pl.org/EI2N.aspx">http://www.in4pl.org/EI2N.aspx</a>	EI2N2021	25/10-27/10 2021 internet, PT	IFIP / IFAC
6th IFIP WG 5.15 International Conference on Information Technology in Disaster Risk Reduction <a href="https://www.itdrr-2021.com/">https://www.itdrr-2021.com/</a>	ITDRR 2021	25/10-27/10 2021 Morioka, JP	IFIP WG5.15 / IFIP TC5
IFIP INTERNATIONAL CONFERENCE ON ENTERTAINMENT COMPUTING <a href="http://www.ifip-icec.org">www.ifip-icec.org</a>	IFIP ICEC	02/11-05/11 2021 Coimbra, PT	SPCV - Sociedade Portuguesa de Ciências de Videojogos
International Conference on Network and Parallel Computing <a href="https://npc2021.dnac.org/">https://npc2021.dnac.org/</a>	NPC 2021	03/11-05/11 2021 Paris, FR	IFIP WG10.3 / IFIP TC10
International Embedded Systems Symposium <a href="http://www.iess.org">www.iess.org</a>	IESS	03/11-05/11 2021 Online, DE	IFIP WG10.2 / IFIP TC10
IFIP Internet of Things 2021 <a href="http://ifip-iotconference.org/">http://ifip-iotconference.org/</a>	IFIP IoT 2021	04/11-05/11 2021 Amsterdam, NL	being negotiated: KNVI, AOITI, others
22nd IFIP/Socolnet Working Conference on Virtual Enterprises <a href="http://www.pro-ve.org">http://www.pro-ve.org</a>	PRO-VE 2021	22/11-24/11 2021 Saint-Etienne, FR	SOCOLNET - Society of Collaborative Networks

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XI Brazilian Symposium on Computing Systems Engineering <a href="https://sbesc.lisha.ufsc.br/sbesc2021">https://sbesc.lisha.ufsc.br/sbesc2021</a>	SBESC 2021	22/11-26/11 2021 Florianopolis, BR	Brazilian Computing Society (SBC) / IEEE Industrial Electronics Society (IES)
10th International Conference on Performance Evaluation and Modeling in Wired and Wireless Networks <a href="https://sites.google.com/view/pemwn2021">https://sites.google.com/view/pemwn2021</a>	PEMWN 2021	23/11-25/11 2021 Waterloo, CA	University of Manouba, Tunisia / University of Waterloo, Canada / Inria, Paris, France
Working Conference on the Practice of Enterprise Modelling <a href="https://poem2021.rtu.lv/">https://poem2021.rtu.lv/</a>	PoEM 2021	24/11-26/11 2021 Riga, LV	IFIP WG8.1 / IFIP TC8
22nd ACM/IFIP International Conference <a href="http://2021.middleware-conference.org/">http://2021.middleware-conference.org/</a>	Middleware	06/12-10/12 2021 Québec, CA	ACM
European Conference on Service-Oriented and Cloud Computing <a href="https://esocc-conf.eu/">https://esocc-conf.eu/</a>	ESOCC	22/03-24/03 2022 Lutherstadt Wittenberg, DE	IFIP WG2.14 / IFIP TC2
Wireless On-demand Network systems and Services Conference <a href="http://2022.wons-conference.org/">http://2022.wons-conference.org/</a>	WONS	30/03-01/04 2022 Oppdal, NO	IFIP WG6.3 / IFIP TC6
International Workshop on Coalgebraic Methods in Computer Science <a href="https://www.coalg.org/cmcs22/">https://www.coalg.org/cmcs22/</a>	CMCS	02/04-03/04 2022 Munich, DE	IFIP WG1.3 / IFIP TC1
International Conference on Optical Network Design and Modelling <a href="http://ondm2022.tele.pw.edu.pl">ondm2022.tele.pw.edu.pl</a>	ONDM	16/05-19/05 2022 Warsaw, PL	IEEE Photonics Society (TBC) / IEEE Communication Society (TBC)
IFIP WG8.6 Working Conference 2022 <a href="https://ivi.ie/ifip">https://ivi.ie/ifip</a>	IFIP86-2022	20/06-21/06 2022 Maynooth, IE	IFIP WG8.6 / IFIP TC8
IEEE/IFIP International Conference on Dependable Systems and Networks <a href="http://www.dsn.org">www.dsn.org</a>	DSN	27/06-30/06 2022 Baltimore, US	IEEE
5th IFAC Workshop on Advanced Maintenance Engineering, Services and Technology <a href="https://amest2022.uniandes.edu.co/">https://amest2022.uniandes.edu.co/</a>	AMEST	26/07-29/07 2022 Bogotá, CO	International Federation of Automatic Control (IFAC) Technical Committees (TC) on Manuf Plant Control (IFAC TC5.1), Mgmt. and Control in Manufact. & Logistics (IFAC TC5.2), Integr. & Interoperability of Enterprise Syst. (IFAC

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