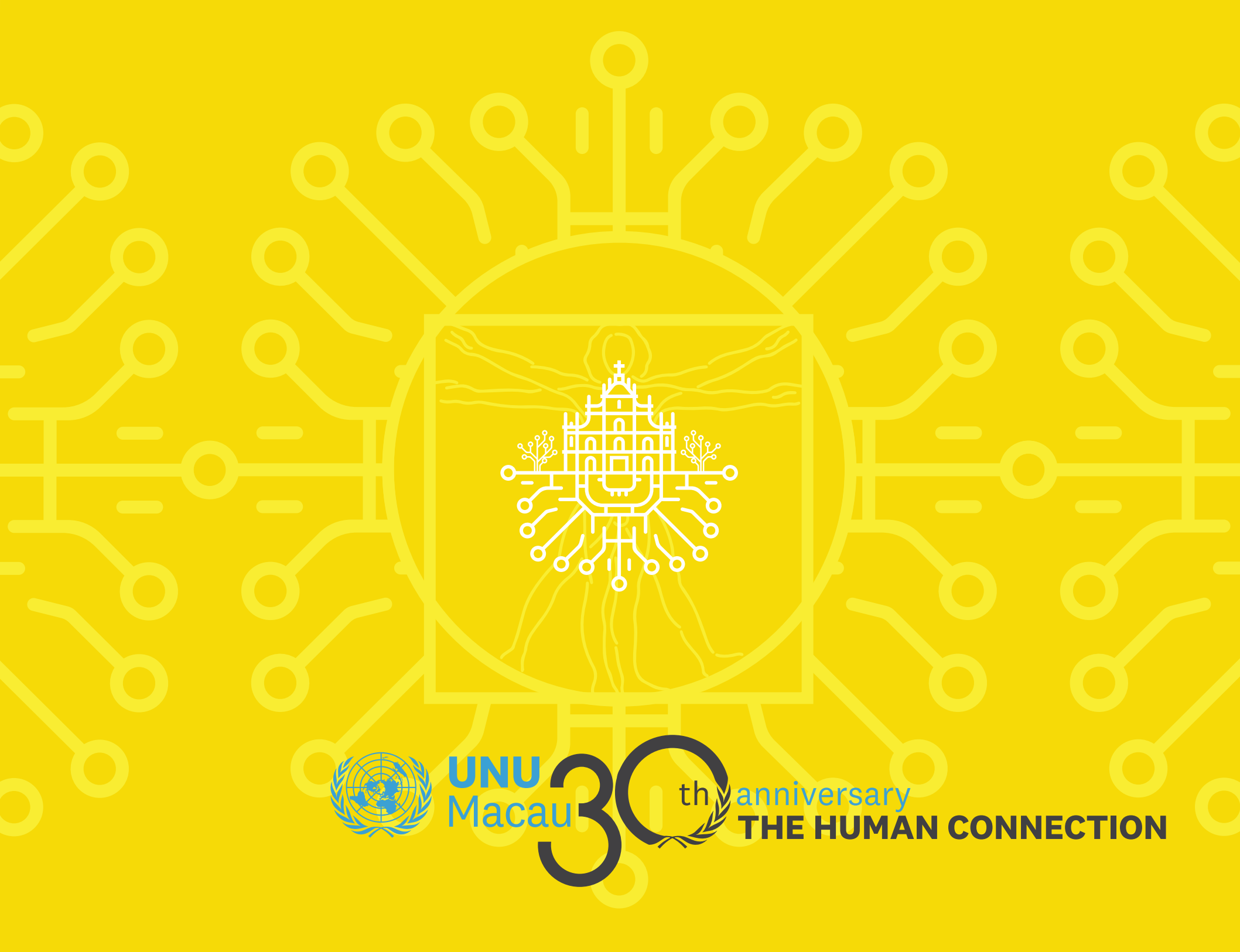

UNU
Macau
30th anniversary
THE HUMAN CONNECTION


UNU
Macau
30th anniversary

CREDITS

INTERVIEWS BY SOFIA JESUS › XIA FAN › FREYA FENGYI HUANG › JESSI ZICHENG ZHENG • **DATA COLLECTION BY** SOFIA JESUS › CHRISTINE YUTING ZHANG **WRITTEN BY** SOFIA JESUS **DESIGNED BY** BBTO/UNTITLED-1 STUDIO **WEB PROGRAMMER** DANNNN/UNTITLED-1 STUDIO **PRINT PRODUCTION** (BEN) LEONG MAN PAN/IB STUDIO **PRODUCER** XIA FAN

聯合國大學國際軟件技術研究所三十周年紀念

創新科技 造福社會

澳門特別行政區行政長官 賀一誠 題賀

二零二三年三月

Congratulatory message from
Ho lat Seng
Chief Executive
Macao Special Administrative Region

UNU Macau 30th anniversary

AS THE EXECUTING INSTITUTION OF THE PROTOCOL REGARDing the operations of the United Nations University International Institute for Software Technology in Macao, and on behalf of the Macao Foundation, I would like to extend our warmest congratulations on your 30th anniversary.

Since its inauguration in Macao, the UNU-IIST has been faithfully fulfilling its mission in fostering talents and professionals in software technology for developing countries and territories, to create more opportunities and conditions for them to compete in the international market. The UNU-IIST has also served as an ideal international platform to conduct exchanges and mutual cooperation between peoples of the developed and developing countries and territories, to advance knowledge and promote human development.

The UNU-IIST has made significant contributions to the development of China over the years of operation, by developing one of the first computer-based railway scheduling solutions for China and promoting IT education in higher education institutions, among others.

The UNU-IIST has contributed in connecting Macao with the world, not only through person-to-person exchanges, but also in providing essential assistance and technologies in introducing Internet into Macao in the 1990s, and in laying the foundation for Macao's e-government in the 2000s.

Thanks to the Institute's expertise, the Virtual Library of Macao, an initiative by the Macao Foundation, came into being in the year 2000. Today the Virtual Library of Macao is still the largest online source of Macao publications and the first point of reference for academics and readers at home and abroad to approach to knowledge related to Macao.

Looking ahead, I am confident that the UNU-IIST will continue to respond to the current challenges of human development, by addressing the key issues of the United Nations Sustainable Development Goals through its long-established tradition in researching and developing high-impact innovations and frontier technologies, which in turn will help in achieving the SDGs.

Wu Zhiliang
President of the Board of Directors
The Macao Foundation

I AM DELIGHTED TO HAVE BECOME THE RECTOR OF UNITED Nations University (UNU) in March 2023, just in time to celebrate the 30th anniversary of UNU Institute in Macau.

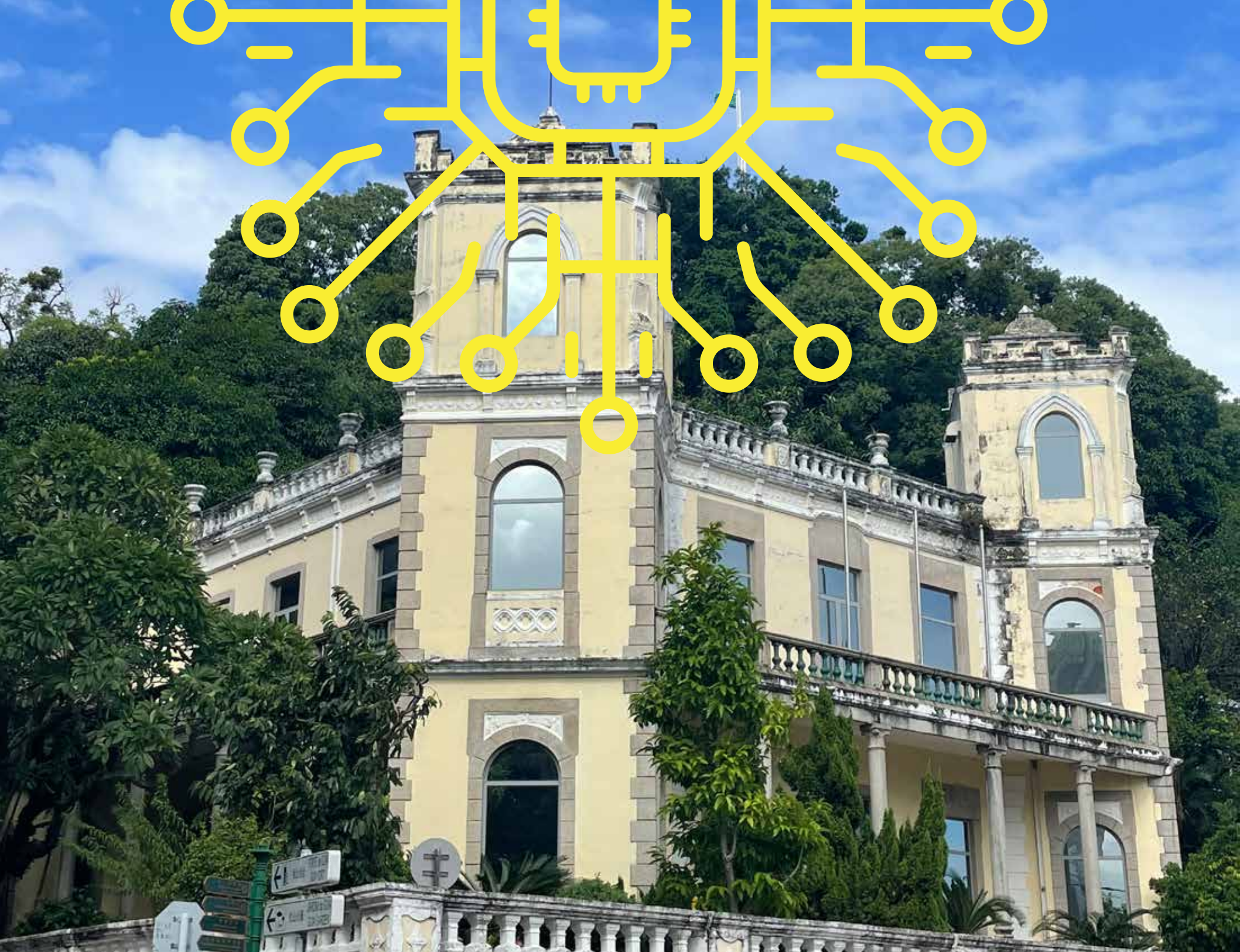
From 1987 to 1989, two scoping studies found that a UNU Institute focused on computing in developing countries could help support the needs of the United Nations and its Members States. The studies led to the decision of the UNU Council to establish in Macao the United Nations University International Institute for Software Technology (UNU-IIST), which was founded on 12 March 1991 and opened its doors in July 1992.

UNU-IIST developed research and capacity building programmes focusing on the pressing global problems of human survival, development, and welfare. It helped address these problems through international co-operation, research, and advanced training in software technology. In 2007, UNU-IIST established a comprehensive centre on research and practice in Electronic Governance, which eventually evolved into its own UNU Institute – the United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV), established in Guimarães, Portugal, in 2014.

We are standing at a critical moment of history, which is full of risks, challenges, and enormous opportunities for development. Digital technology has been changing peoples' lives and societies on all levels. Never before has it been so important to continue producing top-level teaching, research, and policy offerings in the field of digital technology. And UNU Macau is well positioned to contribute to these activities in support of the purposes and principles of the United Nations.

I have three principal objectives to achieve at UNU. The first is to raise the profile of UNU globally. The second is to expand the activities of UNU, particularly in the Global South. The third is to increase the capacity of UNU in the spheres of teaching, learning, research, and policy work in partnership with universities and other key stakeholders across our world. I look forward to working together with the team at UNU Macau to achieve them. Happy 30th anniversary.

Tshilidzi Marwala
Rector of the United Nations University
Under-Secretary-General of the United Nations



CONNECTINGTHEDOTS

AS THE UNITED NATIONS UNIVERSITY INSTITUTE IN MACAU COMPLETES ITS 30TH anniversary, we celebrate its people. Their passion, their expertise, their commitment to UN values, their humanity.

And we do so by publishing a small, yet inspiring collection of stories, in printing and online.

This is not a history book, but it does pay tribute to the Institute's past, as we build on it to look ahead. As **we celebrate the past**, we could not be more grateful to Professor Dines Bjorne, the founding director of UNU-IIST, and Professor Tomasz Janowski, who for ten years led the e-governance programme in Macao, for taking the time to kindly share their memories with us.

Our homage, of course, extends to each and every other director, researcher, Fellow and staff that helped build this Institute, as well as all those who partnered with it over three decades, in the UN, academia, government, private sector and civil society.

As Prof. Bjornes tells us in his generous video message, "there are many ways of doing worthy things". Theirs, he says, "brought smiley faces" and "long friendships". We believe their legacy leaves on.

As **we celebrate the future**, we look at the Institute's current focus on digital technologies and sustainable development, and its commitment to contribute to the UN Common Agenda through evidence-based, policy-driven research based in a human-centred, systems thinking and participatory approach. The mission, as described by director Jingbo Huang, is to conduct research and training that can "bring human/UN values into digital technology, and ensure all voices are included, especially those of the vulnerable populations".

Maybe this booklet is a metaphor for all that. Firstly, we turn to an ancient way of building human relations: storytelling. Secondly, and as **we celebrate science** through the voices of our wonderful multidisciplinary team, we try to connect the dots and note the complex links and interactions between research topics – such as Urban Health, Migrant Tech, Cyber Resilience, Gender, Youth, Health or Artificial Intelligence –, research projects and fields of expertise. And we do all this while reflecting on the advantages of bringing all stakeholders to the table – not for the sake of attendance checking, but for the need of co-building a shared future.

Finally, as **we celebrate Macao**, we thank all the government entities and the local community, from academia to civil society to private sector, for supporting us all these years and those to come. We hope Macao will continue to be a city that brings together talented, passionate researchers and students from different cultures and academic backgrounds, all hoping to co-learn and co-use their skills in research and training to make the world a better place.

Welcome to *The Human Connection.* **The UNU Macau team**

HIGHLIGHTS FROM 3 DECADES

1992

LAUNCHING OF THE UNITED NATIONS UNIVERSITY International Institute for Software Technology (UNU-IIST)

1993~1997

- Overall Systems Software for the Vietnam Ministry of Finance
- Chinese Railway Train Despatch based on 'running maps'
- Multilingual/Multifont Text Representation for languages including Mongol, Chinese, Manchu, etc.
- Radio Telecommunications Telephone System for The Philippines

1999

Casa Silva Mendes becomes the Institute's home in Macao

2000~2003

- Curriculum Development Project
- Development of Computer Science Departments in Developing Countries
- Theory and Design Methods for Real-time Systems
- Formal Techniques for Software Development

2004

- Launching of the Electronic Governance Programme's eMacao Project

2005

- Global Desktop Project Methods for development of Component Software

2007

- WaterBase Project
- rCOS Methodology Research on Formal Methods to improve the dependability and quality of software systems
- 1st International Conference on Electronic Governance (ICEGOV) – organised by UNU-IIST in Macao

2008

- Theories and Tools for Software Technology
- Open-Source Software for Environmental and Health Applications

2009

- Evaluation of Electronic Government Training by EU-China Information Society Project
- Model-driven Component-based Software Engineering

RESEARCH

TRAINING

1993~2009

Training offered in Computer Science and Software Engineering included courses organised in developing countries, fellowships to Macao and support for visits to universities in developed countries. Throughout the years, such advanced training covered areas including software development methods and project management, the co-design of hardware and software systems, algorithmics, as well as the RAISE method and duration calculus.

2004~2014

For ten years UNU-IIST's Centre for Electronic Governance trained hundreds of people in electronic governance, both in Macao and internationally. The e-Macao project was run in three phases aimed, respectively, at software for electronic government, organisational transformation and electronic governance.

16

RESEARCH

TRAINING

2010

- Tools and Techniques for Evidence-based Policy in Higher Education and Research

2011

- Accountable Systems Engineering
- Intelligent Governance of Smart Cities

2012

- E-Governance for Sustainable Development
- Peer-Production Approaches to E-Learning
- Government Information Leadership – Foundations
- Secure Architecture of Electronic Health Records

2014

- UNU-EGOV opens in Portugal as an outgrowth of UNU-IIST's Centre for Electronic Governance

2017

- Closing the digital gender gap (EQUALS research group led by the Institute)
- Improving Peacekeeping through Tech
- Exploring Migrant Tech

2018

- Apprise: Identification of Exploitation of Migrant Workers and Tools for Screening Vulnerable Populations

2021

- Smart Citizen Cyber Resilience
- Examining NGO-Migrant Domestic Worker Relationship in HK to Map Opportunities for Tech Interventions (Policy Brief)
- Data Marginalisation in COVID-19 monitoring systems

2021

Cyber-Resilience capacity building for CSOs in Macao

2022

- Gender-based AI policy in Southeast Asia, with ITU
- Building Citizen Science Intelligent for Pandemic Preparedness and Response
- Gender Implications of AI on the Implementation of Women, Peace and Security Agenda
- Promoting Cyber Resilience among Women CSOs and Women Human Rights Defenders in Southeast Asia

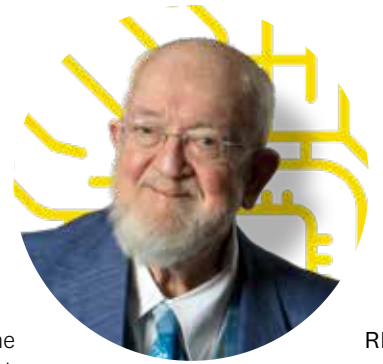
Launch of Training Programme on Digital Technologies for Sustainable Development, targeting different audiences within and outside the UN system.


« TALES FROM THE PAST «

19

ADDRESSING THE SOFTWARE TECHNOLOGY NEEDS OF THE DEVELOPING WORLD

> “UNU-IIST Fellows left fully equipped, on par with the best candidates from the best ‘Western’ universities, to tackle societal infrastructure software and IT projects.” Professor **Dines Bjorner**



Congratulatory message from **Prof. Dines Bjorner**

IT WAS THE SUMMER OF 1992. PROFESSOR DINES BJORNER landed in Macao with no expectations: “There was a job to be done. And it was done.” Decades after, he has referred to those years as “some of the happiest” in his life.

The Professor had been head-hunted for launching and directing the United Nations University International Institute for Software Technology (UNU-IIST), in Macao. The mission, as he once described it in a paper [1] in 1992, was to address “the software technology needs of the developing world” – it was “the first international institute devoted to this subject”, he claimed then. And it was set up at a time when, although the growth of computer usage in the developing nations was “quite high”, “most of them urgently” needed “the establishment or expansion of both basic and advanced training, as well as development and research facilities”. There was “at once a lack of available software professionals for industrial growth and a chronic shortage of educators and trainers of professionals of the future”.

Back then, most developing countries had “few software companies and little experience in industrial software development”. Local software development, Prof. Bjorner then argued, was “essential in the developing world not only to establish and strengthen local industry, but also to provide software in local languages and with cultural features adapted to the specific needs and conditions of each country”.

“Although the knowledge and competence gaps between the industrialised and developing nations may be substantial, the UNU-IIST can still help specialists reach state-of-the-art levels in software technology. The discipline is in its infancy”, he wrote in 1992. The prophecy came true.

RESEARCH AND DEVELOPMENT

When Prof. Bjorner was talent-scouted to lead the new UNU institute in Macao, he had, for 15 years, already built-up Pan-European research projects and a research centre in his home country, Denmark. “So, I was ready”, he tells us today, at age 85.

He recalls he was more interested in “how to construct large scale software based on mathematical insight” – software for real applications – rather than in the “theoretical foundations of computing”.

Moreover, he saw in UNU-IIST “a possibility to show that young, eager people from what was then referred to as emerging economies, the ‘developing countries’, could themselves, with a little bit of prodding, conceive and develop large scale societal infrastructure software systems for their own countries”.

Back in the 1990s, the Professor explains, the Institute pursued two intertwined lines of applied research and experimental development (R&D): research into real-time embedded software concepts, and the development of real applications.

[1]

Such development projects, Prof. Bjorner adds, were carried out "in close, daily collaboration" between the Institute's professional staff and UNU-IIST Fellows from Asia, South America and Eastern Europe - usually three to four people and in two or more years –, with each staff member mentoring typically three UNU-IIST Fellows. "In several cases these projects resulted in actual, deployed software", he notes.

One of those projects was the "Chinese Railway Train Despatch" based on "'running maps'", which involved a collaboration with the Chinese Ministry of Railway.

"Here, four Chinese UNU-IIST Fellows were seconded from Beijing and Shanghai to Macao for more than two years in which they developed, into executable code, software for the trustworthy despatch of trains 'up' and 'down' rail lines", the Professor explains. Issues such as "correctness of the software, that is, its robustness under stress, were focal points", he adds.

And he proudly notes: "Our UNU-IIST Fellows joint with their UNU-IIST professional scientific mentors published more papers at referred conferences and in seriously referred journals – by far – than any comparable institutes anywhere in those days. In this way, our UNU-IIST Fellows joined, on par, the international community of scientists."

Other projects concerning development of real applications included the "Overall Systems Software for the Vietnam Ministry of Finance", the "Radio Telecommunications Telephone System for The Philippines" and the "Multilingual/Multifont Text Representation for Mongolian/Chinese/Manchu/Japanese/Korean/English".

Along the research line, three to four professional staff worked daily with UNU-IIST Fellows on more theoretical matters: "underpinning the software development techniques used in the Development projects".

"So, the two groups, R&D, worked intimately together. In weekly seminars, UNU-IIST Fellows, staff and visiting scientists – who often stayed at the Institute from two to six months – from four continents brought all groups together."

The Professor still remembers those Friday afternoons where a group of dozens of colleagues would get together for tea breaks and discuss "more general matters", such as "where is computer science heading", "appropriate university curricula for MSc students" or "philosophy of computing", to name a few.

TRAINING PROGRAMMES

The UNU-IIST Fellows were part of the UNU-IIST Training Programmes, which included two major phases, as Prof. Bjorner explains.

In a first phase, the Institute's professional staff would lecture for two weeks at a university in a targeted fellow country – initially China, subsequently Vietnam, India, the Philippines and many more. The institute's coverage kept spreading, he says, "widening circles throughout Asia, first, then Africa and South America, etc."

Courses taught in those universities focused on "the scientific (R) and engineering (D) underpinnings of what UNU-IIST saw as the essence of Computing Science and Software Engineering". "We encouraged course participants to ask questions. We spent time on answering these questions – prioritising proper answering over covering 'all' course material", he explains.

Lecturers then nominated two to four course participants to become UNU-IIST Fellows for a period of 12-18 months, sometimes more, at the Institute in Macao. Their work and learning experience at UNU-IIST corresponded to the second phase of the UNU-IIST Training Programmes. The result was empowerment: "They left their year or more at UNU-IIST fully equipped, on par with the best candidates from the best 'Western' universities, to tackle societal infrastructure software and IT projects."

During his time as director, UNU-IIST was also host to several two-week international workshops on topics including "Programming Methodology" or "Geographical Information Systems". It also hosted many Macao Computer Society events, as well as provided semester-long Monday afternoon courses to students from the University of Macau.

Looking back into those years as the first director of UNU-IIST, Prof. Bjorner admits there were "many challenges", namely linked to the need "to unify UNU Staff and UNU-IIST Fellows across ethnic and cultural – perceived – 'divides'", and "to 'smoothen' lines of communication" between the local government and UNU-IIST. But as years went by and all parts got familiar with each other's ways of working, those perceived 'divides' disappeared, he says. And for that he emphasises the role of the local staff, who "were absolutely wonderful in soothing out many so-called problems".

Today, he is mostly proud of "having instituted a symbiosis of daily R&D work between UN professional staff and Fellows, international outlook through frequent visitors, constant exposures of staff and Fellows to serious scientific 'open problems', and sending home UNU-IIST Fellows to their mother institutions and keeping contact now with many of them", in Argentina, Brazil, China, India, Vietnam, Nepal, Mongolia, Indonesia, The Philippines, South Korea. Many of them, he notes, are now leading their mother institutions.

Prof. Dines Bjorner has been retired from the Technical University of Denmark for some time, but his scientific work is far from done, and his contributions to the field of computer science continue to be recognised – he was recently awarded the FME Fellowship 2021 for his pioneering work.

At age 85, the Professor still spends "three to five hours a day, seven days a week", on scientific thinking and writing. He published five scientific papers in the last two years, and his most recent book was published in November 2021. He is now translating to English a philosophy book by a Danish philosopher.

BUILDING E-GOVERNANCE

"Macao remained the key source of insight, support and legitimation of our pursuits in digital government internationally." Professor **Tomasz Janowski**

Prof. Tomasz Janowski
on the eMacao programme

PROF. TOMASZ JANOWSKI STILL REMEMBERS THE EXACT DAY he first set foot in Asia. It was September 8th, 1995, and Prof. Dines Bjorner, then the Director of UNU-IIST, and his wife were waiting for him at the Macao Ferry Terminal – he arrived "six or so hours late". The next morning, when he arrived on the 18th floor of the Banco Luso building, then the premises of UNU-IIST, there was no air con. "Prof. Bjorner, seeing me dressed formally, suggested taking out the tie as I may be taken for the director."

Prof. Janowski joined UNU-IIST that year as a Research Fellow. He had just finished his doctoral studies in computer science at the University of Warwick, UK. He heard about the opening in Macao from his supervisor, Prof. Mathai Joseph, and decided to apply.

"The job sounded right regarding the subject matter – I had software development experience from industry and formal methods research experience from my doctoral study –, new professional opportunities, new life experience, and economic conditions." But, today, he remembers that, when applying for the job, he did not understand "the unique nature of the institute, being part of the UN system, and being involved in the development mission". That understanding came later, he says.

His first stay in UNU-IIST – doing research, development and teaching on applied formal methods – lasted seven years from 1995 to 2002, when he resigned for personal reasons, and returned to Poland, his home country, to join the University of Gdańsk, his alma mater, as Assistant Professor. But he kept in touch with UNU-IIST and in 2004 he was back in Macao to develop and lead the new eMacao project.

By then, Prof. Janowski was already well aware of the unique nature of the Institute; what was new to him then was the concept of digital government. However, he saw in the topic the potential "to link up to the development mission of UNU-IIST" and felt

ready to open his academic and professional interests "beyond formal methods". So, he accepted the challenge.

EMACAO

Prof. Janowski noted that the idea of UNU-IIST engaging in digital government was radically new to the institute. As the eMacao Project was developed in close collaboration with Macao SAR Government, focusing on technical issues was too narrow. He recalls that "a mere week or two after arriving at UNU-IIST in February 2004, the government rejected the initial eMacao concept, and the next version had to be radically reshaped". "Rather than pursuing our own interests, we had to pay due attention to the actual needs of government agencies and propose and enable a way forward with digital transformation across government."

The objectives of the project, which emerged from the discussions, were "to establish digital readiness, build human capacity, establish government-academia collaboration, conduct relevant research, and disseminate the results for advancing digital government in Macao SAR".

Such objectives were pursued with 44 government agencies, and eventually, six academic institutions from Macao, namely UNU-IIST, the University of Macau, the Institute of Computer and Systems Engineering (INESC), the Macau University of Science and Technology, the Macao Polytechnic Institute (today Macao Polytechnic University) and Macau Productivity and Technology Transfer Centre (CPTTM).

For instance, in order to establish digital readiness of Macao SAR Government, "we conducted six weeks of daily interviews with management and technical staff in 44 government agencies across all secretaries", "we analysed and cross-checked what we learnt, and we shared the findings with the conference of all agency directors, which took place in UNU-IIST in 2005". "This activity combined research, situational analysis, and strategic development."

The eMacao project lasted until 2006. It was followed by the eMacao programme which until 2014 conducted 22 projects, including projects on strategic technology planning, enterprise architecture, knowledge management, business-technology alignment, technology leadership, etc.

Also worth highlighting, he says, are "the series of 43 eMacao seminars by visitors from around the world", the digital government workshops aimed at bringing together digital government stakeholders from Macao and also from [mainland] China", the government involvement as a key partner of ICEGOV conferences – the first being held in Macao and the fourth in Beijing –, and the introduction of Macao SAR to Waseda University e-government ranking (now International Academy of CIO digital government ranking) in 2014 – Macao SAR is evaluated under this ranking until today.

"These all served to establish a platform for collaboration between government and academia, for continuous learning and education, and for international comparative measurement of digital government development in Macao SAR. It also served to recognise government efforts as a source of good practice in this field. This activity contained a research component, particularly on measurement, but it was mostly about continuous education, deliberation and cooperation." As Prof. Janowski explains, eMacao "improved the agencies' digital government capacity, enhancing communication among agencies, and strengthening the technology learning culture in government overall".

Over time, he adds, "the progression of the UNU-IIST digital government programme led to many international projects, and increased focus on research outcomes". "Still, Macao remained the key source of insight, support and legitimation of our pursuits in digital government internationally."

ICEGOV

A major international project in the UNU-IIST digital government portfolio was the International Conference on Theory and Practice of Electronic Governance (ICEGOV). The conference was first held in Macao in 2007 and subsequently travelled to 13 cities around the world. Unlike other conferences in the field, ICEGOV "put the development agenda at the centre of digital government development", making sure that "digital technology strengthens government capacity, and in-turn societal capacity, to pursue public policy and development".

ICEGOV2007 was organised in collaboration with the Centre for Technology in Government, University at Albany, USA, and the United Nations Asia-Pacific Training Centre for ICT for Development from South Korea. Topics covered included interoperability, knowledge management, organisational transformation, policy development, rural digital government, economics, e-participation, and more.

The event was "very well attended", Prof. Janowski says, citing exact figures: 180 participants, of which 148 coming from 44 different countries and the rest from Macao; a total of 159 submissions received from 268 authors from 54 countries and regions – the largest number from the US, then Nigeria, Brazil, Argentina, Austria, Malaysia, Nepal, Macao SAR and mainland China.

It was also "well received", he adds. It attracted established and emerging researchers in digital government, government executives and public managers, as well as members of international organisations. And "it helped position UNU-IIST as a major player in the international digital government field", laying the groundwork for the future ICEGOV conferences.

After Macao, ICEGOV travelled to Cairo, Bogota, Beijing, Tallinn, Albany, Seoul, Guimarães, Montevideo, New Delhi, Galway, Melbourne, Athens and Guimarães. The conferences secured the presence of presidents, prime ministers, ministers and officials from the host countries, e.g. Alvaro Uribe Velez, President of the Republic of Colombia, opening ICEGOV2009, Ma Kai, Deputy Prime Minister of the People's Republic of China, opening ICEGOV2010, Thomas Hendrik Ilves, President of the Republic of Estonia, opening ICEGOV2011, or David Ferriero, 10th US Archivist, opening ICEGOV2012. Today, he notes, the event is still "alive and well" under the leadership of the United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV).

DIGITAL GOVERNMENT TRAINING

Over the years, UNU-IIST organised different training programmes for different audiences. Prof. Janowski roughly estimates that not counting ICEGOV, well over 1000 people were trained under eMacao and related projects, but he emphasises that "this number hides a great diversity of audiences and their needs, from information technology staff from Macao, through technology managers and the heads of information technology departments in Cameroon, mainland China, Colombia, Ecuador, Lebanon, Mongolia, Nigeria, Oman, Saudi Arabia, etc. to cabinet ministers in Kyrgyzstan and Maldives".

One particular training activity Prof. Janowski highlights is the seven-month-long training for government information technology staff from Macao SAR Government, "through which they learned new technologies, practiced what they learned by developing software prototypes, established contacts and collaborations between experts from different agencies who didn't know each other before, and established collaboration with UNU-IIST and other universities in Macao". "These were the outcomes that outlasted the programme itself."

Another example he gives is the development of the Government Chief Information Officer (GCIO) function for the Colombian Government, which helped to embed this function in the government structure and legislation, and establishing the education programme to train such GCIOs with Universidad Externado de Colombia and the Universidad Nacional de Colombia. By now, he says, "over 2000 GCIOs trained under this initiative are leading technology-related development across the country". "Again, the outcomes scaled up and outlasted the programme itself."

The reason UNU-IIST was chosen to perform digital government training varied over time, Prof. Janowski tells us. "Initially, we performed training through academic partners in target countries who in turn brought their government partners on board. Over time, the training was the result of building institutional relations with government partners in target countries, and embedding of such training in regular training activities by hosting governments."

CHALLENGES AND REFLECTIONS

There were some challenges along the road. Prof. Janowski recalls how sustaining the programme "required building trust between a team of experts and academics working within an international organisation like UNU-IIST and government agencies from Macao SAR, enough to entrust the former with access to the internals of government work, stakeholders and processes" – something that would have been difficult in any context, in Macao or elsewhere, he notes. "Overcoming the challenge involved listening to government needs, working closely with government partners, facilitating government-government interactions, being transparent in our objectives and decisions, etc.", he explains.

The timing of eMacao was another challenge, as back in 2004 "digital government as a field of study was barely emerging, not talking about any systematic transfer of know-how from academia to government and back". He notes that the international digital government research community was then just organising itself: the first edition of the Annual International Conference on Digital Government Research (dg.o) took place in Los Angeles in 2000, and the influ-

ential National Science Foundation programme on digital government started in 2004. “It was essential for us to connect to this community and contribute our own research, rooted in practice”, he says.

Yet another challenge was “building in-house capacity within UNU-IIST for digital government analysis, research and development”, as all team members came from different backgrounds and experiences and none had native digital government expertise, which was “scarce or non-existent then”, he notes.

“We learned together, and we grew our capacity while developing the eMacao programme”, Prof. Janowski says, referring to how the digital government program built and maintained an international team from 17 countries – Argentina, Bangladesh, Cameroon, Colombia, Fiji, Germany, Ghana, India, Kyrgyzstan, China, Maldives, Mongolia, Nepal, Nigeria, Palestine, Poland, and Vietnam. “Despite all differences – background, experience, worldview, culture, gender and religion – the team worked closely and effectively together, developing digital government in Macao and transferring the experience and insight gained internationally; the case in diversity and mission-orientation in action.”

Prof. Janowski especially highlights the commitment, contribution and leadership of the long-term members of the digital government programme, that is Prof. Elsa Estevez – UNESCO chair on digital government and knowledge societies and professor at the National University of the South, Argentina –, and Prof. Adegboyega Ojo – professor of digital government in Carleton University, Canada.

LIFE AFTER MACAO

In 2014, Prof. Janowski and his colleagues working in the digital government programme left UNU-IIST, which then went into restructuring. Prof. Janowski was relocated to Guimarães, Portugal, where he was appointed the head of the newly established United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV). He was joined by Prof. Estevez. Until today, UNU-EGOV continues to be a core centre of research, advisory services and training on digital government within the UNU family.

Prof. Janowski is currently the Head of Department of Informatics in Management at the Gdańsk University of Technology, Poland, Invited Professor at the University for Continuing Education Krems, Austria, and co-editor-in-chief of Government Information Quarterly. He continues to engage with UNU-EGOV on ICEGOV, with European Commission on science-to-policy services, and with other international organisations on digital government and digital agenda.

Altogether, he spent 18 years in Macao. He cherishes many memories from this period: a festive atmosphere during Chinese New Year, long walks in Coloane, watching Macau Grand Prix from the garden at Casa Silva Mendes – the premises of UNU-IIST –, sharing dim-sum in Jade Garden or king prawns in Afonso III with friends and colleagues, the city view from the 18th floor of Banco Luso Building, and “moving around freely and safely using public transport and without knowing Cantonese”. Although Prof. Janowski never visited the city since 2014, he still considers Macao as his faraway home.


«« TALES FROM THE FUTURE ««

LEVERAGING DIGITAL TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT THROUGH COLLECTIVE INTELLIGENCE

> “Our work is to bring human/UN values into digital technology, and also ensure all voices are included, especially those of the vulnerable populations who are also impacted directly by the technological decisions.” **Jingbo Huang**

AS DIGITAL TECHNOLOGIES CHANGE QUICKLY, CURRENT UNU Macau’s research interests may vary from time to time, but the Institute’s director, Jingbo Huang, believes “the core” of its vision remains the same: “leveraging collective intelligence” to “co-create a sustainable future for all and with all”.

“Machines are scalable, fast and consistent; people are flexible, aware and have values, morality and ethics. Our work is to bring human/UN values into digital technology, and also ensure all voices are included, especially those of the vulnerable populations who are also impacted directly by the technological decisions.”

As a special UN think tank, research and training institute, UNU Macau currently focuses on leveraging digital technologies for sustainable development.

Jingbo Huang notes that, 77 years after the UN Charter was signed in San Francisco, and despite the changing of contexts, “UN’s mandate still holds valid and relevant”. “Instead of world war, we are currently still facing a series of global pressing issues such as the pandemic (and the preparedness for the next one), and climate actions, which are equally challenging to mankind.” So, she adds, the Sustainable Development Goals (SDGs) are “a representation and implementation of the UN Charter which focuses around the five Ps – peace, people, prosperity, partnership and planet”. And “one of the most important differences between now and then”, she says, is “the development of technology, especially digital technologies, which are a double-edged sword” and “create additional complexity and challenges for the UN to fulfil its mandate today”.

On one hand, she says, digital technologies offer “opportunities for development”. “For example, in peacekeeping missions, unmanned aircraft systems provide better reconnaissance, surveillance and target acquisition, and thus provide better protection for UN peacekeepers.”

But at the same time, she adds, digital technologies “may pose potential risks to peace, security, and equality”. “For example, biases in Artificial Intelligence (AI) may make the job-search online more difficult for people with disabilities, as the training data for AI in the online recruitment system does not include enough data of people with disabilities’ needs and accommodations.” In addition, design of technologies

"can be opaque to general public", and "the cases of discrimination or lack of digital inclusion are often not easily observable", she notes.

"So, what role can the UN play to both fulfil its mandate and to address the new challenges in the 4th industrial revolution? How can we amplify the positive contributions of digital technologies and mitigate their risks to ensure equality enjoyed by all online and offline?"

Addressing such challenges, she says, is the current mission of UNU Macau. Its specific research interests, the director adds, currently include "the ethics of AI and new technology, cyber resilience, gender and technology, online youth protection, modelling for disaster management, preparing for the next pandemic, digital twins, etc.".

COMPLEX SYSTEMS THINKING

UNU Macau's Head of Research, Serge Stinckwich, notes that while it is important to address "the positive and negative impacts of digital technologies on the SDGs", it is equally necessary to understand that we cannot do so by looking at the SDGs "in silos", as an action towards one target may have an impact in other targets. "We should try to embrace the complexity, because we can see the SDGs achievements are a kind of a wicked problem, in which the solution we may deliver may be worse than having no solution."

So, complex systems, he notes, are composed of different entities which interact with each other, and it is from those interactions that some kinds of phenomena occur. This applies also to the relationship between digital technologies and people. "It's not possible to consider AI systems alone. It's a network in which there are interactions between machines and humans."

Jingbo Huang agrees: "We live in a complex world. The global challenging issues faced by us nowadays are not easily addressed by one single discipline. Instead, we need to look at problems from multiple perspectives, and recognise that different elements are interconnected."

The director tends to compare complex systems thinking to Chinese traditional medicine, "which treats patients holistically". And, to "provide insights from different angles", as well as to provide "holistic and realistic policy recommendations", UNU Macau's team must be interdisciplinary, she says.

Current UNU Macau's researchers come from different fields, including computer science, psychology, public health, communications, and economics. "Sometimes it may be difficult to communicate, because we come from different backgrounds and have different ways of conducting research, but it is very important", Serge Stinckwich says.

PARTICIPATORY APPROACH

One way to address complexity, and that is crucial to the current strategic vision of the Institute, is "to engage the citizen in the design of policies, especially digital policies", Serge Stinckwich says. Because, he adds, sometimes, when we try to understand policies as complex systems, we forget "about the important part: the people". And a participatory approach, related to the idea of citizen science, he says, can help build "more humane technologies".

"With a participatory approach, we try to amplify the voices of the marginalised population, who are often passive receivers of technological decisions. Everyone's voice counts, especially the voices of aging population, women, youth, indigenous people and people with disability. We also empower them to be co-designers of digital technology products and policies. With their participation, our vision of collective intelligence can be achieved", Jingbo Huang says.

As a computer scientist, Serge Stinckwich points out that nowadays "it is not possible" for universities or the public sector to build certain digital technologies, "because you have to use very powerful machines to train those systems, and you need to have access to lots of text resources to train the systems". So, this is mostly done by private companies which have access to social media and to thousands of information and data related to their customers. "What we can do is to empower the citizens, the stakeholders."

But citizen science, the researcher notes, should go "beyond the collection of data": it should involve citizens in the decision-making process. And that is what the Institute is trying to do while conducting science participatory modelling. "It is not only about collecting data, it is also about engaging the citizens to share their points of view, which may be conflicting, so as to try to solve SDGs' challenges."

POLICY-RELEVANT RESEARCH FROM A 'UN-INSIDER'

But what comparative advantages can UNU Macau bring about as a UN think tank?

Jingbo Huang has held various managerial positions in the UN in the past 20 years. UNU Macau, she says, "conducts policy-relevant research for the UN system and governments", while also developing "capacity building activities to help increase digital (AI) literacy for decision-makers".

"As we stated in the UNU Macau Strategic Plan, we are a 'UN-insider'. For external partners, we can support them to connect to the broader UN system, facilitate dialogues, and co-create research agendas on topics related to digital technologies and sustainable development. For internal UN partners, we 'think alike'. The relevancy makes us an ideal collaborator for research and training", she argues.

The Institute's researchers in the past and present have been constantly creating policy impact with their research, the director notes. She gives some examples: "Dr. Mamello Thinyane was one of the major writers of the Guide to Developing a National Cybersecurity Strategic (2nd Edition 2021) ❶, an ITU publication to guide the governments to establish national cybersecurity strategy. Dr. Araba Sey has led the EQUALS research coalition to draft the inaugural report entitled "Taking stock: data and evidence on gender equality in digital access, skills and leadership ❷", a great contribution to the gender digital equality field, which was referenced by many UN works. Dr. Eleonore Fournier-Tombs and her team explored the ethics of artificial intelligence (AI) from the gender angle ❸, which contributed to the inclusive AI policymaking in Southeast Asia. Dr. Franz Gatzweiler consulted with more than 100 partners from academia, private sector and government, and co-created a report to contribute to the Global Digital Compact ❹, an initiative of the UN Office of the Secretary-General's Envoy on Technology – this work sheds light on how we can co-create an open, free and secure digital future for all. Dr. Serge Stinckwich contributed to the International Digital Health and AI research Collaborative (I-DAIR ❺) to explore how participatory modelling can help with the pandemic preparedness. Just to name a few examples. There are many more."

But there are also challenges that a research institute faces, as Jingbo Huang admits. One of them is that "it needs a good 'translation process', meaning converting academic research outcomes into relevant and critical policy recommendations". This process, she explains, "also involves languages – academic researchers tend to speak academic language, while policy consumers may prefer action-oriented plain language, and general public would be interested in reading content relevant to the hot topics, and satisfying their intellectual curiosity". So, dissemination of the research results can take many formats.

But a research institute also strives to successfully fundraise, the director notes. "It is not only as simple as getting paid to conduct research. It involves having compelling visions for research topics, partnership building, finding like-minded people/donors, co-creating projects with donors, and identifying policy consumers from the very beginning to ensure policy impact at a later stage. It takes time to build trust and track record for an institute."

TRAINING

Aside from research, the other pillar in UNU Macau's current strategy is training. "Research and training can be separate, but it is better to go hand in hand", Jingbo Huang argues. "Research enriches the training/education content, and training inspires further research", she explains.

UNU Macau's current course offering ❻ are broadly categorised into five main themes: Smart usage of digital technologies for SDGs; Data for a sustainable digital future; Ethics of AI; Modelling for policy making & Computational Behavioural Science; and Digital behaviour and wellbeing. "In the future, we will continue to update our training offerings, when new technology emerges", the director states. "For example, we recently developed a short course talking about how ChatGPT is not sustainable."

The director, who received her Doctor of Education degree from Columbia University, specialised in Communication, Computing and Technology in Education, says the Institute's target audience in terms of training includes UN system leaders, "who manage technological projects"; government decision-makers, "who need to be aware of the impact and implications of technologies when engaged in AI projects"; and youth, "who will invent new technologies and should be aware of the ethical impact of the technological products, and be able to embed the sustainability thinking in the technology design".

UNU Macau's unique way of providing critical thinking about SDGs and digital technologies may be a comparative advantage, Serge Stinckwich notes. A "big believer" in open access and open-source software, the Head of Research hopes the Institute can contribute with its specific angle to the development of curricula in different organisations.

He also highlights the importance of "co-designing" training courses with universities from developing countries, which may have different points of views and needs.

Looking ahead, Jingbo Huang says the Institute intends "to develop a joint-degree programme at post-graduate level, e.g. a master's or doctoral programme". Education, she says, "takes time, but will have lifelong impact on people".

"We want to let the next generation represent ethics, human values and sustainability in their work design. It is not only about the faster the better, but also the more inclusive, more sustainable the better", she says.

And that may be a different story – in a future yet to be told.

BUILDING COLLECTIVE INTELLIGENCE FOR HEALTHIER CITIES

"The way we measure progress and well-being, and that includes health in cities, needs to be changed." **Franz Gatzweiler**

DO YOU WANT TO REDUCE TRAFFIC NOISE? EASY: REDUCE the number of vehicles on the road. But, as Franz Gatzweiler points out, not always what seems intuitive may be the best solution – you can have buildings with façades that absorb noise instead of amplifying it; and you can have roads with green areas that help minimise that noise. So, as he explains, to understand complex issues, you need to look at all the different interactions of a system's components – and that includes involving people, too. That is how you can build collective intelligence, and better solutions for the future.

With a background in agricultural sciences and a PhD in Resource Economics, Franz Gatzweiler has been applying systems thinking principles through participatory modelling for many years in his work. "It is a research method that is used to understand better complex problem situations in which people are involved in, and, at the same time, build their capacity in solving problems", he explains. It is especially useful to address complex problems – also known as wicked problems –, in which "there are no simple solutions to them, or simple solutions don't work".

Systems thinking, he says, "is a way of thinking the interactions and feedbacks of many components, which, altogether, constitute a system". But it is "not the typical scientific approach or method", which usually "tries to reduce the system as much as possible to clearly find causal relationships or only one causal relationship", he notes. At UNU Macau, however, where Franz Gatzweiler is a Senior Research Advisor, systems thinking and participatory approaches are two main pillars of the Institute's strategy, aimed at building collective intelligence around digital technologies and sustainable development.

So, participatory modelling "is applied systems thinking", Franz Gatzweiler says. It is bringing people together and involving them in the process of trying to find "a

consensus to solve a certain problem". "People can have different ideas of what the system is, and what the problem is and how it can be solved", he explains. And a model, he adds, is not necessarily a computer model, "it can be any idea you have of your own reality".

One of the main challenges of using such approach, the researcher says, "is to bring people together, talking to them in the same language". It is "not necessarily about linguistics", but about "the mindsets people have when they talk and use certain terms, because there are different perceptions of the same exact thing".

In fact, as he explains, the specific nature of participatory approaches is that, "while building collective intelligence", "the information sometimes is vague, the facts are not clear, values are in dispute, things are changing all the time", and "it cannot be measured easily".

Although there are "very often decision makers who do want to join this process", there are also policy makers who "very often shy away from complexity and from involving people in solving complex problems", Franz Gatzweiler notes.

"There is a certain fear from the side of some decision makers. Some have expressed that clearly, openly. Because the usual decision-making process is 'to ask the scientist for a very specific piece of knowledge' that they can use to make decisions", he says.

So, how can scientists address that fear? "It needs to be shown that the participatory approach and the collective building approach is an easier, more effective way of making decisions for the conventional decision makers. And if they apply it, their role as representatives of the people, or their role as decision makers, is not threatened, but supported", the researcher suggests.

Franz Gatzweiler believes UNU Macau is well positioned to use these research methods and to try to make best use of digital technologies by using them in the process of building collective intelligence. Its multidisciplinary team, he adds, is an advantage to try to "solve complex problems better", "in the interest of more people".

He believes this kind of approach is also linked to the need of "giving up the understanding of researchers or scientists as the holders of knowledge", and of "shifting that to the community you are dealing with and you are trying to support when you create knowledge". "So, the researcher actually becomes a facilitator in the knowledge building process and not the sole knowledge holder, the wise man or the oracle you just have to ask in order to find solutions to complex problems."

Franz Gatzweiler recalls Humboldt's education ideal, which argues you cannot be a good researcher if you don't teach, if you don't have the interaction with the students, because that is where knowledge is challenged and advances.

URBAN HEALTH

Before joining UNU Macau, Franz Gatzweiler was a Professor at the Institute of Urban Environment, Chinese Academy of Science in Xiamen, and executive director of the global science programme on Urban Health and Wellbeing: A Systems Approach, which is an affiliated body of the International Science Council (ISC).

"My takeaway from nearly ten years of research in urban health is that the way we measure progress and well-being, and that includes health in cities, needs to be changed", he says.

Cities usually portraited as being healthy and where people are wealthy, he explains, are usually densely populated areas, with high population densities, as well as high incomes. But Franz Gatzweiler questions this idea, even if such cities "manage to organise themselves in the way that everybody is supplied for, that public services are provided for everybody", and so on.

"Because there are other measures of health which are being overlooked, especially social health and mental health aspects. And if we look at those indicators of urban health, then progress looks a bit different", he warns.

Franz Gatzweiler believes a healthier city is a city where people have "healthier, better social relationships". And that, he says, doesn't happen if you stack people on top of each other in high-rise buildings – the opposite happens. "We know that because research has shown that the anonymity of people – even if they are pressed together in high density – increases, and social relations do not improve."

Another factor that can contribute to the health of people in cities is "more urban green". He notes research has shown this can improve mental health, not only because more parks mean more places for people to actually get together socially in

the urban space, but also because urban green brings into the city a certain microbiome that can have a positive impact in an individual's mental health.

The argument in favour of densely populated cities, he explains, is that the resource use per capita decreases, and so the ecological footprint per capita is lower in these cities than in the countryside. "That is true, but it doesn't change the fact that there are many more people in the city, and that these efficiency gains are compensated by other uses", he says, alluding to what is known as the Jevons paradox, according to which increases in the efficiency of the use of a certain resource may actually increase its demand, and therefore increase its use.

"The picture that comes to my mind is a group of people who want to take the elevator to 'move up' (develop, improve, progress). The elevator cabin is too small for all. What do you do? Squeeze people inside, like we squeeze people into cities? Build more elevators, like we build more cities? Let the elevator go faster, like the pace of life in cities is speeding up? Build bigger elevators, like cities are growing into mega-cities and city regions?"

"The dilemmas here are obvious", he says, "especially if the development goals are the same for all and if we do not want to leave anyone behind". "We can and probably have to make compromises and we need to re-imagine our development goals. In that process, we also need to re-imagine and redefine what it means to live a good life on a planet which has boundaries."

EMPOWERING MIGRANT WORKERS WITH TECHNOLOGY

"The biggest challenge is trying to figure out where exactly you want to make an impact, because there are so many people who need help." **Hannah Thinyane**

AS A CHILD, HANNAH THINYANE WAS ALWAYS THE ONE WHO got to share all the candies in the family. "They knew I wouldn't steal them and would make sure everyone got the right amount of everything", she laughs. Her strong sense of justice has been driving her life, and her work as a researcher, to this day.

"Through the years I always tried to figure out how to use my computer scientist skills, and research skills, to contribute to alleviate injustice. And at UNU Macau [where she arrived in 2016 to work as a Principal Research Fellow] we had the space to do that: to develop a whole research space in whatever we wanted, as long as it involved ICTs (information and communication technologies) and sustainable development", she tells us. She chose to start Migrant Tech.

"The main goal of the project was to understand how digital technology can be used to support low paid and less skilled workers, particularly looking at enhancing their human dignity and physical integrity, meaning allowing them to choose what happens to themselves in a dignified way", Hannah Thinyane explains.

It proposed to do so by generating insights and thought leadership on migration and ICTs; innovating and inventing ICTs in support of migrants, communities, and other affected stakeholders; and incorporating the research findings into evidence-based policymaking.

DIGITAL TECHNOLOGIES AND HUMAN TRAFFICKING

"One of the main focuses of Migrant Tech", Hannah Thinyane explains, was "a theme that developed looking at digital technology against trafficking".

One of the main projects led by Hannah Thinyane was the "Apprise: Tools for Screening Vulnerable Populations [1]". This research, which involved regular research field trips, was aimed at designing screening technology for and with vulnerable workers and frontline responders; exploring the role of Artificial Intelligence (AI) in supporting decision makers to rapidly triage cases; and the post hoc analysis of interview responses to inform responsive action and policy.

In this project, UNU Macau partnered with Mekong Club [2], an NGO based in Hong Kong that works with the private sector to bring about sustainable practices against modern slavery across the globe. It firstly helped researchers set up over 30 anti-trafficking stakeholders' consultations in Thailand. The goal of these consultations – which included police, members from international organisations, NGOs and survivals of trafficking, among others –, "was to understand what problems they faced in victim identification, what technology they had access to, and how they believed that technology could support them", Hannah Thinyane explains.

"It turned out they needed a screening tool to help them overcome key issues like lack of privacy during initial discussions, lack of training – because people don't know what trafficking really looks like –, lack of communication – everybody speaks different languages –, and a lack of trust between those who were around watching the conversation and people who were taking part in those discussions", she says.

After that, Hannah Thinyane and her team developed the Apprise tool, which is "a mobile app that sits on the NGO's or the frontline worker's phone and is there to help them in their initial outreach with potential victims of trafficking". It offers "a series of yes or no questions, translated into the common languages of different workers", which includes many minority languages. In the end, the app tells the potential victim something like: "It seems you are in a vulnerable situation. Do you want our help to leave?" This point, as the researcher notes, upholds the principle of human integrity and dignity, allowing the potential victim to decide what to do after gaining a better understanding of his/her specific situation.

In practical terms, it works like this, as Hannah Thinyane explains: the frontline worker hands over the phone and a set of headphones to the potential victim, who then goes through the app's questions in the language he/she chooses; in this process, the frontline inspector holds a screen in which he/she sees which indicators come up from the interview and gets the advice on what to do next, such as taking the person immediately to a shelter, in cases of extreme exploitation.

With the support of Freedom Fund [3] and Humanity United [4], Apprise was piloted by Thai Government's Ministry of Labour and Royal Thai Navy as part of their Port In Port Out (PIPO) fishing inspection centres.

The team later expanded the project developing another app, the Apprise Audit, which focuses on facilities, such as factories, and aggregates workers' responses by facility, addressing fears of retaliation while protecting their anonymity. "So, if you have one person who is brave enough to speak up, then you can change the conditions of that whole facility."

This solution, the researcher notes, underlines the policy impact of the project. "If you know how people report they have been exploited, you can look for patterns and then make protection strategies based on them."

"If it wasn't for Mekong Club, their knowledge of the field and their connections, this would have still remained just a research project. So, it was one of those really great synergistic relationships, where we had the technical expertise and the research backing, and they had the knowledge of the field", Hannah Thinyane notes.

The Apprise tool is still being used by the International Organization for Migration (IOM), which funded part of the research. The Apprise Audit – rebranded now as Diginex Apprise – is currently being maintained by Mekong Club and Diginex, where Hannah Thinyane currently works as director for Global Supply Chain R&D.

DIGITAL TECHNOLOGIES AND MIGRANT WORKERS' JOURNEYS

Another research project under Migrant Tech consisted of a consultancy study conducted by UNU Macau – by Hannah Thinyane, Michael Gallo and Don Rodney Junio

– for the International Labour Organization (ILO). It looked at improving the understanding of how migrant workers utilise digital technologies along their recruitment journey. The work resulted in the report "Use of digital technology in the recruitment of migrant workers [1]", which was prepared under the framework of the ILO Integrated Programme on Fair Recruitment (FAIR Project, phase II).

Another research project that Hannah Thinyane developed in Cebu, in the Philippines – together with Sammia Poveda – was a study that investigated the impact of digital skills training on the psychosocial well-being of survivors of sexual exploitation. It also looked at how the training program and the security of high-skilled employment affect recovery and reintegration.

Other Migrant Tech researches include Jenny Ju Bei's work on "Social Media Usage of Dual Migrants in Border Crossing [2]". This research project focused on mainland Chinese dual migrants in Macao, that is, individuals who had left family and friends in other provinces of China and moved to Zhuhai, and migrated daily to Macao across a regulated political border.

Another project was Juhee Kang's work on "ICT use among North Korean women in South Korea [3]", which focused in studying the role of digital technology in the migratory experiences of these women, including how mobile communications play into their journey from North Korea as well as their resettlement in South Korea.

UNU Macau's Migrant Tech team also included Sophie Zinser, Jenny Ju, Karthik Bhat and Francisca Sassetti.

Looking back at all those years of Migrant Tech research at UNU Macau, the researcher says one of the main challenges was "trying to figure out where exactly you want to make an impact, because there are so many people who need help". "Being able to say 'no' to some, for me, was the hardest thing."

On the other hand, the major take-away for her was to understand that digital technology is not a silver bullet. "It's never just a technology problem. Technology can be one factor, but it is not the only one. You need to look at the scaffolding, understand the context and the political dynamics and the essential problems that exist there if you are going to make a real impact."

But Migrant Tech also had an important impact on researchers themselves, Hannah Thinyane says, especially in the careers of research assistants that came to work with her. "I would just get them out into the field, because there is nothing like field research. You meet the people on the ground, you hear their stories." Many of those research assistants, she says, "have now entered the space [of fields related to human rights] because of the stories they heard and the applied research they could be part of".

She still treasures the memory of that multicultural team at UNU Macau and going up and down in the office "hearing people speaking Hindi and Spanish and other languages". "It was a nice team to be part of."

Hannah Thinyane has a PhD focusing on human-computer interaction and a history of migration herself. Born in Wales, she grew up in Hong Kong, later moved to Australia, and before moving to Macao she worked in South Africa for over ten years, mainly looking at ICTs for sustainable development and ICTs for transparency and accountability.

She is now based in Australia again. She got her beach back, but she still misses those end-of-day encounters with friends, by the sea, in Macao's Cheok Van. "Friendships are always what you take away."

ENHANCING THE RESILIENCE OF CITIZENS IN SMART DIGITAL FUTURES

“It’s all about trying to operationalise the ‘Leave No One Behind’ principle.” **Mamello Thinyane**

THERE IS ONE THING MAMELLO THINYANE CANNOT WORK without: “passion”. A computer scientist driven by social justice, he needs to know that the work he is doing is going to “improve someone’s life”. “It makes me sleep better at night.”

His eagerness to see “a very immediate applied, practical impact of his work” can be seen in two main research projects he led while working as a Principal Research Fellow at UNU Macau. He says they were both about finding out “how you strengthen, how you empower the typically marginalised stakeholders”.

SMART CITIZEN CYBER RESILIENCE

One of those projects was the Smart Citizen Cyber Resilience [1] research project, which undertook research and developed tools to enhance the resilience of citizens and civil society stakeholders against adverse cyber incidents.

The name, he tells us, was inspired in the notion of “smart city”, which is often more linked to the idea of technologies or digital infrastructures being put in place to provide better, more automated, urban services, and less to the need of having citizens equipped with the right knowledge and tools to navigate that digital future we are creating. So, the UNU Macau project also involved the component of capacity building of CSOs, while recognising civil society stakeholders as significant actors in the co-production of national and global cyber resilience.

But what does cyber resilience mean?

Mamello Thinyane explains that, as we have been adopting digital technologies more and more, be it at the personal level, the organisational level or country level, there has also been an increase in risks associated with that use of digital technologies – “broadly, cybersecurity risks”, but this term, he notes, includes technical risks, such as ransomware or data breaches, as well as socio-technical risks, such as cyberbullying, threats to child safety online or issues related to surveillance.

For him, though, the biggest overall risk nowadays in cybersecurity is the fact that “we tend to look at it as being very siloed”, as we try to make sure each critical infrastructure owner is secure, like the bank or the government. The problem, he says, “is that risk can cascade across sectors” and so, we need to think on “how to strengthen the cyber security ecosystem, to make sure the whole ecosystem is strong”.

Cyber resilience, he says, is about “how we, as individuals, organisations, society, make sure that life continues, and business continues, despite these adverse cyber risks and cyberattacks”.

A key idea in this concept, he further explains, “is that it goes beyond trying to prevent the risks and threats and it goes into actually preparing yourself before the onset of the threat and making sure that: when the threat occurs, you can minimise the impact; and that after the threat has passed, you ensure recovery in your business processes, or in your lives, or in your organisations”. Moreover, he adds, it goes be-

[1]

yond bouncing back: "It is about how we make sure we adapt, how we become better as a result of that".

From preliminary research, UNU Macau's team – which also included Debora Christine, Christy Un and Vitoria dos Santos – found out that "you need to think of cyber resilience as a whole of society agenda or issue, because a society can only be as cyber resilient as its weakest links". He gives an example: "If you have the private sector and the businesses doing very well in cybersecurity, but you have community organisations, CSOs, not strong enough, then you are not resilient enough as a whole society".

Because cyber resilience "is a global challenge", the team looked at approximately 14 states in the Asia Pacific region, to analyse to what extent were governments prioritising whole of society cyber resilience. This work resulted in the report "Cyber Resilience in Asia Pacific – A review of national cybersecurity strategies [1]", which has been well received, according to Mamello Thinyane.

"From literature and primary research", the team saw "that CSOs continue to be more vulnerable compared to the private sector and to governments, when it comes to being cyber secure, cyber resilient". And the situation in Macao was similar to what happens globally, he says.

So, they worked with CSO Caritas Macau to ensure that across their many different operations – "they have about 40 different service centres" – they could try to identify some of the risks they were exposed to, to understand what resources and technical competencies they had, so as to help them fill some of the gaps.

This work, he explains, involved "quite a lot of capacity building workshops with Caritas Macau", targeting, in one group, managers within the organisation, for training on how to strategize around cyber resilience, and in another, targeting technical-related personnel, training them with "really practical hands-on skills" on everything from "how to do good data backups" to "how to do encryption of data and communications". This work project also led to the "Civil Society Organizations' Cyber Resilience [2]" report.

DATA AND SUSTAINABLE DEVELOPMENT

Another research Mamello Thinyane was involved in at UNU Macau was the one related with the Data and Sustainable Development [3] project, in which he worked with Debora Christine. This project was formerly known as the Small Data Lab, which had started when Prof. Michael Best was leading the Institute (2015-2018) – the former team included Michael Best, Fan Yang, Ignacio Marcovecchio, Karthik Bhat, Lauri Goldkind, Vikram Cannanure.

The Data and Sustainable Development research project, Mamello Thinyane says, addressed the same question of the Cyber resilience project – "how you empower the typically marginalised stakeholders" – by focusing on data ecosystems, critically investigating the sustainable development data assemblages, and developing artefacts to support the active participation of civil society stakeholders in those data ecosystems.

From the United Nations perspective, Mamello Thinyane explains, "we were looking mostly at monitoring the Sustainable Development Goals (SDGs)", but the existing framing and articulation of the indicators tend to be "more framed at the government's level, and the national level". And though this work is critical – in terms of monitoring progress towards the achievement of the goals and in informing subsequent policy directions –, it may overlook realities at a subnational level that could perpetuate and even aggravate marginalisation, resulting in invisibility to policymakers, misrepresentation in the datasets, and discrimination.

"You may look at a country that has really high educational scores at the aggregate level, but if you go to some of its small communities you will find a completely different story", he warns. And such stories are seldom heard.

In order to investigate the variations of marginalisation and exclusion throughout the course of data processes, Mamello Thinyane and Debora Christine developed "A framework for data marginalization and exclusion [4]", which identified five dimensions of the phenomenon: the unknown voices – invisible in the mainstream societies, hence unknown to the data collecting entities; the silent voices – who, due to individual and personal factors, do not have the agency and the ability for vocalising; the muted voices – whose marginalisation and exclusion in the data processes is attributable to their social marginalisation; the unheard voices – who are excluded in the data sampling and data collection phase, due to factors such as digital disengagement, illiteracy, language exclusion, geographical factor, and economic exclusion; and the ignored voices – who are marginalised during the analysis of the collected data both through traditional statistical processes and new data approaches.

In the end, he says, it was all about "trying to operationalise" a key principle to the United Nations' Global Agenda and the SDGs: the "Leave No One Behind" principle, which seeks to ensure that all people participate in and enjoy the benefits of sustainable development.

Besides the development of this framework, the project also involved working with Macau's CSOs, namely Caritas Macau, once again. "That's how I like to work, I like to build relationships with people that we continue to work with over time." In this project, he explains, they built some systems for the CSO, "trying to help them improve their data", especially data regarding homelessness.

UNU Macau ended up joining the Global Partnership for Sustainable Development Data [1], which is a global network using data to achieve the SDGs, namely "improving lives, fighting inequality, and promoting environmental sustainability". The Institute joined their working group on "citizen-generated data", and would later join another working group related to "inclusive data".

TECHNOLOGY AND SUSTAINABLE DEVELOPMENT

Mamello Thinyane notes that a couple of decades ago, computer science or the Internet used to be something "completely separate from societal issues". But the reality today, he says, is that there is a digital transformation going on and, "the same way the steam engine or electricity transformed economies and societies fundamentally, digital technology is doing the same to them in a very fundamental way", it is transforming not only organisations and businesses, but also "transforming our lives, transforming us as individuals". "Technology is changing us."

So, because "it is so much of who we are", it is "impossible to ignore the role of digital technology in allowing us or hampering us from achieving sustainable development". But one of the problems is that "people that develop digital technologies sometimes are not aware" of this and decisions are made without thinking of the potential societal impacts on issues like relationships, health and wellbeing, humanity, for example.

"So, how do you make sure that with the technologies you develop, you are being aware of their impacts on sustainable development, are being responsible, are being accountable, as well? What are some of these positive and negative interactions between digital technology and development?"

And "it's all going to get more critical", he warns, giving the example of Artificial Intelligence (AI) systems – "How can we ensure they still remain ethical and respectful of the values of individuals?". "This will remain an important area of study for a long time."

After working for six years in UNU Macau, Mamello Thinyane is now based in Australia, where he is Optus Chair of Cybersecurity and Data Science, at the University of South Australia's UniSA STEM [2]. He is working with government, industry, and community stakeholders to strengthen collective cyber resilience. He is still collaborating with UNU Macau, currently working on the UN Women "Cyber Resilience among Women CSOs and Women Human Right Defenders in Southeast Asia" project.

He considers himself a citizen of the world.

While growing up in a small, rural village in Lesotho, Mamello Thinyane used to be amazed by looking at the sky and watching airplanes fly by. He wished to become a pilot one day – until he went on his first airplane travel and that "got demystified". So, he just moved on "to the next exciting thing".

But one passion did accompany him always, from childhood to now: explaining things to people. "I always enjoyed helping people walk through a concept or idea, helping people get through issues or understanding things better." That, and making sure "that everyone thrives, everyone does well, particularly the marginalised and vulnerable".

APPLYING A GENDERED LENS TO DIGITAL TECHNOLOGY

JAIMEE STUART ASKS: "HOW MANY FEMALE LEADERS GET TO LEAD PROJECTS that promote the voice of women, and more specifically the voice of women in technology?" At UNU Macau, she is doing just that, while working together with two other female researchers from the Institute, Cara Antonaccio and Min Yang, in two interconnected research projects commissioned by UN Women.

"I come from the field of Psychology, Cara is from Public Health, Min is from Communications. We all have a desire to work in science and technology, and each have a passion for evidence and research. What we have here, and what makes the work of UNU Macau unique, is not so much the interdisciplinary nature of our work. It is that we are bringing our different perspectives into an applied space, doing evidence-based research in the field of technology. And these are gendered and diversity perspectives", she points out.

CYBER RESILIENCE FOR WOMEN HUMAN RIGHTS DEFENDERS

One of the projects UNU Macau is currently working on with UN Women is "Cyber Resilience among Women CSOs and Women Human Right Defenders in Southeast Asia", which is still in an initial phase.

"We are interested in exploring the cyber security threats, and risk factors and vulnerabilities that exist in CSOs and among women human rights defenders", Cara Antonaccio explains. "We are doing that through survey methods and interviews with women human right defenders, to get a sense of what training was provided to them through their organisation to maintain their security, as well as their different behaviours related to staying safe online and maintaining the security of their data."

UN's Office of the High Commissioner for Human Rights defines women human rights defenders (WHRDs) as "all women and girls working on any human rights issue" ("women defenders" and "girl defenders"), as well as "people of all genders who work to promote women's rights and rights related to gender equality".

The UNU Macau team working on this project also includes computer scientists Mamello Thinyane and Arthit Suriyawongkul.

A part of the project involves a cyber audit, that is, a technical analysis of the potential vulnerabilities that organisations might face. But, as Jaimee Stuart explains, this cyber audit is not only a technical analysis: it also involves the way people use digital devices, systems, and networks, as well as "the sort of policies that organisations have in place to protect data, to maintain privacy, etc.". After all, she says, "the bigger cybersecurity threats are human threats", often related to "people not engaging in protection and privacy, or now wanting to".

AI AND WOMEN, PEACE AND SECURITY

The other project the team is working on together with UN Women is "Gendered implications of Artificial Intelligence (AI) on the implementation of the Women, Peace and Security Agenda in Southeast Asia". It examines the topic through the lens of three categories of uses of AI in relation to Women, Peace and Security: peacebuilding uses; neutral uses; and conflict-oriented uses. Through this lens, the researchers propose to investigate applications in Southeast Asian countries, associated gender risks, and possible technical and policy solutions.

The Women, Peace and Security (WPS) Agenda evolved from a Resolution adopted by the United Nations Security Council in 2000, and recognises "women's full and equal representation and participation in all levels of peace processes and security efforts", as described by UN Women.

"The WPS Agenda is an important series of UN resolutions that focus on the gender dimensions of conflict. We used these ideas to understand the impact of AI to women's human security as well as women in conflict and post-conflict settings", says Eleonore Fournier-Tombs, who led the research when she was working at UNU Macau as a Senior Researcher.

She explains there are three categories of AI that impact WPS: "AI for peacebuilding, which includes chatbots, predictive analytics, and tools to fight human trafficking; AI for neutral purposes, especially social media; and AI for conflict, which includes disinformation tools and automated weapons systems".

"Overall, we found that people were very concerned about the way in which social media can have an adverse effect on women's safety", Eleonore Fournier-Tombs tells us. However, she adds, "there were also some implementations of AI tools which helped the WPS, such as the development of a chatbot in Thailand, called SisBot, which helped women who had suffered from sexual assault access immediate judicial and psychosocial support".

Jaimee Stuart says UN Women is "particularly interested in how new technologies are informing the contemporary environment, with AI being one of those technologies that can potentially undermine security". She gives an example: the existence of "social media algorithms that expose women more to hate speech and discrimination". But there is also "a huge variety of other ways that AI is being used across contexts in a gendered way", she says.

The team is using a hybrid research methodology that, in addition to social media analysis, also includes literature review and semi structured interviews, Min Yang explains. She adds the team – which, besides Eleonore Fournier-Tombs, Jaimee Stuart and Min Yang, includes JeongHyun Lee and Preeti Raghunath – already interviewed 16 stakeholders. After writing the final report, the researchers will organise a stakeholders' meeting to gather experts to validate the research results, she says.

An important aspect of the research project is related to "the need to engage in regulatory frameworks around AI", Jaimee Stuart adds. "The broader aim of this is to understand the impacts of AI technologies so that we can understand how to best govern this within Southeast Asia."

In the social media analysis, Min Yang found evidence that social media is being used by civil society organisations in the peacebuilding process. For example, she says that civil society organisations (CSOs) and peacebuilding actors use social media as "a tool and a platform to voice women's needs, to amplify women's leaderships in promoting the WPS Agenda". "They also use it to disseminate messages within and beyond their networks, to engage more social resources and stakeholders to participate in the process of WPS Agenda implementation", she says.

Jaimee Stuart notes that another "interesting finding" from the social media analysis is that "even when CSOs are located in a specific country, they are advocating across the region", "they are using social media not just as a national platform, but also as a regional platform to build peace". "And they are using it not just as a mechanism to support and raise voice and narrative around the WPS Agenda, but also to raise funding", she says.

"So, in the analysis that Min did, she found that there are a range of affordances for CSOs in which AI in social media can be used in a positive way, and, I would say, in a targeted manner", Jaimee Stuart notes.

Both projects with UN Women are interconnected and, in the end, will inform part of the training programme that the international organisation is currently running for civil society actors and human rights defenders.

"Women are less likely to be cyber security experts, less likely to work in the space of AI, less likely to be technical support people and to have technical training, and less likely to come from STEM backgrounds. Therefore, they are less represented in the potential solutions to these problems, so that is why you need to take a gendered perspective to this", Jaimee Stuart says.

Cara Antonaccio believes the multidisciplinary nature of the team brings about "a lot of opportunities for mutual learning". UNU Macau, she says, "is a really great space to engage with others who may have different perspectives" and it really helps you "to take a step back" and eventually "build up a greater understanding of things". "Multidisciplinary work is greater than the sum of its parts", she says. "It really takes things to the next level."

Min Yang agrees. "It is an opportunity to see the world from different angles, because the world is a very complex place and looking at it from one angle is definitely not

enough to understand where we are living." But it is also more than that, she says: "I see it as also an inspiring opportunity. For example, Cara and I have talked about the possibility of exploring research in health communication, which is very important."

But Jaimee Stuart emphasises: "We are working in a space where women are under-represented. We all have passion in science and technology, and have expertise in many different disciplines, but also care about making a difference. That's what I want us to be known for here at UNU Macau. And it is not just about gender, we should be known more generally for working with marginalised populations. Because that's what we all care about."

EQUALS GENDER EQUALITY IN THE DIGITAL AGE

UNU Macau was one of the founding partners of EQUALS, Global Partnership for Gender Equality in the Digital Age, a coalition of stakeholders dedicated to promoting digital gender equality and launched in 2016. Other founding EQUALS partners include the International Telecommunication Union (ITU) [1], UN Women [2], the International Trade Centre (ITC) [3] and global organisation GSMA [4]. The Partnership was launched in September 2016.

The EQUALS Research group, led by UNU Macau, examined gender equality in digital access, skills, and leadership with the goal of identifying the state of equality, reasons for inequalities, and remedies to address the causes of gender digital inequality. The project resulted in the research report "Taking Stock: Data and Evidence on Gender Equality in Digital Access, Skills and Leadership [5]", published in March 2019.

The report was edited by Araba Sey, who was then a Principal Research Fellow at UNU Macau, and Nancy Hafkin, an international expert and associate of Women in Global Science and Technology. Other experts that worked at the EQUALS research group at UNU Macau were Michael Best – former Institute's director –, Juhee Kang, Michael Madaio, Lisandra Fesalbon, Yuchao Zhao, Naa Ansah-koi and Don Rodney Junio.

UNU Macau is a member of EQUALS-EU, a regional partnership that originated from the EQUALS Global Partnership for Gender Equality in the Digital Age. It is currently partnering with EQUALS-EU in running a hackathon focused on sustainability. The project, which is being led by UNU Macau's Senior Researcher Jaimee Stuart, is aimed at involving youth in Macau and across the Greater Bay Area, while promoting gender equality. The hackathon is being co-organised by UNU Macau and Chaihuo x.factory, and will be run as a part of Beyond Week, Macau 2023.

EMPOWERING YOUTH, PROMOTING GENDER EQUALITY AND SOCIAL INCLUSION

> “It is important to build intercultural platforms for young women and men [...] and to work with youth, for youth, by youth.” **Min Yang**

IF THERE WAS A KEY WORD TO DESCRIBE MIN YANG’S WORK so far in the UN system, it would be “youth”. If there were two, they would be “youth” and “gender”. But her experience and research interests go beyond that and include the field of communication and ICT (information and communication technology).

Before joining UNU Macau as a Researcher, Min Yang worked for the Social and Human Sciences Sector in UNESCO, where she focused on advancing the 2030 Agenda and the Sustainable Development Goals (SDGs). She undertook a series of programmes at global and regional levels for empowering young women and men, enhancing gender equality and social inclusion, and promoting peace education and peacebuilding.

As Min Yang explains, her work with youth at UNESCO, and the strategies used within the organisation, were mainly centred around three ideas: “work with youth”, “work for youth” and “work by youth”.

Guided by these principles, the researcher highlights the importance of “building international and intercultural dialogue platforms for young women and men”. These platforms, she says, allow young people “to exchange with each other” and provide them with “a great opportunity” to “voice their concerns”.

Min Yang also points out UNESCO’s “Youth As Researchers” global initiative, which was launched during the COVID-19 pandemic and is aimed at encouraging young people to “observe the impacts of COVID-19 pandemic on youth, “do some research” and “come up with potential solutions”. It also helped young people have their “voices, insights and research outputs heard by different relevant stakeholders”, she explains.

“We aimed at encouraging young people not only to be passive beneficiaries, but also to be empowered and become active agents of change for communities they are living in”, she says.

With a PhD in communication studies, Min Yang is passionate about “critical thinking” and “knowledge generating and sharing”. The latter, she tells us, “contributes to the shift in mindset”.

Her research interests include not only “youth and sustainable development”, but also “gender and communication”. She is currently working in a UNU Macau project in collaboration with UN Women that provides a gendered lens to issues such as Artificial Intelligence (AI) and cyber resilience.

And how can a background in communication contribute to research on digital technologies and sustainable development?

Digital technologies, Min Yang says, are “a very critical part” for the communication process and are “developing very rapidly”, while “attracting lots of attentions from people – from the individual to the public, from policymakers to academia, and civil society”.

40

"Digital technologies not only facilitate the transferring process of ideas and information in terms of quality and quantity, change the way of communicating, but also pose challenges to the existing communication system, to the global communication order, and even to the technology-related norms setting across the globe."

Challenges to be addressed include "digital divide", and "digital gender divide", "digital ethical dilemmas", "imbalanced development", "security and privacy issues" and so on.

Having an interest in "mutual influence between technologies and social development", linked to the UN 2030 Common Agenda and the 17 SDGs, communication studies "aim to find solutions" on "how digital technologies can be used for promoting communication and sustainable development" and "how the development of digital technologies can be more human-centric, sustainable and fair", while promoting equality and justice "for everyone", Min Yang says.

THE POTENTIAL IMPACTS OF AI

Min Yang's work has also been focusing on the ethics of AI. She says: "AI has a very profound impact on a variety of areas, including decision-making, employment and labour market, social interaction, healthcare, international travel, education, media, information assessment, data consuming and data protection." "AI also has social implications", she adds. "For instance, will AI reinforce the existing gender biases and racial discrimination? Will AI technologies bring negative implications for the diversity and pluralism of culture, language and media?" Min Yang also stresses: "We cannot address these concerns properly without full ethical considerations".

She recalls that, when the Internet was available for everyone in early days, most of online content were in English. "So, what about the non-English content? What about those people who don't speak and understand English? How can they understand the world through the Internet? This is the influence brought by technology and deserves our attention."

The development of AI technologies is imbalanced globally. She witnessed a dialogue about AI ethics between people from a developed country and a developing country. The latter pointed out: "We don't even have the infrastructure and technical capacity to develop AI, how can we discuss AI ethical issues with developed countries and come up with a universal ethical standard for AI?" Min Yang says "this dialogue reflects a gap which is not only about technology but also about capacity, and overall social and economic development."

"Imbalanced development across the globe persists for a long time, which could be intensified with the impact of AI technologies." However, Min Yang is still optimistic about the future. She says: "We are facing many challenges which cannot be tackled by one but need efforts from all. We need hear all voices, need efforts from multiple stakeholders, need an inclusive regulatory system that is more representative, equitable and sustainable in the long term, to ensure no one will be left behind."

"The UN has been committed to bringing together diverse voices around innovative solutions for problems we are facing", she says. "We realise what and where the gap is, but we can find inclusive and sustainable ways to address it."

Min Yang dreamt of becoming a paediatrician in her childhood. Luckily, she can keep on supporting the younger generation in her current position. Moving to Macao from Beijing, she is happy to embrace new challenges in the UN family. But sometimes she does miss blooming flowers all the year round in her hometown Kunming, in Yunnan province.

ENGAGING YOUTH AND THE VULNERABLE AND MARGINALISED AS EXPERTS AND CO-CREATORS OF SOLUTIONS

> “Participation is not enough. It has to be meaningful.” **Jaimee Stuart**

JAIMEE STUART IS ON A MISSION: “TO DISRUPT SYSTEMS that perpetuate the advantage of a few.” As a researcher, she cares deeply about “the little guy”, “the person that has not been heard”. And is determined to advocate for them: “If I have a platform that I can create that helps other people who normally wouldn’t have a chance, I’m going to do it.”

Her passion for addressing “systemic inequality” has been driving her research career as a cultural and developmental psychologist. She has worked mostly with vulnerable and marginalised individuals and communities. “Because I think that many people who achieve, achieve despite vulnerability, despite marginalisation, despite being a minority. And that shouldn’t be the case. It should be achievement for achievement’s sake.”

Part of her work with vulnerable and marginalised populations has been done in the field of participation. And she notes “it has been hard to bring to the table people who don’t feel heard, or don’t often get the opportunity to be heard in decision making”. There are “inherent difficulties, ethical difficulties, issues of tokenism”, she warns.

“Participation is not enough”, she says: it has to be “meaningful”. And this applies to online spaces as well.

Jaimee Stuart’s research extends to digital contexts, examining cyberaggression and victimisation, online disinhibition, social media use, self-presentation, and social connection for young people online, as well as digital youth participation.

YOUTH PARTICIPATION IN ONLINE SPACES

In many ways, Jaimee Stuart, says, when the Internet came along, it was “democratising”, as it allowed us to start “recognising there were different points of view than the ones that were being privileged in scholarship, research, by the news media”, and so on. And in the early days of the Internet, “people could just get on there and be anonymous, be whoever they wanted to be and say whatever they wanted to say”, although this also had its risks – people thought Internet was not real life, but “it is real life, it is just a different manifestation”. So, the Internet had “all these possibilities and potentials of connecting ourselves to different ways of thinking about things, different cultural world views, also gendered world views, different religious backgrounds, different ways of thinking”, and this is one of its “critical benefits”.

But although the digital environment “enables a broader diversity of voices and more people to participate when they have the opportunity and the literacies to do so”, potentially acting as an “equaliser”, it is also true that “there are many digital inequities for

participation and for voice in the online space", she points out. The digital environment is "a broad space", she says, but "it is not as open of a space as people like to think it is".

Probably, "as a group of people who have less spaces for civic engagement, young people benefit the most from the openness of online spaces", because "they take on the new technologies much faster", "they are more likely to take them on". "But to the most marginalised youth to speak in those spaces, do people actually attend to youth voices in a meaningful way? Or are they just using those youth voices to say that they've engaged with young people?"

She also notes this participation may become more of "an obligation, a burden, on those people", "which has always been the issue of inclusion of marginalised voices". In addition, she says, it is important to recognise that those online spaces "are not necessarily safe spaces", as they are often dominated by people "who are privileged, often times Western voices or people who are older, or people who enforce the status quo some way, and then you have to fit their narrative to be part of it".

And she warns: "If you have a negative experience in an online space, where you're being yourself, especially as a young person, where you try to engage with other people, where you talk about things that are important to you, and then you get shut down, or people use your information and your data in ways that are unethical, unreasonable, irrelevant or tokenistic, are you going to want to put yourself on the line in the same way over and over again?"

Jaimee Stuart feels that "policymakers and researchers are trying to suggest that this is the new frontier of participation, and citizen science is the best and newest thing, but actually", she says, "we need to be thinking about really appropriate ethical ways of doing that". "What does it mean to say that we are engaging or participating, that youth are able to participate, without supporting it in its entirety?"

"The online environment is a replication of the offline environments. And it replicates inequities, and therefore we need to work harder and think about how to detangle these things without just saying 'just because you can access something it means it suddenly is accessible'. It is not the case."

Citizen science, she says, should be "topic oriented", so that "we can really work on co-creating solutions together, using youth voice as an expert voice".

As a Senior Researcher at UNU Macau, she hopes the team can "engage with research projects that connect to the voice of youth, that make youth participation at the centre", "that support this idea that the future for young people is now, that we shouldn't be waiting, that we should be equipping young people with the skills that they need". "Because research for youth is not just research for the future, it's for right now, for sustainability."

She suggests: "We need to build research projects that are more dynamic, more open to engagement, that allow young people to decide what the research topics are, that allow them to tell us what they would like us to focus on, that involve young people in the research, as researchers, as peers, as experts in their own right, and that also support those young people to grow and to develop."

"This is not only research, it is capacity building, it is creation, it is the only way we can work with that other side of our [UNU Macau] strategy, which is complexity."

And while many institutions are slow moving and hard to change, others, like the UN, "already have this idea embedded in its core about diversity". "So, we are well placed to provide a platform on the basis of being UNU Macau", she says.

DIGITAL LITERACIES

As for the digital transformation, in general, one of the "critical problems", Jaimee Stuart says, is that "there is the fear of what's coming and the fear of change, coupled with all of the economic, social, individual benefits that come from there", and "it is hard to take a balanced view". "The tendency is often focusing only on the positive side or the negative side, without understanding the risks and opportunities as they work together."

"My focus is on humans as they use technology; not just on technology as it relates to humans." And as "the influences are complex", "the biggest challenge", for her, "is to unpack that complexity and to figure out how we can really encourage the good things".

That is why the researcher is also particularly interested in education in the field of digital literacies or digital competencies. "Because the more you know, the better you are navigating it."

She challenges the concept of "digital nativity", often attributed to youth born after or growing up in the 2000s. "Just because you know how to access the Internet, or

because you can access it", or "because you used the tablet at age three, that doesn't mean that you have a clear understanding of the changing nature of digital life or how to protect yourself in those environments", she argues.

She has done some research in this field, particularly around social media literacies, looking at "how teachers and students can become more literate in understanding the types of technologies where we self-present and where we are connected with other people constantly". "There are mass interpersonal uses of the Internet and young people are not often taught the skills in formal schooling to understand what is real or accurate or inaccurate, to understand the ways people use the Internet in a myriad of authentic and inauthentic ways", she notes.

"With greater digital literacy", she says, "young people can become better digital citizens in the way they construct and create information about themselves and about others online, and teachers can become better in supporting young people to do that".

Jaimee Stuart was born in New Zealand and, before coming to Macao, she has moved around a lot, from Australia to Uruguay and Mexico, and back to Australia. She also spends a lot of time in Sri Lanka, with her family.

No matter where she is based in the world, she always takes two things with her: her family, physically, and her Tūrangawaewae, the place where she is connected to land, ancestors and history, as it is said in the Māori language – "it's the place where I stand, where my mountain is, my river, my people". "I just have this wide-open space inside of me that I bring with me everywhere."

SUPPORTING FAMILIES AND CHILDREN IN ADVERSITY

"We need to take a person-centred approach, not a problem centred approach, because sometimes what we think of as a problem isn't actually the problem." **Cara Antonaccio**

CARA ANTONACCIO WAS JUST A KID WHEN SHE SHARED A hospital room with people that had moved their entire families to the United States to get access to cancer treatment. The inequities and the stressfulness she witnessed back then ignited her interest in global health and in psychosocial support. Now, she is determined to use her research skills to support families and children facing adversity.

"I saw how difficult it was for families who travelled thousands of miles for their child's cancer care to not only manage having a child with cancer but also navigating the health system in the US, being in a new place, sometimes with five or six children they had to take care of at the same time", the UNU Macau Researcher tells us.

So, she began questioning: "How do we support families when they're ex-

periencing extreme adversity? How can we make it easier for them just by making simple changes in their lives and helping them get the support they need?"

And she went on to look for answers. She pursued a double major in Health Policy and African Studies, a master's in Public Health, a PhD in Social Work, and she still dreams of becoming a medical doctor one day.

In her PhD, she studied mental health and psychosocial well-being in conflict-affected communities and among youth who were formerly affiliated with armed forces and groups in Sierra Leone. Her work focused on understanding those former child soldiers' reintegration experiences after they returned home after conflict, including who they lived with, what kind of physical and social disabilities they were experiencing, and on looking at how to ensure their reintegration in the communities was successful.

"They were just little kids, and they were forced to do just heinous things to their family members, to community members. And in conflict-affected communities, when you reintroduce former child soldiers back into the communities, there is a risk of them not reintegrating successfully, which can increase the risk of subsequent insecurity", she explains. "So, it is really important that when formerly affiliated youth reintegrate, they do so in a way that is very sensitive to their needs and the community's needs."

Digital technologies may be of help. In this research, Cara Antonaccio and her colleagues at Boston College supported work on a mental health intervention that was delivered through what is known as "mHealth" (mobile health). "This was a cognitive behavioural therapy (CBT) intervention for youth affected by conflict, delivered through mobile technologies."

Though there are challenges to be addressed – such as ensuring people have the digital literacies needed to use these technologies and subsidising their use –, this type of approach, she says, allows people to get access to mental health services that wouldn't otherwise be available, "especially in communities that are sort of remote". "They can use their phones to speak to clinicians or therapists. So, there is a lot of promise in channelling these technologies as tools to support people who have experienced adversity."

One of the main take-aways from her research, she says, is that "we need to meet people where they are" and "go in with an open mind", she says. "We need to take a person-centred approach, not a problem-centred approach, because sometimes what we think of as a problem isn't actually the problem. So, we would go in with mental health interventions when families couldn't even feed their children…" Sometimes, she adds, "what we think people need isn't what they actually need", and sometimes maybe certain interventions should come "after we address primary needs of survival".

Curious by nature, and passionate about learning, one of the reasons Cara Antonaccio joined UNU Macau was that she wanted to get training in building digital platforms, while supporting experts in these fields in making decisions related to health and social issues. She is motivated to conduct interdisciplinary research, as well as to design data-driven tools to support health in humanitarian crises and communities affected by conflict.

She is currently working on a programme that examines the conflict-related and contextual drivers of attacks against humanitarian assistance, as well as the geospatial diffusion dynamics of attacks against aid workers, globally.

"I'm really motivated to develop digital tools that we can use to help aid workers and community health workers keep themselves safe so that they can focus on the work that they're meant to do", she says. And that includes "programmes where we can send them warnings saying things like 'this is the current situation at the place you are going, consider taking a different route'".

The researcher notes "the motivation the UN has to use evidence to inform practice and policy" and, hence, sees in the work of UNU Macau a "great opportunity" to respond to that call.

An ocean away from her home country, she keeps her great great grandmother's wedding ring close by. "To me, home is not really a place; it is sort of the people. And this makes me feel connected to my roots."

ENGAGING CITIZENS TO PREPARE FOR THE NEXT PANDEMIC

> “How can we engage citizens so that they can share their views and we are able to co-design policy with them?” **Serge Stinckwich**

AS A COMPUTER SCIENTIST, SERGE STINCKWICH IS ESPECIALLY interested in “providing tools for people who are non-computer scientists”, and in making digital technologies “more humane”.

When he was younger, he was more driven by the “theoretical aspects” of computer science. Now, he is more passionate about “the impact” it can create, especially long term. Citizen science, he believes, can help make that impact more meaningful.

Before joining UNU Macau as Head of Research, he was an Associate Professor at the University of Caen Normandie (France) and a researcher in the UMMISCO international joint research unit of IRD (French Research Institute on Sustainable Development) and Sorbonne University.

Over the years, he developed an innovative research programme about modelling and simulation of complex systems at the intersection of several scientific disciplines applied to developing countries’ issues. With a research interest in domain-specific languages, he has lived in Vietnam, where he worked in a programme that dealt with deploying simple mobile autonomous sensors during disasters. He has also lived two years and a half in Cameroon, where he worked in applications related to epidemiological surveillance and environmental monitoring.

PREPARING FOR THE NEXT PANDEMIC

Having a special interest in public health, Serge Stinckwich is currently working on a project in UNU Macau that is funded by I-DAIR, the International Digital Health and AI Research Collaborative: “Building Citizen Science Intelligence for Pandemic Preparedness and Response: Needs Assessment and Pilot Implementation”.

The project, which has been conceived as having different stages over the next five years, is based on the premise that, to contain the pandemic through accurate, real-time and data-driven measures, it is urgent to establish collective intelligence capabilities that involve all stakeholders.

“After the COVID-19, we can see that there are some issues – communication issues, trust issues – and disconnections between the experts, or the expertise, and the citizens”, the researcher explains. And the question is: “How can we reduce this gap?”

In this pilot phase, researchers are focusing on “the participation piece”. “How can we involve citizens who are not necessarily experts in the medical field, how can we engage them so that they can share their views and we are able to co-design policy with them?”

This question is being explored in three different countries: Brazil, Kenya and Vietnam. “Because we are thinking there are different contexts and, depending on the countries, there may be different issues to solve.”

The idea is to bring together, in each country, different stakeholders, including hospital staff, ministry officials, and people from different communities. This can be done in different groups, depending on the issues they want to address, Serge Stinckwich explains. “What are the main actors involved? What are the resources they have? What are the dynamics between the actors and the researchers? What are the interactions between the actors?”

Part of the process includes training facilitators, and building models that represent the reality of people, based on those discussions. It also includes “building games”, “to understand better some kind of interactions between the different stakeholders”, as well as building “a computer model” that can represent the actors and their behaviour, allowing for simulation and extrapolation, and for exploring different scenarios.

He explains all this happens in a kind of a “feedback loop” that involves presenting results to the people involved and enabling them to build trust and have a better understanding of each other’s’ points of view and behavioural reactions. In the end, the idea is to try to propose some contextualised policies, he says.

In addition to Agent Based Modelling, Serge Stinckwich’s current research interests also include Artificial Intelligence (AI) applied to Sustainable Development Goals (SDGs).

He highlights the importance of UNESCO’s recent Recommendation on the Ethics of Artificial Intelligence [1], which was adopted by 193 UN member states in November 2021, and presents some guiding principles regarding the development and use of AI technologies. According to the organisation, there is a need for “a human-centred AI”, and for “international and national policies and regulatory frameworks to ensure these emerging technologies benefit humanity as a whole”.

Serge Stinckwich believes many countries now want to assess their AI landscape, but he asks: “How can you apply these principles in a specific country?”

Firstly, “developed countries and developing countries don’t face the same kind of problems or issues, so it is very important to contextualise”, he says. Also, it is important to analyse the ecosystem in each nation to understand the potential risks and benefits these technologies pose in that specific context, he adds. In the end, policy recommendations may be different, depending on the country, he notes.

One project by UNU Macau that illustrates this need to assess AI in a contextualised form is the research that resulted in the report “Gender Sensitive Artificial Intelligence (AI) Policy in Southeast Asia [2]”, a work led by former UNU Macau Senior Researcher Eleonore Fournier-Tombs.

But Serge Stinckwich points out there is also “a need to think about ways to provide solutions in a broader sense”. For example, he says, there is still a lack of recommendations for the people or companies that are building the AI systems. “So, we have to provide regulation”, he says.

Would a global regulatory and enforcement instrument for AI be desirable, at this stage? “It’s difficult to answer”, he admits, because “it is not enough to say ‘your system should not do this or that’; we need to know how to guarantee that the system will not do this or that”.

“In principle, you need to have AI systems that do not promote discrimination, for instance. But how do you go from that? How do you operationalise such principles?” There are researchers addressing these questions, but Serge Stinckwich says we are still “a bit far” from finding a solution.

And while we look for answers, AI systems continue to be built, he notes. At the same time, there is an ongoing debate, the researcher explains: on one side, there are those who tend to a more transhumanistic vision – that advocates the use of current and emerging technologies to enhance human capabilities and improve the human condition – and think that too much ethical framework may slow down the achievement of these goals; and others who adopt a much more cautious approach to these current and emerging technologies, highlighting the need for stricter ethical regulations.

“Critical thinking” is key to address these questions, Serge Stinckwich says. Because there are risks and ethical problems that need to be addressed, including in the case of ChatGPT, which he recently addressed in a workshop. Some people, he says, believe such systems “will transform their lives” and will only bring about benefits, but they do so because they are not aware of the potential consequences they may have in a variety of fields, from environment to job market, for example. “It is our role to explain how such systems work, the benefits they bring, for sure, but also the potential negative impacts they pose.”

"Like a chemist needs to conduct experiments" to be in touch with reality, Serge Stinckwich says he needs "to code" from time to time. But what can really bring his mood down is to spend too long without teaching. "I need that kind of energy by young people", he says. "It is of the most importance to be in contact with people that energise you and will give you some new ideas."

When he was a child, in France, he first wanted to become an astronomer. "I was very passionate about that." In his first year of college, studying physics, he was even very much interested in quantum physics. But he eventually got "contaminated by computer science", he says.

A minimal and experimental electronic music fan, he likes to be engaged with people that work on this field "in the local scene". He did so in Vietnam, and he continues to do so in Macao. Asia does feel home to him.

ADDRESSING RISKS AND OPPORTUNITIES OF AI FROM A GENDER PERSPECTIVE

"AI should be made much safer through policies and regulations, and specific types of AI, such as autonomous weapons systems, should be forbidden." **Eleonore Fournier-Tombs**

A MEDICAL DOCTOR, A FOREIGN CORRESPONDENT, A DANCER. Eleonore Fournier-Tombs wanted to be many things when she was a child, but, by age 13, she was already attending Model UN conferences and aiming at the path she eventually followed: working at the United Nations.

"In a way, now, being a researcher at the UN, I have the opportunity to work for the organisation but also be creative and conduct my own research, which is wonderful", the data scientist tells us.

Eleonore Fournier-Tombs is a global affairs researcher, with a specialisation in technology, gender, and international organisations. She recently worked as a Senior Researcher at UNU Macau, where she led research on gender and Artificial Intelligence (AI).

When it comes to AI, she explains, "there are both risks and opportunities from a gender perspective". Among the risks are discrimination, "when an AI system has a different, erroneous output, based only on gender", and stereotyping, "when an AI system propagates the ideas about women's sexualisation and inferiority". Other risks, she adds, are exclusion, "when the use or development of an AI system is restricted to women", and insecurity, "when an AI system can cause safety issues for women".

However, she notes, if these risks are addressed, "AI can provide important socioeconomic opportunities for women, such as supporting their businesses, providing solutions to women's health issues, and reducing gender-based violence and trafficking".

One way of addressing the risks, she says, is "combining different government policies and regulations, along with technical standards that ensure that technologies are safe for women before they are deployed".

GENDER SENSITIVE AI POLICY IN SOUTHEAST ASIA

One of the research projects Eleonore Fournier-Tombs led at UNU Macau was "Enhancing The Development of Standards and Frameworks for Critical Technologies in Southeast Asia", for the International Telecommunication Union (ITU) Regional Office for Asia and the Pacific.

In this project, she and her team investigated gaps and opportunities in gender and other societal biases of AI in Thailand, Malaysia, Indonesia and the Philippines.

The project provided the policy report "Gender Sensitive Artificial Intelligence (AI) Policy in Southeast Asia [1]", as well as "a series of trainings to policymakers in the region, with the objective of informing the development of policies, standards and networks that would mitigate gender risks in these technologies and increase their opportunities", she explains.

"We found that policymakers in these countries were very receptive to the notion of gender-safe AI, but needed some clear guidelines as to how to think about them and address them in AI policy", she says. "Generally, gender-sensitive AI policy is not extensively addressed globally, so Southeast Asian countries doing this would be pioneering in the domain."

Eleonore Fournier-Tombs says that, in this research project, she learned a lot "about the intersectionality of gender in these countries, such as the difference in experiences for rural women, indigenous women, and elderly women".

There were also different considerations from a religious perspective, she adds. "For example, Muslim women in Indonesia and Malaysia may have different realities and different uses of AI than women of different religions. There are also many migrants coming to and from these countries, and AI in a context of migration is a rising area of concern."

The research team was also composed of JeongHyun Lee and Arthit Suriyawongkul, UNU Macau; Preeti Raghunath, University of Monash in Malaysia; Matthew Dailey, Joyee S. Chatterjee, Philippe Doneys, Wanchanok Sunthorn and Sirayuth Thongprasert, Asia Institute of Technology (AIT); Kris Villanueva, Government of the Philippines; and Febroza Belda, Indonesia.

While in UNU Macau, she also led the research project on "Gendered implications of Artificial Intelligence on the implementation of the Women, Peace and Security Agenda in Southeast Asia".

But AI technologies pose other challenges as well, and most of the issues on gender are observed with any group that has traditionally been marginalised in society, the researcher points out. "So, we see similar issues with people of colour, linguistic minorities, indigenous peoples, and so on."

Also, she adds, "because AI technologies are used so broadly across all sectors, they can have a number of adverse effects, including on the environment, as many models require specialised hardware and extensive energy resources to run".

But the researcher notes that just because there are many risks in using AI, it doesn't mean that we should never use it. "Rather, it means that it should be made much safer through policies and regulations, and that specific types of AI, such as autonomous weapons systems, should be forbidden."

DELIBERATIVE DEMOCRACY

Eleonore Fournier-Tombs is also interested in research on deliberative democracy. During her PhD at the University of Geneva and postdoc at McGill, she developed a tool called DelibAnalysis, which helps researchers predict the quality of political deliberations.

"It was developed in order to have better comparative metrics for deliberative venues, to support better deliberations", she explains. "For example, it was used originally to compare online and offline venues for deliberation, to think about specific features of these venues and how helpful they were in consensus-building."

The tool was then applied "to compare indigenous and partisan parliaments in the Canadian North, to understand what features of each were conducive to good decisions from parliamentarians", she says. Now, she explains, "it is used around the world by different researchers" and she plans "to redevelop it in the next few years to make it easier to use and upgrade the technology".

Eleonore Fournier-Tombs has also worked as a data scientist at the Centre for Humanitarian Data (OCHA). She started working there at the beginning of the pandemic "to develop models that would predict the spread and the severity of COVID-19 in

[1]

countries that were already experiencing humanitarian crisis, such as South Sudan, Sudan, Haiti, Yemen and Central African Republic".

She was then asked to contribute to similar work at the World Bank, "to look at the compound effect of natural disasters on COVID-19". "We studied Jamaica, Kenya, and Indonesia", she says.

"Overall, it was very interesting for me to see the impact of these events on the virus spread, and to be able to add features indicating vulnerability to COVID-19 as they varied in different countries and contexts", she notes.

This work also led to her participation in a grant from the International Development Research Centre (IDRC), received at the University of Ottawa, which aimed to localise the OCHA model to Senegal and Mali.

Today, Eleonore Fournier-Tombs is Head of Anticipatory Action and Innovation at the UNU Centre for Policy Research (UNU-CPR), in New York.

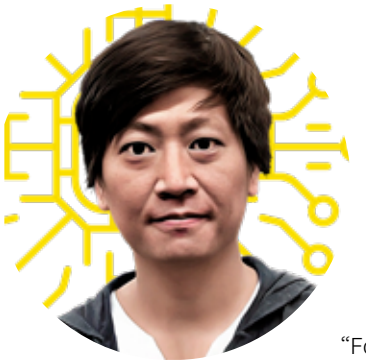
The teenager who took part in many UN mock conferences has grown up to be a researcher who enjoys "digging deep into an issue and providing conceptual and methodological framework for people to think about complex topics". And she enjoys doing this "from a global perspective", so she tends to research "issues of interest to the United Nations and member states".

"It's also very important to me to contribute to technical empowerment of people, so I like to do multidisciplinary work where social scientists or policymakers will gain additional technical skills and experience", she says.

A mother of two young children, there is one thing she cannot work without: "childcare". She recalls "this really was a big issue during COVID-19", when she had a five-year-old and a nine-month-old at home and was "trying to concentrate to do modelling and research" – "I did a lot of work at night". "Now, I really appreciate each day that my children are fine doing their activities, so that I can write." The science world, we guess, appreciates it too.

ENSURING ACCOUNTABILITY IN AI SYSTEMS

"There are certain things in the world that once you break you cannot bring back. So, we need to worry about them." **Arthit Suriyawongkul**



MANY STEPS IN ARTHIT SURIYAWONGKUL'S CAREER WERE taken after events that happened "by accident", he says. But, with a background in computer science, as well as in anthropology, he has been building knowledge around connecting the dots between humans and technologies, from different perspectives. Today, his research focuses on Artificial Intelligence (AI) accountability.

While there are some high-risk areas associated with AI that "we should avoid" and "prohibit" for the time being, because "we do not have enough scientific knowledge" on what its long-term consequences will be for humans, "there are other areas in which we actually have enough knowledge to deal with it, to control it", he explains.

"For those areas [we can deal with], we have some standards and we need to make sure that people who operate AI systems follow those

50

standards. And that is the job of auditors", he says, though admitting that the establishment of such standards at the regulatory level by individual countries is still "in the very beginning" and much auditing is done "case by case".

Arthit Suriyawongkul first joined UNU Macau as a Visiting Research Fellow, and continues to collaborate with the Institute as a researcher – he is currently working in the "Cyber Resilience among Women CSOs and Women Human Right Defenders in Southeast Asia" with UN Women.

As a PhD Candidate at Science Foundation Ireland Centre for Research Training in Digitally-Enhanced Reality (d-real), based in Trinity College Dublin, Ireland, he is working on automations that can improve the work of AI human auditors – which is usually linked to the safety aspects of AI, as he explains. One of the reasons for working on these automations is that there is a gap between the speed at which AI systems are being developed and the speed at which human auditors can assess all those systems.

He gives the example of decisions by public sector bodies. Justice systems include appeal instances to which people can turn to if they do not agree with a court's decision. And work in both instances involve similar scale of speed, he notes, as in both cases that work is performed by humans. However, if AI is used to generate court decisions at a first instance level, while allowing the possibility of people then appealing to instances where decisions will be made by human judges, because we still need to ensure the human oversight somewhere in the system, the work speed will be different, and the situation will become unbalanced.

Arthit Suriyawongkul illustrates the idea with potential figures: "If with AI we would be able to make verdicts for 10,000 cases a day, the capacity of the appeal judges would still be around five cases a day. So, we would actually have a huge gap in checks and balances in the system. This means the level of accountability inside the justice system would be lower."

So, such a system, he points out, is not necessarily "useless", but does require "some upgrade" to ensure accountability.

"But there are certain things in the world that once you break you cannot bring back. So, we need to worry about them, to be careful about them", the researcher points out.

Environmental impact assessment mechanisms, he exemplifies, can introduce precautionary measures to avoid consequences such as the destruction of a rainforest, for instance, because "a small harm may lead to a harm that is irreversible". Similarly, he says, "there is a fear that, in some very high-risk areas, AI may create the same kind of effect".

One of such high-risk areas is "subliminal AI", a set of techniques that have the potential to manipulate the human mind and to alter a person's behaviour. "If we, as a human society, do not actually have enough scientific knowledge yet of what will happen if we allow AI to do certain activities in a large scale, the current precautionary measure [available] is to prohibit it", he says.

"So, if an AI auditor, after his/her assessment feels [a certain use or tool of AI] is just too dangerous and we do not have enough knowledge about it, let's not go further."

FROM SOFTWARE TO ANTHROPOLOGY, AND BACK

Originally from Thailand, Arthit Suriyawongkul used to love drawing as a child, and dreamed of being an architect. But playing videogames in his high school years eventually made him develop an interest in computer science. "I wanted to be a programmer."

After he finished his undergraduate studies in information technology, he got a job "in a huge company, at that time", working in a team that was localising software into Thai language, as well as its algorithms and counting systems – like collation order, calendar, time system or currency –, "to fix the needs of local users".

This first "accident", or experience in getting "more involved with languages and cultures", made him start reflecting on the linkages between software engineering or computer science and "the societal, cultural settings" of the users, and of this "other set of knowledge we should be aware of".

An eager learner, he moved on to pursue a master's in Cognitive Science and Natural Language.

The next "accident", he says, was that, after completing his master, he had a chance to work in academic research, this time in "automatic summarisation". "It was about allowing more people to get access to information", as abstracts or summaries "actually help people decide whether they would like to invest their time to read further books or paper or articles".

Around that time, he spent many of his free hours editing the Thai Wikipedia. “People were expecting the Internet to bring a lot of knowledge to them, but Internet connection alone could not ensure that. You needed content. So, me and some other volunteers started to translate content.”

This experience developed over a period of political tension in his home country and new regulations regarding the online space. He and others became aware that part of the online content was being censored by authorities. In 2008, he and his colleagues co-founded the Foundation for Internet and Civic Culture (also known as Thai Netizen Network), an NGO promoting civil rights in the digital environment.

Working closely with some journalists, activists and lawyers, the computer scientist became increasingly aware that “the Internet is not only about computers connecting to other computers”: “Behind the screen, there are users; and they are humans.” So, he moved on to study a second master, this time in Anthropology. “It felt like a natural step for me in order to understand the human culture.”

So, after encountering “language” as a potential “barrier” in the relation between digital technology and its users, and “time” as a second one, Arthit Suriyawongkul identified “Internet censorship” as a third obstacle.

Looking at the world today, he admits not only his understanding of issues changed over time, but also the society and even the Internet infrastructures. Nowadays, for many people in some countries, he says, “Facebook is the Internet” – they go online mainly through their mobile phones and “they know Facebook before they know websites”. Another example he gives is the landscape of e-mail service providers, which, “globally”, is now concentrated in a handful of companies.

At the same time, he adds, web encryption was not as widespread back then as it is today. “It’s actually getting harder for local ISPs [Internet Service Providers] to censor the Internet”, but the problem now, he points out, is that “because of the concentration of services in very few big platforms, it is actually easier for those platforms to censor the Internet”. Today, he notes, search engines and social media giants “have more power in terms of information control than a lot of governments”.

And while legal instruments – such as Constitutions – are able to hold a government accountable in its use of power, a similar mechanism is lacking for these private companies, the researcher notes. He adds there is a debate now on “digital constitutionalism”, which deals with the need for a framework that ensures mechanisms of checks and balances and the protection of fundamental rights in the digital society. “It is a challenge.”

Though Arthit Suriyawongkul says his interests change over time, a main theme has always been “allowing people to get access to knowledge and fulfil their curiosity, their autonomy”.

As he loves to “find answers”, he feels “privileged” for, as a researcher, being able to work on the problems that he is interested in. Although he enjoys the individual reflection process very much, he highlights the importance of talking with co-workers, even if remotely. “Colleagues”, he says, are the one thing he cannot work without.

UNU Macau 30th anniversary

MESSAGES FROM UNU MACAU BOARD MEMBERS

Tim Unwin

Chair of the Advisory Board, UNU Macau
Professor of Geography Emeritus,
Royal Holloway, University of London

I first arrived in Macao in March 2016 by ferry across the Zhujiang River Estuary from Hong Kong airport. As so often on my later visits, the stretch of water between these two Special Administrative Regions of China was shrouded in fog. This not only made the crossing much slower, but also added to the sense of mystery.

The UNU Institute then was very much in re-start-up mode. Mike Best had taken over as the new Director in 2015 after the decision had been made the previous year to re-constitute the UNU International Institute for Software Technology – IIST (founded in 1992). With Ed Cuttrell from Microsoft Research as Chair of the Advisory Board, there was a buzz in the air about what could be achieved. Mike's own interests were especially in working with the UN's blue helmets (through the Institute's Digital Peace Lab), but there were strong interests in other research areas, especially gender (with the UNU playing a leading role in establishing the UN EQUALS initiative through its Gender Tech Lab), and also in local indigenous data (the Small Data Lab).

My memories of the city and Institute in the late 2010s were of multiple contrasts, the old town with its mixture of traditional Chinese and old Portuguese houses, in stark contrast to the modern casinos built on reclaimed land in the Cotai strip. The flavours and aromas of these different parts of the city fascinated me as I took time to wander the streets. The selection of Portuguese wines was better than almost anywhere else in the world apart from Portugal.

The Institute itself needed substantial physical refurbishment, and this was underway by the time Jingbo Huang took over initially as Assistant Director in 2018, with the Institute staff then being temporarily housed at the City University of Macau. Much evolved over the next year, with Jingbo becoming Director, new research in technologies relating to migration emerging, the name evolving into the UNU Institute in Macau, and the staff eventually returning to their beautifully refurbished building.

However, COVID-19 then struck in early 2020, creating significant challenges in terms of travel, research and recruitment. The Institute has successfully withstood these storms, and it will be so good to return in April 2023 at the start of a new exciting period in the Institute's evolution as its staff seek to undertake and share innovative research around the use of digital technologies in serving the UN's mission and agendas, especially focusing on a systems approach and engaging with some of the latest AI technologies. I can't wait to meet the Institute's new staff and catch up with old friends, but also to feel the vibrant fabric of the city, breathe in its hybrid scents, see how the streets I walked in the past may have changed, hear the multiple voices of tradespeople and tourists, and once again taste the complex diversity of its enticing foods and beverages.

Yonghua Song

Rector, University of Macau
Member of Advisory Board, UNU Macau

As the Rector of University of Macau and member of the advisory board to UNU Macau, it is a privilege to be part of these two leading research and education organisations in Macao since my arrival in 2018. I am truly pleased to witness the growth and development of UNU Macau in the past few years as it builds stronger links with partners in both Macao and Mainland China and connects the city of Macao to the world through its UN network worldwide.

Different from traditional universities, UNU Macau serves as the think tank within the United Nations and beyond. It conducts UN policy-relevant research and generates solutions. By connecting broadly with UN agencies, local governments, academia, as well as private sectors, UNU Macau has been able to address key issues expressed in the UN 2030 Agenda for Sustainable Development through high-impact innovations and frontier technologies. The connection and the unifications achieved are crucial for the whole society to progress.

55

MESSAGESFROM**UNU**MACAU**BOARD**MEMBERS

Together with colleagues on the board, we look forward to seeing UNU Macau's continued growth and the great effort it is committed to make, in both research and capacity building programmes which have been one of the major pillars in its 30 years of history. With a strong, professional and multi-disciplinary research and training team, I believe that UNU Macau has been and will always be fully committed to being a global leader for its committed research and capacity development and a trusted partner constantly exploring collaborative opportunities and maximizing its role and position to fulfil its missions.

Mohamed Sharil Tarmizi
Advisory Board Member, UNU Macau
Advisor, ASEAN Advisory Pte. Ltd.
Board of Directors, Lotus Cars UK

Happy birthday! A journey of a thousand miles begins with a single step and this journey has been 30 years now. As an institute, UNU Macau (together with its predecessors) has blossomed as one of the think tanks for the United Nations (UN) system. As we move in this digital era there is a pressing need to quickly understand issues related to digital technologies and how they affect us in our daily lives.

As someone who was previously from government and now in the private sector, I see the great value that UNU Macau has brought about as a go-to point for intellectual discourse. I wish that UNU Macau will continue to grow from strength to strength to continue to be an intersect between the various multi-stakeholders in the UN system, Member States, academia, private sector as well as civil society in fostering capacity development solutions which are driven by innovative digital technologies.

Nimmi Rangaswamy
Advisory Board Member, UNU Macau
Professor at the Kohli Centre on Intelligent Systems, Indian Institute of Information Technology

It is my privilege to write for the 30th anniversary of UNU Macau. Having been on the advisory board for more than three years I am a keen stakeholder in the future directions the Institute will take for now and in the future. UNU Macau is a policy-relevant research institute focusing on developing highly relevant, innovative and sustainable cutting-edge technologies. Much of its research is a reflection of a passionate concern for global problems of human survival, growth with sustainability and welfare with unanimity. I had the good fortune of playing an advisory role to the institute's leadership team and the international community of scholars engaged in policy-oriented research, technology capacity building and dissemination of knowledge in furthering the mission of UNU.

In my involvement with UNU Macau I have sat in debates, discussions, evaluations of research experts, recruitments, administrative processes, and, not in the least, relevance and significance of research to building policy. The Macao research team is poised truly at the intersections of interdisciplinary research and compelling development outcomes. The past couple of years has made me look anew at the UNU Macau research as a 'third space' harnessing the potential of academic research and industry innovation — a space that can potentially be sui generis think tank drawing from its unique location as a research body.

INSIDE PAGE PAPER

Olin Smooth › High White › 120gsm

•

ENVIRONMENTAL INFORMATION

FSC®

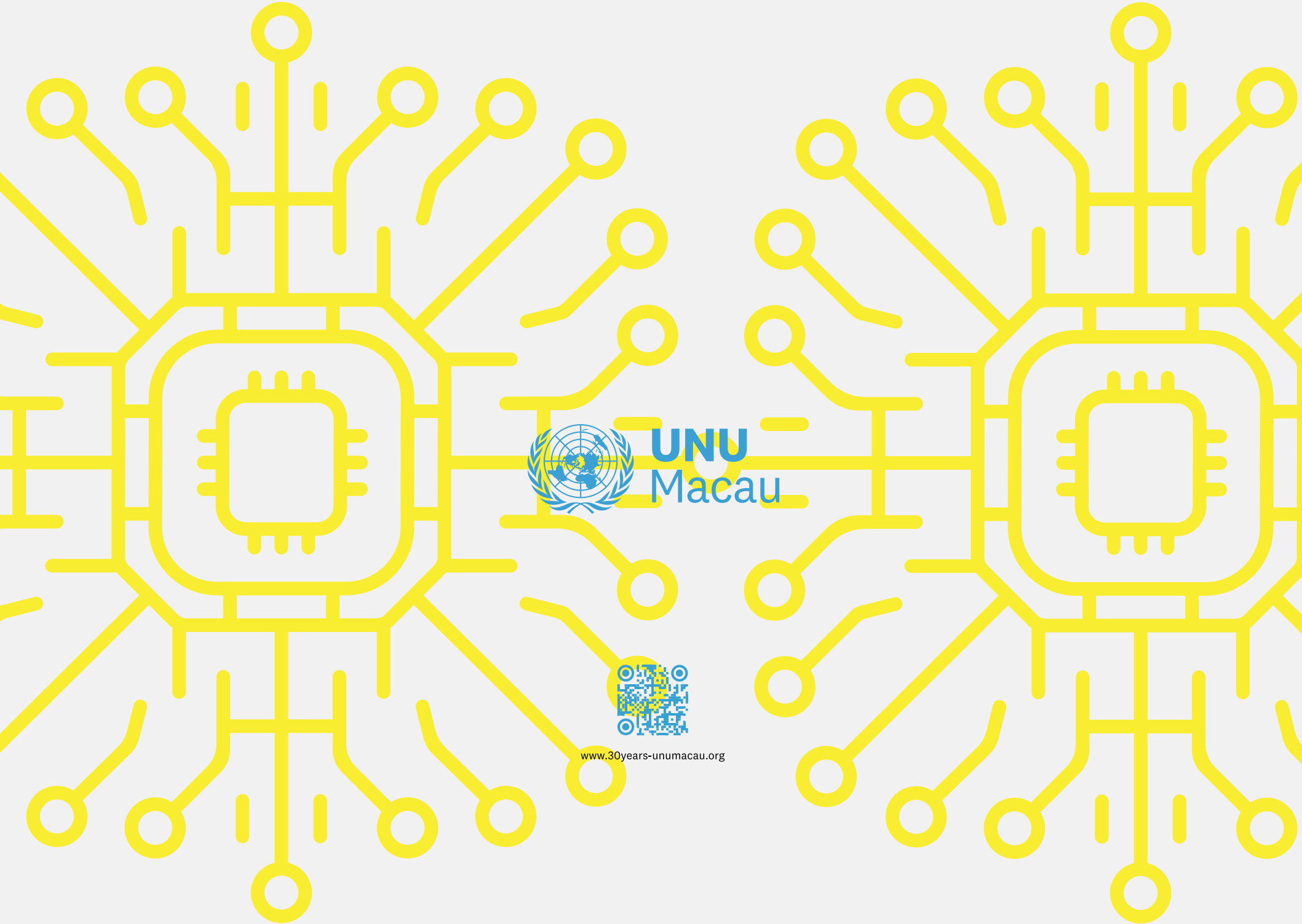
ISO14001

ECF

FULLY RECYCLABLE

•

200 COPIES PRINTED



www.30years-unumacau.org