PSET CLOUD

Innovation through collaboration

The PSET CLOUD DigiTrans 2022 conference report

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Acronyms and abbreviations

4 IR	fourth industrial revolution
AI	artificial intelligence
API	application programming interface
GDPR	General Data Protection Regulation
JET	JET Education Services
KYC	know your customer
MVP	minimal viable product
merSETA	Manufacturing, Engineering and Related Services Sector Education and Training Authority
NPC	non-profit company
NQF	national qualifications framework
NYDA	National Youth Development Agency
PMN	Pathway Management Network
POPIA	Protection Of Personal Information Act
PSET CLOUD	Post-school Education and Training Collaboration and Learning Opportunities and Utilisation of Data
PYEI	Presidential Youth Employment Intervention
SAQA	South African Qualifications Authority
SITA	State Information Technology Agency
SSI	self-sovereign identity
TVET	technical and vocational education and training
UNESCO	United Nations Educational, Scientific and Cultural Organization

Foreword

It is my pleasure to share with you the PSET CLOUD Digitrans 2022 Conference Report brought to you by the merSETA and its project partner, JET Education Services.

We are indeed privileged to have had such an excellent calibre of local and international speakers who accepted our invitation and willingly shared their expertise and knowledge on topics pertinent to the development of a digital platform for the post-school education and training sector.

The conference programme was well-aligned to the key focus areas of the PSET CLOUD as an interoperable platform that will ensure:

- Job matching - between job seekers and potential employers as users of the platform;
- Access to and use of career and labour market data to enable individual and organisational decision-making through various information systems linked through application programming interfaces (APIs) but without the integration of data;
- Credentials for lifelong learning - digital records of formal, non-formal and informal learning that can be verified with trusted partners; and
- Data privacy - self-sovereign identity (SSI) - which requires approval from the individual who owns the data before data is shared.

This focus is vital for us as a country to bring about the much-needed systemic change in an otherwise fragmented education and training post-school ecosystem. We have also been fortunate to address the challenges that such a multi-disciplinary project presents.

As a project that straddles education, labour market information and technology, the PSET CLOUD benefits immensely from the continuous inputs and support of experts in South Africa and around the world. These experts work in spaces contributing to the richness of this conference. As such, the merSETA has made excellent progress in the improvement of its own digital ecosystem by being an early adopter of the PSET CLOUD. We will gladly share the lessons learnt with similar organisations in the near future as the programme prepares to scale.

With over 550 delegates registered for the conference, we are pleased to have brought into view the progress made thus far and share deeper insights into several components of this five-year multi-stakeholder initiative.

The deliberations of the conference will allow us to continue this pioneering effort, thus enabling us to produce a product that serves the needs of the people and addresses large-scale unemployment.

We are also proud to announce the success of the call for nominations at the conference which culminated in the establishment of the PSET CLOUD Launch Group. This committee has already met twice and members representing various stakeholder groupings within the post-school ecosystem are playing an important advisory role in directing the development of the PSET CLOUD.

A special thank you to our keynote speakers, Dr Borhene Chakroun and Prof Saurabh Sinha, all invited speakers, panel members, delegates and conference partners for making this conference a resounding success.

We look forward to hosting a follow-up conference as we launch the PSET CLOUD in 2024.

Wayne Adams (Mr)
Chief Executive Officer
merSETA

Conference programme

Day 1 (28 February 2022)	
Introduction: Connecting people and data	Dr Rooksana Rajab, Director of Resonance Consulting Services and Associate at JET Education Services
Welcome address	Mr Wayne Adams, Chief Executive Officer, merSETA
Keynote address	Building bridges to better decisions: Interoperable platforms – A UNESCO perspective. Dr Borhene Chakroun, Director of Policies, Lifelong Learning Systems, UNESCO
Session 1: Credentials and micro-credentials: Occupations	Dr Julie Reddy, CEO, South African Qualifications Authority, in conversation with Mr Herman de Leeuw, initiator and Executive Director, Groningen Declaration Network, Mr John Hart, Associate, Centre for Educational Sociology, University of Edinburgh and Mr Vijayen Naidoo, CEO, Quality Council for Trades and Occupations
Session 2: Differential privacy	Dr Bangani Ngeleza, Executive Director, Nantso Holdings, in conversation with Mr Nicholas Grislain, Chief Science Officer and Co-Founder, Sarus Technology
Session 3: Self-sovereign identity (SSI)	Barbara Dale-Jones, Director, The Field Institute, in conversation with Mr Carel de Jager, Managing Director, ChainOps Pty Ltd, Ms Beth Havinga, Managing Director EdSAFE AI Alliance and Mr Lohan Spies, CEO/Founder, DIDx
Session 4: PSET CLOUD governance models	Dr More Manda, Senior Manager: Strategic Planning, merSETA, in conversation with Mr Jason Bygate, Head of Innovation, Tech and Data for Development, Capacitate Social Solutions, Mr Chris Beukes, Senior Employability Advisor, Skillbank, Ms Lazelle Van Kramberg, Deputy Chairperson, Organised Labour, National Skills Authority and Mr Paul West, Senior Education Adviser, Paul West and Associates
Wrap-up and closure	Dr James Keevy, CEO, JET Education Services

Day 2 (28 March 2022)	
Welcome	Dr Rooksana Rajab, Director, Resonance Consulting Services and Associate, JET Education Services
Keynote address	The Possibilities for the PSET CLOUD: Prof Saurabh Sinha, Deputy Vice-Chancellor: Research and Internationalisation, University of Johannesburg
Session 5: Toward an appropriate, relevant and representative governance structure	Ms Nicole Copley, Independent Legal Professional, ngoLAW (Pty) Ltd
Call for nominations to serve on CCxPPP.za	
Session 6: Demo of international interoperable systems	Ms Eduarda Castel-Branco, Senior Human Capital Development Expert: Qualifications: Africa Team, European Training Foundation, in conversation with Prof Mongi Boughzala, Professor of Economics, University of Tunis El Manor
Session 7: Complementary platforms in South Africa	Dr James Keevy, CEO, JET Education Services, in conversation with Mr Stephen Logan, CEO, PrivySeal, Ms Carmel Marock, Manager, Singizi Consulting Africa and Mr Kuben Nair, Chief Brand Officer, Harambee Youth Employment Accelerator
Session 8: Demo/Launch of PSET CLOUD MVP	Ms Kelly Shiohira, Executive Manager, JET Education Services, in conversation with Mr Andrew Akpan, Senior Consultant, Reos Partners, Ms Kirtida Bhana, Training Executive, Plastics SA, Ms Barbara Dale-Jones, Director, The Field Institute, Mr Khetho Mtembo, Senior Software Engineer and Mr Kgothatso Tloubatla, Software Development Graduate
Day 2 closing	Dr James Keevy, CEO, JET Education Services, in conversation with early partners: Dr Jeremy Gibberd, Chief Researcher, Council for Scientific and Industrial Research and Adjunct Professor, Nelson Mandela University, Ms Sandiso Sibisi, Director, COOi Studios, Mr Yamkela Spengane, Founder and CEO, Spengane Automotive and SapioTek
Conference wrap-up and closure	Ms Sebolelo Nomvete, Chief Operating Officer, merSETA

DAY 1

Introduction

Work and learning in South Africa, very distant friends in a post-apartheid South Africa, are beginning to shake hands with the introduction of the Post-School Education and Training Collaboration and Learning Opportunities and Utilisation of Data (PSET CLOUD) project. JET Education Services (JET) and the Manufacturing, Engineering and Related Services Sector Education and Training Authority (merSETA) have been the driving force of the project for the past three years.

Much progress and development has taken place since the inception of the project, and an inaugural virtual conference, *DigiTrans 2022 Conference*, was held on 28 February and 1 March. The theme, *Building Bridges to Better Decisions,* sums up the intention of the conference – to promote engagement, collaboration and partnerships with relevant stakeholders representative of citizens, civil society, the public sector and the private sector.

DAY 1

The PSET CLOUD vision – connecting people and data

A pre-recorded video[1], which served as an introduction to the PSET CLOUD at the beginning of the conference, features Dr Rooksana Rajab, a director of Resonance Consulting and a senior associate of JET, who leads the five-year project.

The PSET CLOUD solution is geared towards helping learners, job seekers, educators, employers and policymakers equally so that everyone can collaborate and make better informed decisions. Dr Rajab described the PSET CLOUD as "a social construct that addresses fragmentation in our education, training and development system" and a technological means that can narrow the gap between education and the labour market. She explained that many factors have contributed to this fragmented state, in which key organisations in one ecosystem are working in silos "so much so that work and learning have been distanced from each other, despite several attempts over the years to unite them".

Dr Rajab expounded on the "when" and "why" of the project: the big disconnect between South Africa's post-school learning and work, evident in the high unemployment numbers reported year by year since 1994. And she cited the latest figure as being an all-time high of 34.9% in the third quarter of 2021. "So there's an urgent need for citizens to skill, upskill and reskill themselves, to ensure they remain agile and adaptable in an unsure and volatile labour market."

Having sketched the timeline of the project in broad strokes, Dr Rajab shared the vision with the audience: "to have an interoperable platform that connects large volumes of data and key stakeholders in the education and training ecosystem so that there is more efficient planning and better decision making". She eloquently described the manifold utility of the platform: it will be able to harvest rich knowledge and intelligence from the data that is collected; will enable citizens to make informed post-school decisions; will help unemployed people find jobs through the matching of skills with opportunities; will provide insight into trends; will close the gap between supply and demand in the labour market in the long term; will show available job opportunities, what the formal and non-formal learning requirements for these jobs are and where people can go to get skilled. She went on to add that the intention, in the long term, is to empower citizens to create the capacity for change and systemic change in particular. This could be possible by fostering trust and collaborations within the sector. Hence the notion of building bridges "so that data can be anonymised and shared, while still respecting the rights of the individual and ensuring we comply with data privacy".

Dr Rajab reiterated the need for the platform, which is interoperable and powered by artificial intelligence and machine learning that produces smart insights from application programme interfaces connecting stakeholder datasets. Citing the complex system in South Africa "where individuals have to navigate multiple sources of information, most times with very little resources and extremely poor access to information", she firmly believes that the platform is one that will allow not only people but also data to be connected. And with its focus on connecting work and learning through data, will drive long-term economic upliftment.

The video concluded with steps for the future that include: "consulting widely on adopting a suitable governance structure with an appropriate institutional form … to be in place, hopefully, by the end of 2022"; and adopting a minimum viable product (MVP) during the planning process for scaling. Dr Rajab appealed to the audience for their continued support of the project and acknowledged that in order to achieve these two medium-term goals, "we will continue our journey of broadening and deepening collaboration".

1 https://psetcloud.org.za/events/previous-events/digitrans-2022/pset-cloud-intro-video-by-dr-rooksana-rajab

DAY 1

Welcome address

Wayne Adams, chief executive officer (CEO) of merSETA, co-sponsor of the PSET CLOUD, officially opened the conference and welcomed an audience of more than 560 delegates representing government, business, the non-profit sector and civil society[2]. Despite the somewhat bleak context surrounding the conference – a time in which South Africa and the rest of the world are recovering from the devastating effects of the COVID-19 pandemic, particularly in the areas of education, training and work – Mr Adams remained upbeat about the role that the PSET CLOUD could play in South Africa's post-COVID-19 recovery.

Building Bridges to Better Decisions, the theme of the conference, was introduced by Mr Adams as "such a great way of explaining the importance of the interoperable data ecosystem because fragmented systems in planning and implementation of policy and sectoral priorities have compromised how and the extent to which the PSET sector responds to national and sectoral priorities". He said that the scarcity and mismatch of skills are among the indicators of challenges in the PSET sector because of unreliable data for planning and implementation.

The theme seems to echo a recommendation by the Organisation for Economic Co-operation and Development: better coordination and cooperation between all stakeholders. Referring to its 2019 report, *Getting Skills Right – South Africa*[3], which identified some of the challenges confronting the PSET and labour market, Mr Adams highlighted the recommendation to strengthen skills development agendas. He also explained the role of the merSETA as "an intermediary body that brings together the worlds of work, learning and policy", strategically positioning itself as an early adopter of the PSET CLOUD initiative. The decision to be an early adopter was influenced by the alignment of the PSET CLOUD objectives with one of merSETA's strategic outcomes: "Our strategic outcome is [to have] ethical governance and resource-capable merSETA operations established and maintained [and] to adequately provide skills development related services, goods and products that are responsive to occupations and skills growth demands of the MER sector and labour market."

Mr Adams was emphatic about the digital transformation of the public sector being key in driving South Africa's growth and development agenda and addressing "the triple challenges of poverty, unemployment and inequality". The importance of the interoperable data system is that it deals with reliable data in real-time. Access to such a system would assist citizens, employers, PSET institutions, policymakers and other key role players with making make informed labour market decisions.

Mindful of the conference theme, *Building Bridges to Better Decisions,* Mr Adams stressed the importance of collaboration: "In a data- and digital-driven fourth industrial revolution (4IR), SETAs, universities, technical and vocational education and training (TVET) colleges, industries, civil society and government can no longer afford to ignore the power of data and collaboration, which has been made easier by the use of digital technologies." He concluded with "an open invitation to all institutions operating in the PSET sector to join us on this journey. We all owe it to the citizens of our country to build a PSET system that can support South Africa's socio-economic development agenda".

2 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-mr-wayne-adams-day-1-welcome

3 https://www.oecd.org/els/getting-skills-right-south-africa-9789264278745-en.htm

DAY 1

Keynote address:

Building bridges to better decisions – Interoperable platforms *A UNESCO perspective*

The keynote address by Borhene Chakroun[4], Director of the Division for Policies and Lifelong Learning Systems at the United Nations Educational, Scientific and Cultural Organization (UNESCO), provided pertinent points for consideration when he presented UNESCO's perspective of interoperable data systems. Beginning his presentation with a glimpse of the impact of COVID-19 and the disruption in learning, Dr Chakroun reminded the audience of the dual role that digital technology could play: while it can connect, it can also divide along various parameters, such as wealth and skill sets. Divisions are exacerbated by the fact that this role plays out within an unevenly emerging ecosystem of digital learning. He also urged the audience to consider "a broader vision of a new social contract for education", emphasising that any discussion of interoperability should not be limited to technical aspects but should include human-centred elements – centring on the most marginalised by addressing the digital divide to ensure the right to education; steering digital transformation according to education needs; expanding investment through free and high-quality digital education content. He listed five dimensions for transformation that UNESCO is proposing for a new social contract: (1) pedagogy, (2) curricula, (3) teaching, (4) schools and (5) learning in all spheres of life.

UNESCO views data protection as a fundamental human right, and the following questions are guiding the work of the organisation:

- *How do we ensure that data is transparent, open to be analysed and understood by all, without causing insurmountable ethical issues?*
- *How do we ensure that the data fairly represents all learners equitably?*
- *What measures are needed to mitigate potential bias by gender, ethnic grouping, religious affiliation, demographic group, socioeconomic status, etc. within education planning processes that use advanced analytics against data profiling (or deterministic algorithmic interference)?*
- *How do we ensure data privacy and anonymity, when data mining makes it possible to de-anonymise apparently anonymised data; and how do we prevent and mitigate data breaches and surveillance?*
- *How do we resolve who owns the data IP – the EdTech provider or the learner, especially given that the learner usually owns the IP of anything else they create, such as a poem or a painting?*
- *How do we reconcile data captured by commercial players, ultimately for profit, with data captured and analysed for the common good? How can data help to advance SDG4 [sustainable development goal 4] and the "right to education"?*

Dr Chakroun shared a possibly extreme scenario that he had conceptualised before COVID-19, a scenario that has become the reality after COVID-19, and urged the audience to think about other possibly extreme scenarios. He referred to the metaverse credentialling that will also help to shape thinking about digital ecosystems. Citing Roy Amara, past president of The Institute for the Future, he concluded with a flourish, "We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run."

4 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-borhene-chakroun-interoperable-platforms

DAY 1

Questions

Thought-provoking questions were asked after Dr Chakroun's presentation. The questions and responses follow below:

Abeeda Holdstock: ***The five dimensions that you've described do not mention infrastructure, particularly hardware versus software and access. Is this not one of the biggest issues that Africa faces?***

Borhene Chakroun: "The importance of the infrastructure that Abeeda mentioned also relates to the diversity of the ecosystem across the world and how in some economies, we don't have schools, for example, or school buildings. During COVID, we understood that school is very important and that online learning had brought about a myth that we can live without schools. We feel that schools are important not only for learning but for social integration, for health and for nutrition. But we probably need to rethink schools. We need to rethink the walls, the timetable, the learning spaces and look at the learning that is happening in the different aspects. In that case, the infrastructure becomes much broader than building schools or bringing tables or computers into one space. We have to think of the connectivity of learners, for example, and that is not necessarily only connecting schools to the internet, or bringing computers into schools. So I feel the infrastructure dimension also has to take into account the philosophy we have for learning spaces, for connecting learner spaces, for placing it in a lifelong learning perspective."

James Keevy: ***Is there a place for international agencies to support countries with common and open platforms?***

Borhene Chakroun: "Yes, international agencies do indeed have a role to play but I believe that it is very hard to regulate technology. It's almost a 'mission impossible', at least for an international organisation such as UNESCO, and in any case, we don't regulate technology. But we do regulate principles, ethics, international norms regarding recognition and the valuing of qualifications, for example. So that's the train we need to take." He added, as an example, that UNESCO had adopted a new recommendation on open science and one on ethics and artificial intelligence. "We could, for instance, adopt a recommendation on ethics in interoperability or in a learning ecosystem. I feel that's the action we need to take and that's the responsibility we have. I also feel that this probably requires cross-agency collaborations. For example, the ITU [International Telecommunication Union], in this case with the Telecom and Broadband Commission, could be involved in such discussions because there we have [both] the telecom companies and the stakeholders; there is space for collaboration."

DAY 1

Questions

Julie Reddy: ***How will we mitigate the commodification of data while protecting the data owner's agency?***

Borhene Chakroun: "Part of the work that we can do in bringing together member states would be [on] how we can mitigate these tensions or these challenges of protecting data while also leveraging data for better learning from a lifelong learning perspective … there are some elements of good practices." He cited the example in France where strong data protection laws and rules exist. "The GDPR [General Data Protection Regulation] is one, at a European level. There are probably some national legislations that are important but for now, they have been looking at data [protection] in society and the economy and less so in education. And we feel this is the work that we need to advance."

James Keevy***: Could we consider a new context where credentials are [worth] more than qualifications?***

Borhene Chakroun: "I think this is an important debate. One question is: how, or through which lens are we understanding the evolving credentialling ecosystem? Either we look at it through the lens of the national qualifications framework – a more institutionalised perspective on qualifications and credentials. Going forward, this will probably be a limitation on the way we look at learning and the learning experience. Or we look at credentialling from a much more open perspective. And in that case, considering credentialling or another form of presenting the learning experience and outcome – the learning that we are achieving – would be the way forward that we would have to take in our [UNESCO's] work. We would probably need to think about this perspective where the physical and the digital or the virtual will have to intersect, including providers, the learning itself and the learning journey.

We would have to be clear about what the objective and overall goal is, and the overall goal must remain human-centric and driven by our quest for a sustainable agenda for a more humanistic perspective – not by a commercial, technology-only-driven aspect.

At the end of the day, we would like that any learning experience or representation is recognised, is valued and is valuable for further learning or for commercial or social purposes. So if it loses that element of valorisation for the individual or for the community or society, then we have a problem with credentials or with the way we are presenting them. This must be part not only of a national perspective but also an international, cross-border perspective because mobility in this "metaverse perspective" is not only a physical mobility; the mobility is a virtual one. You can learn sitting in Johannesburg and engage with a programme that is in Santiago, Chile. And you can earn a credential from across the border but would like to use it for your local activities, and **that** dialogue, **that** collaboration, **that** agreement, is what we need to address.

DAY 1

Questions

I feel that we have an open avenue that we have to explore. But we are not there yet. There is still a very heavy institutional perspective on qualifications, which probably will remain, in some parts, for instance, basic education or for specific types of credentials and qualifications. But increasingly, the lifelong learning journey will be driven by a much more flexible, more agile and potentially a very open credentialling ecosystem."

Rooksana Rajab: ***You talk about international collaboration. We, in South Africa, are grappling with systems collaboration. What are some of the pointers you can share with us on how we can open this conversation so that we all reach for the same objectives? In my experience, everybody that we talk to – from policymakers, decision-makers, implementers, citizens – they all want an improvement in their lives and their livelihoods and, similarly, recognise the value of lifelong learning. Could you share with us some of the things you've succeeded with that we could consider from a systems level and then organisational level and then individual level in interoperability?***

Borhene Chakroun: "First, in any discussion, I believe the transformation should be steered by the stakeholders rather than by the technology. If we are steered by technology, we will be in a situation we cannot control. We must be steering the digital transformation, and this must be at the centre.

Second, I think that we speak a lot about the transformation and the dialogue without thinking about the capacities of the institutions themselves, their ability to engage and the capability of the stakeholders. I think investing in the capacity of the institution is very important.

And lastly, the governance dimension: This requires multi-stakeholder dialogue. It cannot only be government organisations. It must be government, civil society and the private sector playing important roles. And that is what we're trying to do. For example, at UNESCO we have a Global Education Coalition that includes the UN [United Nations] organisations and, of course, the government but also civil society, a foundation, private sector, media and research institutions. I think that multi-stakeholder collaboration would be very important and would be needed [in the South African situation]. It cannot be solved only by the public [sector] organisations."

DAY 1

Session 1:

Credentials and micro-credentials: more than qualifications?

Credentials, micro-credentials, macro-credentials, credentialling? What do these terms mean, and how are they used? What about qualifications? These were some of the questions the three panellists, Herman de Leeuw (initiator and executive director of the Groningen Declaration Network), John Hart (retired Head of Qualifications Strategy with the Scottish Qualifications Authority, now an independent training and education consultant) and Vijayen Naidoo (CEO of the Quality Council for Trades and Occupations) grappled with during the question-and-answer session chaired by Julie Reddy[5].

When introducing the topic, Dr Reddy referred to a question raised earlier in the keynote address, "Could we consider a new context where credentials and micro-credentials are more than qualifications?" and also referred to Dr Chakroun's response to that question, which was essentially that it depends on the lens through which credentials and qualifications are viewed. Dr Reddy suggested that "we take a more expansive view and lens and look at learning *outcomes* rather than the *output*, the end-result, which is your qualification certificate and your transcript".

In introducing the discussion, Dr Reddy shared her views on credentials and micro-credentials and what they mean for the South African National Qualifications Framework (NQF) space. She admitted to "really grappling" with the terms, their meanings and how they are being used. A Google search produced the following definition for the term, "credential": "a qualification, achievement, personal quality, or aspect of a person's background, typically when used to indicate that they are suitable for something." Currently there is no common definition of micro-credentials but "since it is a derivative of credentials, I think that the same sort of descriptors apply".

Dr Reddy mentioned that current education systems and employment recruitment practices still focus almost exclusively on formally acquired and recognised full qualifications rather than on other forms of credentials. "Many countries in Europe and North America, in particular, appear to confine their narrative on credentials to a narrow viewpoint that is premised, in my view, on traditional and linear academic educational thinking, that the only learning that has merit or deserves consideration is that which is quality assured, formally assessed and certified as a qualification or a credit."

Dr Reddy provided a South African viewpoint that contrasted with this narrow viewpoint. "In conversations with colleagues, many hold the view that qualifications and/or credits reference only *some* of the aspects of a more expansive basket of non- and informal credentials and micro-credentials." This view is premised on the reality that, while a person's learning journey over a lifetime is cumulative, it is seldom linear. "Many of our own competencies, attributes and skills are accumulated most often in haphazard and unintentional ways through a diverse nexus of non-formal and informal, mostly self-directed learning pathways." She said that the evidence of this is usually showcased most clearly in a person's biography, curriculum vitae (CV) and resume, which spotlight not only formal qualifications but also other achievements, competencies and attributes, leaving the reader to determine suitability for something. "In other words, concluding that recognition of learning and other credentials is determined by the recogniser."

5 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-julie-reddy-credentials-and-micro-credentials-in-nqf

DAY 1

Panel discussion

Dr Reddy then posed questions based on these views to the panellists.

Her first question was: ***What are your views on the idea that there is more to learning that needs to be recognised and acknowledged as credentials, rather than the current over-emphasis on formal qualifications?***

"It's a very rich question, full of all sorts of complexities and overlaps between ideas, so I want to give an answer which is both broad and, in a sense, conservative. It seems to me, in moving to an outcomes-based system as we did [in Scotland] and you did [in South Africa] many years ago, you open up the possibilities for recognising all sorts of different achievements, as long as it can be stated in outcome terms."

Mr Hart said that in his work in many countries (setting up qualifications frameworks), "there isn't really an idea of how anybody could have an achievement which is as broadly defined as that. The European Qualifications Framework offers a definition of 'qualification', which is 'the formal outcome of an assessment and validation process obtained when a competent body determines that an individual has achieved learning outcomes to given standards'. If you read that in one way, it leaves things very open but it also allows you to be very tight and restrictive in it. It depends, for instance, on how you define 'a competent body'; and in some countries, that's the ministry. So, on the one hand, my answer is 'Yes'; we should be exploiting all the opportunities of outcomes-based credentials. But on the other hand, I want to pose a question: Why is it that formal qualifications are seen as so important and given such wide recognition?"

He proceeded to provide possible answers to that question. "People are sometimes conservative and want to look after their own interests as represented in the system as it stands. But how are gatekeepers and recruiters and employers to find their way through the growing maze of credentials?" He added that there are currently about one million credentials available in America, and while there is logic in the formal qualifications that needs to be understood, there is also the institutional logic in the organisations that award, deliver and assess, which also needs to be taken into account.

"We need to interrogate the form and substance of what it is we are talking about when we talk about qualifications, credentials and micro-credentials. In South Africa and many other countries, the emphasis is on a formal qualification, and I think that in the South African context, everyone aspires to that formal qualification, irrespective of one's background. With limited university spaces available, for example, there is a scramble for this formal qualification because, socially, it has particular meaning or standing.

If credentialling and micro-credentialling is part of a process of getting towards a qualification, then that is the substance and form I am talking about. Is it a way for us to recognise prior knowledge and skills that have been obtained? And in the South African context, what is its worth? Is it for sustainability? For self-employment? Or even leading to employment? Or does it also constitute recognition towards a pathway that will eventually culminate in what we call a 'full qualification', or what in other countries is now being called 'the credential'?

Panel discussion

Have we learnt any lessons from the standards-based system that we had, which was in some sense micro-credentialling? Is credentialling or micro-credentialling a replacement? Is it complementary?"

He concluded by saying that "industry certainly seems to have an appetite for this element called credentialling or micro-credentialling because it focuses on a specific skill, which industry would require, while those of us who look at this more academically, within the constructs of an NQF, would probably overcomplicate what might be a much simpler issue [when] viewed by industry".

Herman de Leeuw responded: "To me, it seems that the terminology is sometimes so important. A 'credential' is basically something that testifies and attests to what someone has achieved. It could be a macro-credential, a micro-credential; in a way, they are envelopes: they stand for a certain amount of learning accomplished, while at the same time, 'qualification' may not necessarily be the same thing, because to me – coming from the background of a credential evaluation agency – a 'qualification' meets the requirements of a certain professional licensing body, most clearly in the case of medicine or physical therapy. There are a number of professions that basically require a qualification.

Now it might be that in the South African context, you don't deal easily with these terms because they may have very distinct connotations. But nevertheless, for the discussion, it may be useful to draw a line between, well, anything that someone does – we can capture either in formal or non-formal learning. I think micro-credentials come into their own right when a person has achieved their first position in their employment history. We all know that there is something like an 'entry qualification' to get you where you want to be, a starting position; but haven't we all witnessed that? Having been trained as a chemist, a physician, whatever, after 20 or 30 years, you are no longer working in the same field, and this is where micro-credentials and the whole issue of non-formal/informal learning become so important."

Mr de Leeuw said that it becomes important because "organisations require people who have soft skills, or very specific skills, so there is a need in all organisations and society as a whole for these credentials".

In response to the further question about a definition of credentials and micro-credentials and how these terms might be used in an NQF space, Mr de Leeuw explained: "There is this term 'macro-credentials' – not in opposition to but complementing 'micro-credentials'. The term 'macro-credential', as defined recently by Beverley Oliver, means any prolonged block of educational attainment that is formally approved, quality assured, typically bachelor's degrees, master's degrees, or teaching qualifications."

He added that micro-credentials might be part of macro-credentials. "A micro-credential may be one semester, as part of the road towards a bachelor's degree; but at the same time, they may also sit somewhere else – that's the confusing part. Most of the qualification framework systems that we know have been devised to deal with a whole series of educational levels such as general secondary education, vocational and technical secondary education and higher education such as bachelor's and master's degrees. He continued, "Micro-credentials were not consistently thought

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of to 'fit in' the system. I think the systems will have to accommodate the micro-credentials because these might not easily fit into any system at all. But since there is this societal need for them and a societal appreciation of what micro-credentials can bring for organisations and for persons, there simply is the need to rethink qualification systems and frameworks."

Mr Hart explained an initial struggle to find a definition for the term 'qualification' and having decided on that term, there remained a "rag-bag of other things which could be called supplementary or part-qualifications". He observed that "I find the term 'micro-credential' very unhelpful. It is a distraction, more to do with marketing than conceptual analysis. Does it mean more than a small qualification or other credential normally delivered online? If so, that would be fine; we would understand what it was. But that definition would not help us to decide whether these go into the qualifications framework or are recognised for purpose A or purpose B and so on."

He added that he was "very alarmed" at some of the more disruptive US-based developments in this field, which are "opening up a sort of Pandora's box of expectations and half-understandings about the process of awards and recognition and how people actually choose to give status to a particular type of achievement or qualification".

Mr Hart commended the Credential Engine[6], describing it as "a non-profit database that offers an exhaustive list of characteristics, which you could use to define a type of qualification". He added that the website also has a list of types of credentials.

Moving on to the inclusion or rejection of micro-credentials in qualification frameworks, Mr Hart recommended that this should be dependent on whether or not these micro-credentials meet – as with any other qualification or award – the rules of that framework. This would vary from one framework to another. He cited the example of the Scottish framework, which would simply say, for instance, that "the micro-credential must have clear learning outcomes, a minimum of ten notional learning hours, formally recorded assessment and be subject to both internal and external quality assurance".

Mr Hart concluded his answer with: "I support an approach which uses a broad definition of 'credential' and then backs it up by an analysis and a framework which allows you to describe any qualification within a set of agreed terms. That would help credential evaluators decide what they would accept, and it would help framework people decide what would go into the framework and what would not. Micro-credentials, in that case, would have served for a *range* of types of qualifications and, therefore, that term itself is not helpful in this context."

Vijayen Naidoo expressed agreement with Mr de Leeuw's argument that NQF policy documents constrain their education systems. "I am of the view that NQF policies should be opened up to provide for micro-credentialling." He suggested that the 'skills programmes' that were introduced in the South African space link the two – "micro-credentials and skills programmes are essentially the same things."

6 https://credentialengine.org/

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Turning to a possible definition of micro-credential, he argued that a micro-credential should nevertheless entail all of the elements required for the formal awarding of a qualification or even a part-qualification in terms of its quality assurance. A micro-credential must still provide proof of a learning outcome, define both in terms of the related competency as well as the skill, whether a 'soft' skill or a specific technical skill. An essential consideration should also be how the learner has acquired that particular learning experience, whether formal, non-formal or informal. Finally, he emphasised that "these learning outcomes must be assessed against a set of standards which will allow the issue of whether it is a credential or micro-credential and must be issued by a body that carries the necessary authority to do so, so that there is not a burden [of proof] on the learner or the carrier of that micro-credential."

Mr Naidoo illustrated his argument by supposing the credentials a welder might have: a gas welder (types of welding include gas, arc, steel, etc.) might hold this micro-credential as a part of a stack of credentials that a person might acquire during a career.

In closing, Dr Reddy asked the panellists about their understanding of the difference in usage of the terms between Europe and North America and what it means for the South African NQF. The consensus was that these differences exist, even within countries, because of historical, political and cultural approaches, and that the quest to find a more universal definition of the terms should continue.

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Session 2:

Differential privacy – protecting individuals while sharing data interoperably

Data privacy issues are especially high on the South African agenda because of the Protection of Personal Information Act (POPIA) coming into effect in 2021. Imparting personal information for legal purposes is commonplace but today's high-tech world risks personal data ending up in the wrong hands.

Dr Bangani Ngeleza, Executive Director of Nantso Holdings, chaired a session on the topic of collecting, processing, storing and publicly sharing information in an interoperable data ecosystem[7]. His opening words foregrounded the importance of privacy in the sharing of data and interoperable systems, "technological tools that can be used to publicly share information about a dataset whilst protecting information about individuals in that same dataset".

Nicolas Grislain, Chief Science Officer and co-founder of Sarus Technologies, was introduced by Dr Ngeleza to share insights about technologies for enabling the analysis of private data. In his highly technical and thought-provoking presentation[8], Mr Grislain defined the concept of practical private data analysis. He introduced what he called "the theoretical building block" that is essential to solving the problem of sharing data while, simultaneously, protecting data.

He explained that the basic principle of differential privacy can be leveraged to build complex, state-of-the-art algorithms in data analysis. Illustrating the theory, he sketched how algorithms can be composed to build a modern and efficient framework to enable private analyses practically.

"Let us say we have a dataset with personal data about a lot of people. We want to compute something about this data, maybe SQL [structured query language] queries. It can be statistics, such as linear regressions, logistic regressions, or whatever. It can be advanced machine learning models training but it can also be modern deep learning on these datasets. The problem is that this data may be very sensitive, such as medical records, education or financial records, so we do not want to leak any information about individuals. We want to learn general features and general patterns about the data but we do not want to risk the privacy of any individual in the dataset."

He explained further that currently, risk is minimised by manually removing less relevant information; aggregating the data so that individual characteristics are lost in the mass of other individuals; ensuring that an individual appears in many aggregates; and employing other heuristics to prevent data attacks.

However, being manual, these anonymising measures require an understanding of the privacy risks and potential attack scenarios. They are also time-consuming and often diminish the quality of the data. Analyses are thus not as good as they could be. He explained a more efficient, systematic and convenient method that preserves the data quality better and arguably provides stronger protection. This method is based on a theoretical framework called differential privacy.

The essence of the theory is that no inference can be made about an individual based on the analysis of the dataset in which that individual appears. A differentiated privacy algorithm run on two datasets, which differ by only one individual (one missing or extra), will produce a result that will be "randomised and slightly noisy, and this noise will be such that both results will be

7 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-bangani-ngeleza-differential-privacy

8 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-practical-private-data-analysis-nicolas-grislain.pdf

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statistically indistinguishable. The noise will erase the inference of one individual, which means you will not be able to infer anything significant about any individual in the analysed dataset."

Differential privacy provides a systematic approach that eliminates the need for an attack model or for expert judgement. The method also allows quantification and control of the extent of privacy loss, which in turn permits a notion of privacy budget.

Mr Grislain explained how complex mechanisms can be composed of basic building blocks. "For instance, if you want to publish a statistical average, such as the average age of people in a dataset, you can add some random components to the average in the form of Laplace distributed noise. And because Laplace distributed noise has some nice mathematical properties, you will get a differentially private estimate of the average."

He discussed another approach to ensuring data sharing without revealing information about individuals in a dataset: the method of adding "Gaussian noise", a more complex mechanism that is widely used in statistics. He went on to outline Differentially-Private Stochastic Gradient Descent [DP-SGD], an algorithm that is "ubiquitous in deep learning, can be adapted for use within differential privacy." He explained that Stochastic Gradient Descent is about minimising some loss of function. By adding random noise at points along the gradient descent, the individuals' data will simply become lost in the amount of noise.

In Mr Grislain's view, because all modern data analysis and machine learning can be more or less reduced to some gradient descent, a very large spectrum of data analysis algorithms from analytics, statistics, machine learning and advanced AI can be made differentially private. "So differential privacy is really quite universal. You can run any kind of complex data analysis – from natural language processing to image recognition to whatever other application you are interested in."

He cited some real-world examples of differential privacy in practice whose efficacy can be mathematically proven: the US Census Bureau, Google, Apple, Microsoft, Uber, Facebook and so on.

He then explained how Sarus Technologies uses differential privacy to protect the data of individuals. The idea is "to proxy all data interactions" because any interference could cause data to leak.

His argument is that "We stand between the sensitive data and the analyst. We filter any interaction with the sensitive data. The analyst can submit results, and we guarantee the differential privacy of the published results. This is all done with minimum disruption to the current workflow of the analyst."

In conclusion, Mr Grislain demonstrated what a comprehensive differential privacy framework could look like.

He ended off by saying that today, companies such as Sarus Technologies are building the tools to enable data analysis with privacy guarantees in quick and efficient ways that avoid long waits for results and without having data quality reduced by the process.

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The questions and answers following the presentation included the following.

James Keevy: ***The notion of differential privacy is good but we should be careful not to create a black box approach that few people understand.***

Nicolas Grislain: "I think that is a very valid point. And that is why it is very important to base those tools on open-source building blocks. Various experts can have a look at what is inside and can validate that it is a proper and protective approach. I would say that today most web browsers use photography, and everyone trusts photography even though it is a black box and very complex. So I think it will be the same with differential privacy. We will have to trust some experts but once enough people trust them, then it is okay to use those tools."

James Keevy: ***Is DP useful only for aggregated computations? We lose any sense of individual track even if we anonymise.***

Nicolas Grislain: "DP, by definition, will prevent any individual tracking. It is made impossible by the tool because it is dangerous to track individuals. And that is why the alternatives to differential privacy are usually rather weak, or they require some strong assumptions about what alternatives exist. If you want to protect privacy, it is not a good idea to try to have access to individual trajectories. What you can do with individual trajectories, though, is to fit a precise and complex model that will give you all the statistical properties of those trajectories, so you can analyse and classify the individual data as statistical groups rather than as individuals. It is possible to analyse tracks but not have a look at each individual track."

More Manda*: What are some of the benefits of differential privacy compared to other privacy mechanisms of privacy strategies for Big Data*?

Nicolas Grislain: "The main advantage is that you do not have to have any assumptions about data sets that you publish with private information, which is not the case with alternatives to differential privacy. Any systematic tool that preserves privacy will have, at some point, to use some form of differential privacy."

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Session 3:

Self-sovereign identity

Barbara Dale-Jones facilitated the session on self-sovereign identity (SSI) with special reference to education[9]. Self-sovereign identity is a new model of digital identity: a decentralised identity protocol which sees individuals managing their digital identities and controlling what others need to verify about them, including data about their education, training, skills, projects, job history and more. It enables the mobility and portability of learning in more dynamic and immediate ways. Consequently, it has the capacity to transform systems such as education, health and banking.

The first speaker was Beth Havinga, co-founder and managing director of the European Edtech Alliance, who set the scene with an engaging talk that sketched the development of data usage in education over time. Generally, from an education perspective, use of and interaction with the internet has progressed in ways that are increasingly decentralised, broadly, as follows:

- **web1:** knowledge transfer by accredited institutions – focused on sharing information;
- **web2:** centralised platforms distributing education-enabled communication tools and interconnectivity systems and services (what is currently being used);
- **web3:** individuals gathering skills from a variety of sources and validating that knowledge in their own wallet – this third strand being more current and looking towards the future with data becoming more decentralised.

Ms Havinga pointed out the changes in data ownership during the three web streams and the benefits that SSI provides. "The key point of self-sovereign identity is that it provides a greater degree of flexibility, privacy and security around the use of the data, and you own all of this data and all of the processes that surround it." She presented a compelling argument that developments in digital education need to consider digital equity in providing learning opportunities for all. "If we believe that every child deserves a fair chance to get the education they need to live a productive and healthy life, then our educational systems must be redesigned to provide that chance."

The next speaker, focusing on principles, protocols and technologies that enable SSI, was Carel de Jager[10], a blockchain consultant at the Blockchain Academy, who took over the reins of the session by asking: "What do we mean when we talk about identity?" He proceeded to advance a number of possible answers to this question and proposed that at one end of the spectrum of attributes of identity are our personal feelings and our relationships, our desires and thoughts, and at the other end is a random number issued by the government – our identification number. Then there is the identity layer called the bitcoin private key, a layer on top of a cryptocurrency blockchain, and that one needs to interact with this blockchain.

9 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-barbra-dale-jones-self-sovereign-identity-technology

10 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-blockchain-self-sovereign-identity-carel-de-jager.pdf

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Mr de Jager explained that a form of identity is needed for every interaction with the global economy. For example, when registering at a university, a government identification document, demographic information, academic results and often proof of residence are required. When an authority requests these documents or proofs or know-your-customer information, the acceptance of these documents or proofs is dependent on a trust relationship between the issuer and the verifier/requester.

For instance, when presenting your identification document to a bank to open an account, the bank needs to trust that the government issued that document and also that the government is maintaining its database of identities, ensuring that no one can hack into it or create fraudulent identities. In addition, the general assumption is that things will stay this way and that this trust will remain valid in the future. However, Mr de Jager added the following scenario: "If this trust breaks down, let us say next year, then the system collapses, and the owner of that identity will probably lose access to the products or services that they had procured, or at the very least, compliance will be threatened."

Another example is the issuing of a certificate by a training provider such as a university. If a graduate applies for a job sometime after receiving the degree, the prospective employer has to trust that the university has honoured the reason for issuing that credential. If the university is to remain trusted for as long as that credential is in use, then it needs to remain sound. Should the university cease to exist, then the graduate would struggle to convince a future employer of the legitimacy of that degree because that institution is no longer trusted.

There must always be a trust relationship between the verifier and the issuer, with Mr de Jager citing recent incidents of the Russian government website being hacked, rendering the site untrusted. This break in trust leaves citizens wanting to verify their identity but having difficulties in doing so.

Using another example of traditional credential systems becoming a hurdle, Mr de Jager quoted a World Bank 2018 report on remittances[11] explaining the decline in the number of active bank accounts. Remittance costs have skyrocketed, mainly because of the 'Know Your Customer (KYC)" procedures for identifying clients, which are becoming stricter every year. He said the cost of a KYC check in South Africa ranged between R180 to R1 800 per customer and that "a bank would rather show a prospective client the door than take on the risk of non-KYC compliance."

It was argued that the lack of identity documents for more than a billion adults in sub-Saharan Africa and South Asia is a huge obstacle to global economic growth. Mr de Jager suggested that "If we could solve this problem, there is a strong argument to be made that this would be a massive catalyst to global economic growth that might even alleviate poverty entirely … and it would be at least as big a revolution – if not bigger – than the world wide web. One of the tools needed for this solution was created in 2008 and emerged in 2009 with the birth of the blockchain – the Bitcoin blockchain. This is an append-only, permissionless, decentralised database that has no authority, no administrators, and is totally accurate and transparent. There is an identity layer on top of this database, which you need to write to interact with the blockchain

11 World Bank Group. 2018. Migration and remittances: Recent developments and outlook. *Migration and Development Brief*, 29. https://openknowledge.worldbank.org/handle/10986/30280

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[to change data]. We figured out, shortly after the discovery of this technology, that if we can connect this identity layer to identities in the real world, then we can give birth to a new concept, and this concept is called self-sovereign identity."

Mr de Jager explained that the concept of SSI allows a user to record and manage their own identity while having full control of it, without needing to trust any third party. The trust relationship model is flattened and becomes completely decentralised. Now a requestor who seeks to identify verifiable information or credentials from another entity needs only to have trusted the issuer at the time the credential was created. He emphasised that this removes the need to trust the issuer at the current time, nor is there a need for the issuer to retain that information as it can be deleted. He argued that this attribute also prevents issuers from "hoarding and monetising personal information for the Facebooks and Googles of our time" because "the user is fully in control and can even monetise his or her own identity and data and reap the benefit of it".

If the SSI solution is correctly designed, privacy can be preserved, while the user can still build a reputation and manage their own data without losing access to it. The platform will be free or cheap to use and permissionless, which will remove all barriers to entry. The protocol does not distinguish between social classes, races, religions, or even between humans and machines. Mr de Jager proposed that "Apart from minimising fraud and breaking down hurdles, the solution will enable the advancement of a new technological revolution, including virtual worlds, self-sovereignty, globalisation and digital asset management,".

He concluded by remarking that SSI is an elegant solution that can be used alongside conventional identity systems – causing little to no disruption – and encouraged his listeners to experiment with the technology or to take a course at the Blockchain Academy. "The technology can be scaled linearly. You can build a small pilot project and scale that up as time and technology become more available."

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Panel discussion

The following questions were discussed.

Question: ***If one joins a club through a platform or some other means, without prior vetting by others, is one not in essence giving one's data in some form to another? What is the self-sovereignty that was described in the talk – are we talking self-sovereignty or decentralisation?***

Carel de Jager: "Fundamentally, yes. Data can still be hoarded but it is no longer a requirement for the functioning of a system or process. For instance, Facebook cannot work without having and retaining your identity. There is no way for Facebook or Google to function in a self-sovereign way with their current structure. If a self-sovereign identity model is designed correctly, and the policies and implementation are also correct, then you can do everything you do today, interacting with the web in the same way as you do today but no one keeps your data; no one needs to hoard your data for the system to work."

James Keevy: ***How can SSI be used across the South African Qualifications Authority (SAQA), the quality councils and the education and training providers?***

Carel de Jager: "The lowest hanging fruit is definitely certification. The biggest barrier [to implementation] is the network effect. You need to get all the stakeholders and role players involved in adopting this technology. It does not work with only a single person using it; it needs to be adopted far and wide, and, therefore, you need the participation of key players in South Africa, such as the SETAs and the education system, which is very formally organised. You need a big industry like that to bootstrap this technology, and once you have a big one on board, the rest will fall into place. So, to summarise: pilot the project, get a big stakeholder involved that is well connected to others, and then roll it out."

Question: ***Trust in the digital environment is always an issue. How can citizens be sure they have full control of their identity?***

Carel de Jager: "Trust takes a completely different form in this case. In SSI, trust is a lot more robust. In our current system, there is a whole lot of fragile trust involved. If you have a credential, the issuer needs to be trusted forever; otherwise, your credential becomes invalid. The trust that we put in our government is incredibly fragile because governments are not the world's most efficient entities. In SSI, all that fragile trust is removed. It is made incredibly robust because you, the individual, are then in control of your own data."

The final speaker of the session, Lohan Spies, presented a summary of the SSI protocol that is being developed in the PSET CLOUD initiative, providing insight into the advantage of this protocol in various projects, even outside of education.

Mr Spies shared an example of the way the technology stack was applied in the Yoma project, which was built with UNICEF and other partners. Yoma (Youth Agency Marketplace[12]) "is a digital platform where youth can develop their skills,

12 https://www.yoma.foundation/

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find opportunities and achieve impact – while connecting to peers in a supportive community".

The development of this platform is fundamentally based on the concept of SSI, with the intention of enabling youth to use SSI through the dimensions of growth, impact and thriving. Anyone can become a member of the platform – employers, learners, the youth, or sustainable development-related initiatives, therefore providing everyone involved with an SSI that is the basis upon which they interact with others in that environment.

Mr Spies explained that by creating an account on the Yoma platform, the user/account holder opens an SSI wallet and builds an SSI. All the data under that identity is owned by the user/account holder, who decides what should be done with it.

When a user creates an identity, a learning opportunity page is provided by the platform. The user can click on an opportunity and is taken to the website of that opportunity's learning provider. Once the user has successfully completed the opportunity, an official credential is issued by Yoma to attest to its completion. This allows users to build a credible CV within the Yoma ecosystem. Yoma even incentivises users, together with businesses, by issuing tokens as rewards for completing learning tasks. They can click to go to the marketplace, where tokens can be redeemed for airtime, data, further learning opportunities and other available items such as food.

The platform is open source so it can be used for multiple purposes. Unlocking and fostering the value of open data while still ensuring that users can secure their data is important. Because of this, the data on the system is only available with the explicit consent of the data holder. A credential is given to holders who can then decide how that credential is shared, with whom and under what terms and conditions. So while open data is very important in terms of sharing, the holder of that identity must explicitly consent for the data to move.

An important principle of the development of the platform is ensuring open access to users without the need for a smartphone, internet access or airtime, therefore catering to everyone's needs. The design of this system started by addressing the minimum user requirement needed to use SSI technology, solving the problem by establishing a custodial solution that allows the platform to provide access to people without smartphones and/or internet access.

Mr Spies then spoke about technology and its governance, with governance being key in ensuring that the technology works as expected and in alignment with the rules and guidelines of whatever ecosystem it is applied to (e.g. education).

The technological component of the Yoma stack is the single sign-on mechanism, which allows users to explore the entire ecosystem without needing a new username or password while also boarding different platforms and opportunities easily. Mr Spies highlighted the importance of not needing to recreate existing data within SSI.

Mr Spies cited examples of SSI in action in education, singling out the Kenyan government and the Ethiopian Ministry of Education, stating that SSI technology is mostly used in the education sphere. Turning attention to the practical implementation

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of such a system, he posed the question: "How do you actually get a system of this nature off the ground, and what value can it provide?" He listed the benefits as:

- Decentralising data, ensuring that data is not used for surveillance purposes or exclusion and inclusion of certain people at any moment. With this being a truly open system, it ensures that users have ownership and control of their own data, thereby significantly reducing fraud in the education sector;
- Reducing the high cost and extensive time requirements for verifying educational credentials. An employer can immediately verify a CV with complete certainty, and in this seamless educational ecosystem, credentials can be unlocked and repurposed to find employment rapidly.
- Boosting employer trust in the market, as well as being able to gain verifiable insights into the market's requirements, such as specific needs or a surplus of learners in certain sectors. It is also a POPIA-compliant solution because all the data is shared only with the explicit consent of the user.

According to Mr Spies, two main factors are necessary for getting the system up and running: "Number one: we need the governance. Number two: we need the network. SSI, like any other blockchain, is a team sport, and everybody must play the same game for this really to provide benefits at scale, which it can."

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Session 4:

Proposed governance models for the PSET CLOUD

"The successful implementation of interoperable digital ecosystems should be anchored in mechanisms that govern collaborating institutions." This was how More Manda (Senior Manager of Strategic Planning at the merSETA) introduced the session on establishing a governance framework for the PSET CLOUD[13], a necessity he considered to be "quite critical for clarifying roles and responsibilities, especially when there are so many stakeholders involved, as well as for establishing accountability and decision-making through setting standards and norms, regulative as well as cultural cognitive mechanisms".

Dr More introduced the four speakers of his panel, citing work-related biographical details of each speaker: Jason Bygate (Director of Innovation and Technology for Development at Capacitate Social Solutions), Paul West (Senior Education Advisor at West & Associates), Christopher Beukes (Senior Employability Advisor at Skillbank) and Lazelle van Kramberg (National Skills Officer of the South African Municipal Workers' Union).

Jason Bygate's focus was on how data governance of the PSET CLOUD was evolving, and he suggested that the starting point is the objectives of the PSET CLOUD and the context in which it should be working[14]. He described the complex issue and causes of youth unemployment in South Africa – "one of the worst globally" – and highlighted the "vast, persistent inequality across the country". He stated that addressing these issues encompassed the essence of the PSET CLOUD's objectives.

The difference between institutional and system governance is a key consideration for the governance model. Both the operational structures that determine how governance is applied as an institution or an organisation and technological strategies for how that data is managed, how access is provided and certainly how that data interacts with other systems must be taken into account.

In relation to initiatives for addressing issues underpinning youth unemployment, Mr Bygate mentioned the fragmentation that exists across interventions by both government and civil society. It was suggested that much of the references made to collaboration between initiatives and systems amounts to little more than "lip service".

A further key consideration in exploring structures for governing the implementation of the PSET CLOUD is the need for unbiased and informed insights and opinions and ensuring that decisions are driven by collective interests represented across the cloud, with no single agenda or political objective driving those objectives.

Mr Bygate stressed the need for action: "We need to ensure that the structures facilitate action, rather than lead to stagnation and perpetual consultation."

Echoes of Beth Havinga's plea to consider digital equity in providing learning opportunities for all could be heard in Mr Bygate's comment that the realities of the digital divide should be considered, with youth and the organisations that serve them often having no access to the technology they need.

His opinion of SSI was clear: "I think that self-sovereign identity is a great example of how fast technology is evolving, one that can serve a more inclusive structure and that is less prone to the traditional trappings of governance and oversight."

Mr Bygate mentioned the need for consensus – being able to incorporate the opinions and perspectives of a broad range of stakeholders, all those intending to participate in any kind of platform function. The ideal was to establish informed consensus, although this was not always possible.

Having "experienced on many occasions that 'the majority' simply means that all the fools are on the same side," a quote he attributed to Claude McDonald and one that most likely might have drawn some laughs from the audience if they could have been heard, Mr Bygate added that decisions are not necessarily always in the best interests of the collective. Sometimes a single agenda drives the decision, one that is coordinated to be carried across to the majority. "Often, this leads to, if not stagnation, also some level of bias in the implementation of a governance structure. For me, the ideal is to look at a blended model, where you can incorporate:

1. Functions of professional advisory (specialists that understand the context, the needs and complexities);
2. Cooperative consensus (input from stakeholders about how the structure should function and that it is a representative view that is driving the decisions being made by the governance structure); and
3. A participatory function (important to know that the tech operators of the platform can provide active insight into the governance structures)."

Mr Bygate shared his thoughts about the evolution of platform cooperatives over the past few years. "This is largely an extension of the way that technology is scaled in the sharing economy to create mechanisms for mass-aggregation and, potentially, exploitation that we have seen in the likes of e-hailing and the transportation services. But what this has done is seeded a new model for collective engagement – a movement away from technology that has, perhaps, in a way, in the past enabled the exploitation at scale – towards a cooperative design with shared values."

He said that this evolution goes back to a term that was coined by Trebor Scholz in 2014[15], taking a look at how we can "clone the technological heart of online platforms to create a structure that is more cooperative in nature and one that includes a range of stakeholders in both governing and managing the way those systems are applied". He shared the importance of the basics: common sense, shared ownership and governance amongst people who depend on the enterprise as well as coordination rather than competition among enterprises.

Cooperative enterprises have, in the past and present, relied on two kinds of strategies to gain traction. First, there may be competing interests and multiple existing initiatives, and really the intention is to create collective benefits that can be found through cooperation, driving the ability to succeed where conventional approaches have failed. This was referred to as "the power that is latent in solidarity". Secondly, "The rules of the system are changed to support a more cooperative practice. Here we are looking at key stakeholders, such as governments, that can see the value of co-operation with enterprise enough to encourage and fund it."

13 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-more-manda-proposed-governance-for-the-pset-cloud

14 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-data-governance-jason-bygate.pdf

15 Scholz, T. (2014). Platform cooperativism vs. the sharing economy. In *Big Data & Civic Engagement*, 47-52. https://www.researchgate.net/profile/Nicolas-Douay/publication/321777389_Big_Data_Civic_Engagement/links/5a3153b3aca27271447b66b6/Big-Data-Civic-Engagement.pdf#page=47

DAY 1

Session 4:

Proposed governance models for the PSET CLOUD

Mr Bygate said that the hope was to reach a "digital cooperative that combines the benefits that can be provided through advances in technology such as blockchain software, where we are enabling the scalable coordination of disparate individuals, with a legally defined structure that creates a new kind of organisation, one that is run by both law and code, to further the goals of the communities that it represents".

He added that this does not necessarily mean that they would opt immediately for a distributed autonomous organisation but perhaps, as some of the speakers in a previous session of the conference had suggested, one where there is the function of custodianship and where there is a governance structure that would oversee the functions of the platform that are at play and the management of the day-to-day of the systems.

In summary, the following list was suggested to be key requirements in establishing the governance structures for the PSET CLOUD ecosystem:

1. Establishing and maintaining trust across all of the stakeholders;
2. Co-determined objectives and shared principles that underpin the governance structures themselves;
3. Shared values and transparency;
4. Democratisation of ownership and governance;
5. Legitimacy of the data that is managed and processed, protection and portability of the data so that users are not trapped in one system but can move between systems;
6. Inclusion and integration, the ability to incorporate and collaborate with other initiatives that can add value to a collective goal;
7. Leveraging emerging technologies for the benefit of the collective interests and making sure that those structures are accountable and also transparent.

Paul West and Chris Beukes had been tasked to research and develop and present an advisory note on the governance model options for the PSET CLOUD[16] in an effort to meet the need for greater clarity. They presented an introduction to this governance note which discusses recommendations on the institutional form and considerations for the establishment of the PSET CLOUD entity[17].

Mr West outlined the background and context of the establishment of the PSET CLOUD against a backdrop of barriers facing the market, including high levels of unemployment, unemployed graduates and diplomates, low levels of entrepreneurship and a lack of preparedness for self-employment, increased numbers of empty positions due to the unavailability of appropriately skilled applicants exiting the education systems and a sluggish economy with a missing tax base amongst other problems. He pointed out that the PSET CLOUD project is "all about real-time data, whether linked to citizens, PSET stakeholders or organisations across the system. And it's a lot of people involved".

16 West, P.G. and Beukes, C.J. 2021. *Digital governance advisory note. Johannesburg: JET Education Services and merSETA*. https://psetcloud.org.za/news/digital-governance-advisory-note

17 https://psetcloud.org.za/events/previous-events/digitrans-2022/pset-cloud-governance-guidance-note-paul-g-west-christopher-j-beukes.pdf

DAY 1

Session 4:

Proposed governance models for the PSET CLOUD

Paul West emphasised that the first of the underlying principles is that ethics is not merely a choice but an absolute requirement. "We must focus on transparency, getting away from secrecy and apply good ethics, all through. Service to the people – the Batho Pele principle – cannot be treated as a checkbox; its critical importance must be emphasised." The governance note is not a marketing device but rather highlights the clear knowledge and understanding that "we need to follow a legal and ethical path".

Mr West proceeded to list some of the challenges encountered in proposing a governance structure for the PSET CLOUD while at the same time indicating the action required. "It is a funder-led project, so that must be understood and related issues addressed. Is the name inclusive of everybody across the span from pre-school to post-retirement? Does it cover all the necessary transversal systems in the country for the benefit of our citizens and the residents? We need to work collaboratively so that one government department does not hold court over another. We need to use a consensus-building approach, and we need to move into much more public transparency."

Mr West concluded this first part of the presentation by reiterating the need for building consensus and collaboration as opposed to dominance and emphasised that transversal interoperability and the use of standards must be the norm.

Chris Beukes added that "What we are doing here is nothing less than most essential for our education systems but actually for the people of our country and our continent." He introduced the recommendations towards a governance model and structure.

DAY 1

Recommendations

1. Build trust through good principles

The Batho Pele principles are “most essential to ensuring a fully inclusive and high-quality service. While these principles sometimes end up as posters on walls, they must be part of the measurement index of a service such as this”.

2. Build trust through consultation

Consultation was “critical” to the process. Consultation should reach those in the furthermost corners of the country. For example, in remote Mbangwane near Swaziland and Mozambique, consultation should involve everyone, from the induna, chief, counsellor and community forum, to the Mpumalanga Department of Education, schools and local MER sector employers. He said, “We take the very basic governance viability matrix and present it to stakeholders at different levels in different ways to get their input as to what sort of organisational structure the PSET CLOUD could really take.”

3. Establish equal partnership in PSET CLOUD governance

There is a need to establish equal partnership in PSET CLOUD governance. “From our research and findings, we have put together and recommend the Citizen-Civil-Public-Private-Partnership, the ‘double C-triple P’ structure, as a governance model where all the stakeholders are equal representatives, equal partners and equal owners in the PSET CLOUD. This means that our South African citizens and residents really need to be part of the process, and we need to find mechanisms to ensure that their voice is heard.”

The second partner is the civil society sector (including trade unions, professional bodies and support organisations such as JET), which would be an equal partner in PSET CLOUD governance.

The third partner is the public sector, where the Minister of Communications and Digital Technologies is instructed to oversee transversal systems in the country. He said that this minister could then support other ministries – of Education, Labour, Cooperative Governance, Traditional Affairs and so on – to ensure that the full skills pipeline is considered in the process. Mr Beukes said that many good policies and structures had been put into place in the public sector, which “really could ensure that this [PSET CLOUD] becomes a success”.

The fourth partner in the CC-PPP model is the private sector, and here it is important to consider both the formal and informal economy and how the informal economy can participate in a PSET CLOUD of this nature.

The main benefit of this recommended partnership model is that it puts the beneficiary first. It includes all stakeholders and enables co-ownership, collective benefits and collective responsibility. “And it is really a top-down, bottom-up, left-right, right-left model. It talks to the point of partnership and collaboration; but not lip-service collaboration – just true collaboration.”

DAY 1

Recommendations

4. Engage the Minister of Communications and Digital Technologies

The Minister should be engaged since the Department of Communications and Digital Technologies is mandated to use South Africa’s digital transformation to achieve digital inclusion and economic growth by creating an enabling policy and regulatory environment, as well as implementing the National Integrated ICT [information and communications technology] Policy White Paper[18]. The policy provides a roadmap for inclusive digital transformation and interventions to reinforce competition and facilitate innovation across the value chain. The policy also provides strategies to address the digital divide, affordable access and infrastructure rollout and facilitate inclusivity. This department is essential and pivotal as a participant in or leader of this process from the government’s perspective.

5. Establish a non-profit subsidiary company through SITA

Mr Beukes reminded the audience that the purpose of a non-profit company (NPC) is to improve the quality of life for others at all levels, whether it be locally, nationally or in a community. NPCs are not primarily interested in private or financial gain but in advancing the public interest. The State Information Technology Agency (SITA) could establish an NPC or a subsidiary through the Companies Act in accordance with the SITA Amendment Act 38.

6. SITA to delegate PSET interoperability protocols and standards

The SITA could consolidate the enforcement of interoperability standards and security of public data for all transversal systems through a subsidiary organisation created to govern and implement the PSET CLOUD. The legislative framework makes provision for the SITA to establish the PSET CLOUD as an NPC subsidiary and to delegate PSET-related interoperability protocols and standards to such an entity.

7. Register the PSET CLOUD as a public benefit organisation

Registering the PSET CLOUD as a public benefit organisation through the SA Revenue Service holds tax exemption and donor benefits and will enhance the PSET CLOUD’s potential for cost-effectiveness.

18 Department of Telecommunications and Postal Services. 2016. *National Integrated ICT Policy White Paper*. https://www.gov.za/sites/default/files/gcis_document/201610/40325gon1212.pdf

DAY 1

Recommendations

8. Register the PSET CLOUD as an intergovernmental agency

The baseline PSET CLOUD documentation alludes to the potential for the PSET CLOUD to serve more countries than just South Africa. Advantages of establishing the PSET CLOUD as an intergovernmental agency include the potential for pan-African collaboration in terms of data interoperability and digital fluency across the continent. Such an approach could boost trade opportunities, build stronger relationships between partner countries and potentially even provide smaller countries with an opportunity for greater economic power.

9. PSET CLOUD as a formal, informal and non-formal credential validation platform

The purpose of the PSET CLOUD on a macro level is to ensure that valid supply-side and demand-side data is centrally available for effective decisions for citizens, the PSET system and industry in order to maximise the economic development of South Africa. On a micro level, each resident or citizen would have access to valid information to make PSET and employment-related decisions. Therefore, informal, non-formal, and formal data should be made available through the PSET CLOUD to equitably address the full spectrum of both the supply side and demand side of the skills pipeline.

10. Adopt a participatory subscription-based funding model for the PSET CLOUD

While it would require start-up funding, the PSET CLOUD could operate through a participatory subscription base that would not require hardware or software changes for suppliers and customers but the implementation of protocols and standards to ensure the maximisation of data interoperability for the PSET CLOUD. Some of these subscription clients could be the National Skills Fund, SETAs, public institutions, private institutions, professional bodies and employers.

Mr Beukes concluded with the statement that "the PSET CLOUD should remain free to citizens at all times".

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Lazelle van Kramberg briefly presented the intention of the Reference Group: to expand its membership by forming a steering committee representative of civil society and worker organisations, trade union federations and trade unions, vulnerable workers, precarious workers, community organisations and private sector representation, as well as those government departments that are keen on the roll-out of the PSET CLOUD initiative. She argued for inclusivity, mentioning that "we need to ensure that we take everybody with us and solicit buy-in from everybody by continuously building trust".

Ms van Kramberg sketched a positive picture of the steering committee as a hive of activity that includes trust-building, accountability, taking responsibility and demonstrating transparency while inexorably working towards the exit point of a governance structure.

DAY 1

Panel discussion

The following questions were discussed with the panellists.

Question: ***What resources – both human and financial – will be needed for a cooperative model?***

Jason Bygate: "From a resourcing point of view, we want to start by leveraging the resources that we already have access to. A lot of work has already been done, and we want to harness those resources as best we can: the work that Lohan [Spies] and his team have been doing on self-sovereign identity, the work that PwC and Bankserv (Africa) are doing around digital identity. The starting point would be to harness resources that have already been committed and to build a foundation on that, rather than arbitrarily allocating resources or estimating what is required. I think we have a starting point for considering what that cost might be but at this stage, it would be premature to fix a number while we are still mapping out what this cooperative might look like."

James Keevy: ***Can you give us examples of the custodian role of digital cooperatives*****?**

Jason Bygate: "The role of the organisational structure that would oversee the functioning of a platform would be that of custodian. The technology is now available to allow a level of separation of organisational governance from system governance. The organisational governance would have a role in defining what the data and systems governance would look like. I do not think that there are good examples of the sorts of governance structures that we would need, principally because the governance structures play catch-up to systems. We are only at the start of considering the idea of a decentralised or distributed model of automated organisational structure; we are still in a hybrid phase where we want to manage the best of what technology can provide. Until then, we need some custodian function. We need the systems that will allow us to get the input of various stakeholders. The way we are going about it now is probably the best way we can look at it – getting input from as many stakeholders as possible in establishing a structure that would allow us some independence and enable governance and also reliance on technology to fill the gaps."

Question: ***What are some of the governance challenges that we are likely to face in situations like the PSET CLOUD? And at the back end, how can we mitigate some of these challenges?***

Christopher Beukes: "The PSET CLOUD needs to bring together the citizens, the civil sector, government and the private sector as equal partners. It will not be easy for either side to share their power or perceived power for the benefit of the education system and for the livelihood of citizens. This is also true for stakeholders in each of these sectors. In taking on a new approach such as the PSET CLOUD, there are concerns amongst stakeholders, one concern being that relinquishing power will diminish your responsibility and your value. This is one of the challenges that we must face. Once this shared partnership and sharing of power is established, then we have to go externally. Another challenge is that the PSET CLOUD may need to rebuild trust that may already have been broken."

Paul West: "I would suggest ensuring maximum transparency. Things should be done out in the open so that people are not taken by surprise later. Maximise the trust by making sure that everyone who can possibly be involved is involved. Ensure that we are ethical, clean and above reproach in all possible ways."

Closing

Dr James Keevy wrapped up the first day of the conference by succinctly drawing together some of the main ideas that underpinned the presentations[19]. He observed that even though most attendees hailed from the education and training space, the arena of the PSET CLOUD is interdisciplinary, with a crossover between education and technology. The PSET CLOUD is the beginning of a bridge between the two disciplines.

Making reference to the book *We Make the Road by Walking: Conversations on Education and Social Change* by Myles Horton and Paulo Freire[20], which takes its title from a poem by Antonio Machado[21], Dr Keevy encapsulated the process of the work on the PSET CLOUD as "making the road by walking it". He spoke of the development of the PSET CLOUD as a new social construct on our doorstep but something quite foreign to us. He observed that "We are not quite sure what to do with it. It is very digital and very abstract; but it offers something that can catapult our country into a space where we link supply and demand, where we link unemployment and competencies in a very agile way".

Using the analogy of the phrase, "The king is dead. Long live the king", Dr Keevy asked the audience, cautioning that terminology and nomenclature can present an obstacle, if they could live with "The qualification is dead. Long live the credential"? He endorsed the keynote speaker's charge to leverage action while still protecting learners, referring to a key concept that underpins the PSET CLOUD – sovereignty – an important principle in the new social construct. Referring to the cost of transactions that allow for requesting permissions and validating them, Dr Keevy indicated that the technology to do so is available in South Africa but the ecosystem is missing, a gap that the PSET CLOUD has been building to fill over the past few years since its inception. The challenge is to connect the ecosystem and the technology. However, the PSET concept of power should not be underestimated, and new forms of governance that will embrace the new social constructs need to be considered.

He summed up the PSET CLOUD as having three components: self-sovereign identity; credential fluency and understanding learning in all its facets; and the notion of interoperability. Dr Keevy assured the audience that the PSET CLOUD is not intended to replace data systems or organisations. It is meant, instead, to build bridges between the existing data systems in a way that is authentic and credible and protects the privacy of individuals' data. Concluding with the intention to scale the project linearly in order to create a critical mass for the ecosystem that will catapult South Africa into a space where supply and demand can be connected, he argued for immediacy: "We do not have to wait ten years; we have the technology, we have the ecosystem; we just need to link these two."

Dr Keevy's final questions might well have left many a conference attendee mulling over possible answers late into the night: What is the potential of the PSET CLOUD to move South Africa forward in the way described? Are we agile enough to leapfrog? Do we have the courage and political will to do it?

19 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-james-keevy-day-1-wrap-up

20 Horton, M., & Freire, P. 1990. *We make the road by walking: Conversations on education and social change*. Temple University Press.

21 https://www.poetryfoundation.org/poems/58815/traveler-your-footprints

DAY 2

DAY 2

Keynote address:

The 4IR and the possibilities for the PSET CLOUD

After Dr Rooksana Rajab's greeting on the second day of the conference, Professor Saurabh Sinha, Deputy Vice-Chancellor: Research and Internationalisation at the University of Johannesburg, provided a review of local and international 4IR developments that could either promote or limit the PSET CLOUD in South Africa[22]. He set the stage for this with an interesting account of the three earlier industrial revolutions leading up to the current fourth revolution.

The 4IR, encompassing cyber-physical systems, deals with artificial intelligence or machine learning. The phases in this revolution are considered to be machine learning, machine intelligence and machine super-intelligence, which, according to Professor Sinha, "a number of us fear". He described this revolution as human-machine symbiosis and touched briefly on the conceptual notion of the fifth industrial revolution in Europe that seeks to regain some humanity in the face of the 4IR technology: "In this fifth revolution, the human and machine interactions get even closer to that human-machine symbiosis."

Professor Sinha pointed out that COVID-19 had accelerated the pace at which the adaptation and adoption of technology innovation occurred, with platforms such as Zoom becoming larger in terms of revenue than some of the major airlines – also an indication of how some jobs have shifted. He noted that the 4IR challenges the traditional university set-up because it creates opportunities for vocational learning and online learning and for a combination of the two. "This particular revolution will require everyone to pursue the art of lifelong learning." With this in mind, he encouraged those in management and leadership positions to "bring about change management in this revolution in an appropriate way" so as to be non-threatening. "So we should, therefore, going forward, look at those human elements that ensure gradual progression but on the back of the skills revolution."

In true 101 style, Professor Sinha then focused on "some of the nitty-gritties" of cloud computing, mentioning the following acronyms for various service types: software as a service (SaaS), platform as a service (PaaS) and infrastructure as a service (IaaS). He remarked that the way the PSET CLOUD is progressing during its first phase is actually as SaaS, in that "it gives you interaction, it gives you the ability to use certain tools and apps and the ability to do collaborative editing".

The other aspect of cloud computing is deployment. In this regard, he mentioned public, private and hybrid cloud infrastructures. For those interested in career paths in the field of cloud computing, he mentioned players such as Amazon Web Services, Azure, Google Computing Platform, Alibaba and IBM.

Professor Sinha concluded this section of his presentation with the concept of a "Cloud of Clouds". For the launch of a new platform such as the PSET CLOUD, he suggested creating an avenue or room for inviting people to join, as well as creating links to social media platforms. "Another channel that we often forget about is that people are already on platforms such as Facebook and LinkedIn, and so building the channel from the other side, for example, by using hashtags, becomes quite important. … You take the room … and you put it where people already are. … You already have a captive audience, which you have selected through the different mechanisms that social media provide." He emphasised that these strategies should not be seen as one approach *versus* the other but rather as one approach *and* the other.

The professor's paradoxical "change is a constant" might have elicited a knowing nod from many viewers when he mentioned scope creep. He reminded developers, "You must keep in mind that new users will have new requirements. A platform like LinkedIn has been able to do that quite successfully. They had a base platform with the basic [user] profile, and then, step by step, they added applications, including learning apps. Once upon a time, Google did the same by adding G Mail and G Drive later on. You do have to think about this from a long-term perspective. Initially, you would like to build a big client base, and then on top of that, you would like to build services." At the same time, he also cautioned developers to keep cyber security in mind, mentioning in an aside that cyber security is an important field of study and practice for the skills revolution.

Expanding on cloud computing in relation to the skills revolution, Professor Sinha called "edge computing" a new area that has come to fruition. "Your cell phone is a mini computer now, and this means that many of us are, in fact, carrying clouds and portals. This means you have, in fact, a cloud of clouds [in your pocket] and that gives you edge computing." His final comment was a reminder of the theme of the conference: "While we are learning – and we must remember that we will be learning constantly in this revolution – we should seek and solicit partners. We may find, for example, that we are not the best when it comes to cyber security but we may be able to find the right partner to give us that strength."

"Complex things communicated simply," was the apt comment from Dr James Keevy, CEO of JET, as he thanked Professor Sinha for his talk.

22 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-the-possibilities-for-the-pset-cloud-prof-saurabh-sinha.pdf

DAY 2

Keynote address:

The 4IR and the possibilities for the PSET CLOUD

DAY 2

Session 5:

Toward an appropriate, relevant and representative governance structure

Nicole Copley presented what she called "a crucial and fundamental decision for the PSET CLOUD" – the decision to set up and empower an interim "Launch Group" responsible for building a governance structure to serve the PSET CLOUD ecosystem[23].

To provide a backdrop to the process of establishing a governance structure, Ms Copley gave an overview of the phases of development, starting with Phase One from 2019 to 2021, "which was thought of as the dreaming phase, the testing phase, the consulting phase and the phase of making sure that everybody was participating. Also, it was a kind of a custodial phase." During this phase, the Reference Group was established to move the project forward. Phase Two (the current phase) is about building on the foundation laid by the Reference Group and establishing a governance structure and the terms of the legal entity.

Ms Copley introduced the term "Launch Group", which she said she hoped would come out of the proceedings of the session. "We specifically chose the name 'Launch Group' to show that it will be an interim group that will be appointed and will be building the governance structure going forward. Phase Three will go beyond today, and we hope that during this phase, there will be a legal governance structure that is chosen and constructed to be the home and foundation for the PSET CLOUD. That will take PSET CLOUD into the future, having a credible legal existence – something which will outlast those who are currently involved; something to ensure that it thrives, survives, grows and can deliver to serve the citizens of South Africa."

Ms Copley went on to say that this third phase would take PSET CLOUD "from a movement, a loose alliance of sorts, into the established and empowered part of the process". She showed a visual representation of the stakeholders who had been engaged, drawn upon, spoken to and referenced during the first phase. They are grouped into four fundamental parts of the ecosystem: citizens, civil society, public sector and private sector, known by the acronym CCxPPP. za, which is shorthand for what Ms Copley said she hoped would become known as the Launch Group. The intention is for the Launch Group to be representative of all four of these components of the sector. She indicated that the Reference Group would be absorbed into the Launch Group. "Our next steps today are essentially about making the circle bigger."

The procedure for the nomination process was outlined: the immediate first steps during the session would be to conduct a poll to determine whether or not to endorse the proposed process; if the endorsement was given, the nomination process would then begin. The current Reference Group would then review the nominations and select the Launch Group, which would be the body to make decisions on governance and legal structure.

Ms Copley mentioned the timeframe for the steps of the process. By 12 April 2022, the Launch Group (comprising the Reference Group and nominated candidates, with the guiding principle being representation according to CCxPPP) should be established. By 10 May 2022, the Launch Group should have held its first meeting (which would discuss – and work towards – deciding on and setting up a legal structure and governance model to oversee the PSET CLOUD.

23 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-nicole-copley-proposed-governance-model-for-the-pset-cloud

DAY 2

Session 5:

Toward an appropriate, relevant and representative governance structure

Ms Copley added that she was hoping for a groundswell of support for the process, which would provide legitimacy and credibility. It would show the reach, potential impact and support for this movement that was becoming the PSET CLOUD and for which a legal entity is now being established.

In response to a question from the floor as to whether the call should be going wider than this conference, Dr Rajab indicated that the process of nomination (three weeks) would be via the PSET CLOUD website and was open to anyone. Ms Copley emphasised that the support being sought by the poll was not for the Launch Group, its people and its legal structure but for enabling the process to proceed with the nominations "so that we are not forever stuck in the initial excitement, dream, consultation phase but can move forward into something that has its own life and existence and a proper legal fundament beneath it".

Ms Copley reiterated what Dr Rajab had pointed out in response to the same question, that "the nominations will not be restricted to the people in this room [of the virtual conference] now but there is going to be a period [during which] the call will go out; it will be publicised; it will be on the website". Ms Copley urged those "in the room" to "spread the word, get others involved and get them excited". With accompanying hand gestures, she summed up the possibilities: "This is a moment we have in history to make this thing happen. Let us bring it together."

Note: Of the 90 conference attendees online during the session, 39 voted on the proposed steps towards an appropriate, relevant and representative governance structure for the PSET CLOUD. Of those who voted, 68% gave full support, 23% gave partial support, 10% abstained and there were no votes against the proposed approach to setting up a PSET CLOUD Launch Group that would look into possible governance models and propose a legal structure for the PSET CLOUD entity. It is expected that these Launch Group members will be representative of the four groups of the ecosystem: citizens, civil society, public sector and private sector.

DAY 2

Session 6:

Big Data: Demo of international interoperable systems

"We are in a datafied society," Eduarda Castel-Branca of the European Training Foundation declared boldly when she began her session that considered applications of Big Data and data science in the context of labour market and skills intelligence[24]. "New data sources can be explored to supplement conventional statistical data and renew them towards smarter systems of labour market and skills intelligence."

Ms Castel-Branca was of the firm opinion that Big Data is a goldmine and that analysis of Big Data enables real-time, granular analysis of occupational and skills dynamics. She said that the two sessions on the second day of the conference would highlight "the conceptual and methodological foundations of Big Data applications, as well as their contributions to improve the governance and interoperability of data analysis and data delivery".

She proceeded to introduce the speakers on her panel: Mauro Pelucchi (Head of Global Data Science at EMSI Burning Glass in Bergamo, Italy) and Professor Mongi Boughzala (Professor of Economics at the University of Tunis El Manarand), who discussed labour market intelligence and, thereafter, demonstrated an international interoperable system, the Burning Glass.

Mr Pelucchi's presentation, titled *Unlocking the Power of Big Data to Inform Labour Market and Education Policies*[25], looked at labour market data, interoperability between web job vacancies, traditional data, social profiles and how artificial intelligence (AI) assists in extracting value and supporting policymakers. He addressed questions such as "What is a labour market intelligence system?" and then considered the creation of such a system, "particularly looking at how artificial intelligence and machine learning techniques can extract new dimensions and new flights from labour market data". He said that it was important to understand the context when extracting insights into the labour markets from Big Data.

The context is a continuously evolving labour market, particularly so in the European Union and especially so in the past year, according to Mr Pelucchi. In this regard, he cited the digitalisation of professions, the revolution of soft skills, the internationalisation of the labour market, the impact of the COVID-19 pandemic and the green transition. "Of course, if we want to observe the evolution of these phenomena, it would be quite foolish to use only the traditional data that we have available because we need to use faster, more powerful data, more relevant to the context in which we work."

Mr Pelucchi indicated that the official statistics are good, representative and strong in terms of value but there would be "benefit from additional, complementary information that could be faster to track what is happening now and data that is granular and relevant to real and current market terms to capture emerging trends and analyse what companies are actually looking for". He then described the nature of their work: "Our work is to use this real-time Big Data to transform the online job advertisements into insights and analytics. To do this, we have a strong methodology. Of course, we want to apply academic research and new studies to run this type of work. What we do every day is collect real-time data – from job boards, employment agencies, universities and employers. We apply some framework to clean the noise from this data and deduplicate it, and we apply machine learning and AI to try to predict and classify each job posting in the dimension of the labour market. Here I am speaking of the classical dimension we have in the traditional data because we need to compare the data from the web with the traditional data."

Mr Pelucchi demonstrated how the Burning Glass platform enables the user to see the number of job postings for a certain profession per region, the number of companies hiring, the top recruiting employers, the most sought-after skills for those jobs and the trends, among other things. He admitted that there were a number of challenges. "When we work in a multi-language environment, we need to develop a pipeline and text processing techniques that work not only with the English language but also other languages. This is very complex. Also, deduplication is important because you can find the same job posted on different platforms of the world."

He discussed the three main components of the system. Data ingestion is the component enabling the collection of raw data from big social networks and job boards in both structured and unstructured (raw text) formats. Data processing is for reducing noise and classifying data through machine learning techniques to predict both the occupation and skill. Data analysis is the way information is extracted from data and made available through visualisation to provide insights to the decision-maker.

"Of course, it is a multidisciplinary environment because we do not need only statistical methods or tools but also a lot of knowledge coming from computer science, classical statistics, data visualisation and so on. The real value of this system of Big Data in the labour market is not only the ability to collect and classify the data but to provide insight to the decision-maker. This is the real challenge. We need to increase the interoperability amongst job vacancies, searcher profile and traditional data."

Mr Pelucchi then demonstrated the interoperability offered by his system by searching for a vacancy in a certain industry in a certain location (the City of Edinburgh) of a specific country (United Kingdom). He showed how the system indicates the growth and decline in specific jobs during a particular period (e.g. 2018–2021). He further showed how the system can determine the "location quotient" to quantify how concentrated a particular industry, cluster, occupation or demographic group is in a region as compared to the nation, in this case, the United Kingdom.

He added that their system uses not only job posting analytics and profile analytics but also structural labour market intelligence, libraries and taxonomies. He explained that one of the use cases for their system is the upskilling of people: it can, for example, advise job seekers on the skills required to move from one occupation to another.

"Of course, one of the classic applications [of the system] is education, for example, to advise education providers to improve their education programme and also their skills intelligence. One of our big challenges is to predict the skills needed for the next two years in different contexts, industries and regions."

Another challenge is how to use this data. As an example of the data in action, Mr Pelucchi explained demand and supply analysis and how the use of job-posting data and searcher profile data together can make insights available to the policymaker.

By using data pertinent to Spain, he demonstrated how the system can reveal how many people

24 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-demo-of-international-interoperable-systems

25 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-education-policies-mauro-pelucchi-1.pdf

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Big Data: Demo of international interoperable systems

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transition from one specific occupation to another; a role in cyber security, for instance, is typically filled by a certain percentage of people who had previously worked as web developers. It is also possible to see on a map where these talents are concentrated. The system can also reveal how many days it takes for an individual in a certain role to transition to another specific role.

The next speaker in Ms Castel-Branco's session was Mongi Boughzala, with his talk titled *Towards Smart Labour Market Intelligence*[26], providing a glimpse into labour market challenges in Tunisia and the state of labour market intelligence in this small North African country.

Professor Boughzala said that this is a key topic for Tunisia because this country is facing key challenges in unemployment. The country is experiencing strong supply pressures in its labour market, mainly because of the structure of that market. "Education attainment has increased; the number of higher education graduates has tripled in the past 15 years. At the same time, the demand for skills remains low. The unemployment rate of skilled youth is high. There is a lot of skill mismatch, partly due to the limited labour market analytical capacity," he said.

Furthermore, there is a lack of data on vacancies and skills demand. Professor Boughzala added: "Not enough is known about employers' current and future needs for skills, so how can the education system produce the right skills? This is really the big issue. Quarterly manpower surveys remain the only key source of information but that is not enough. We need a lot more."

He said that low-quality jobs in the informal sector are increasing and easier to find but these jobs are often rejected by the youth, especially women, with tertiary education. They would rather be unemployed than take a low-level job in the informal sector. "We know that skills mismatch is a real issue because about 30 per cent of firms complain about the difficulty in finding the right type of skills."

Professor Boughzala indicated that the legal framework is also a major challenge, especially the National Employment Agency. He said that all recruitment must be reported by employers to the National Employment Agency, which, in his view, does not have the means and capacity to monitor the labour market. Even though private employment agencies are, in principle, not allowed by law, they are flourishing and many are operating openly. Because private agencies are not legally permitted, they cannot produce usable statistics on what they do. According to Professor Boughzala, there is an ongoing debate about amending the law that is "not going smoothly".

"The Big Data projects undertaken in the framework of the ETF [European Training Foundation] prove that, in spite of this poor situation in Tunisia, a lot of progress can be made, and rapidly, if we use the new technology and Big Data and all the techniques that allow data to be captured and used in real-time to provide information labour market needs." Professor Boughzala's utterance of "the technology exists" resonated with Dr James Keevy's closing words at the end of Day 1. Professor Boughzala added:: "And Tunisia has many smart people and schools. What needs to happen is that legislators and policymakers and partners must agree on a better and more coherent legal arrangement and a rational distribution of roles between the public and the private operators."

26 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-labor-market-analysis-in-tunisia-mongi-boughzala.pdf

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Session 7:

Complementary platforms in South Africa

After the presentation of the international arena of interoperable systems, Dr James Keevy, together with panellists Carmel Marock, Kuben Nair and Stephen Logan, visited similar systems closer to home in South Africa[27]. Dr Keevy reminded the audience of the multidisciplinary nature of the PSET CLOUD – noting that it crosses education, skills and digital/tech spaces – and repeated the three important aspects of the PSET CLOUD: data privacy, particularly sovereignty; credential fluidity, which is described as the ability to recognise non-formal, formal and informal learning within one system; and data interoperability. He made a point of noting that while the PSET CLOUD was the topic of the conference, "it is not the only initiative happening in South Africa in this kind of platform, digital, workplace-linking supply and demand space". He then introduced the panel members, who each presented a complementary offering in the post-school qualifications and credentialling field.

Presidential Youth Employment Intervention and the National Pathway Management Network

Carmel Marock (Manager of Singizi Consulting Africa), having been seconded to the Director General's office in the Department of Employment and Labour, is responsible for the expanded employment mandate and for driving the national Pathway Management Network (PMN), which has as its purpose "to transition young people from learning to earning". She presented highlights of this network, the core component of the Presidential Youth Employment Intervention (PYEI)[28].

Noting that the PYEI was launched as a direct response and a coordinated intervention to the challenge that while large numbers of young people are leaving education institutions, they are not transitioning from "learning to earning", Ms Marock said, "This network works across government in all three spheres and also with the private sector and non-government, while it focuses particularly on youth unemployment, enabling young people to access economic opportunities and providing a mechanism for young people to be able to transition and to provide them with support."

She said that while there are other components to the PYEI, the core path is the PMN. "It enables people to transition to the other opportunities and through other opportunities, recognising that young people zig-zag across the economy."

Ms Marock informed the audience that the PYEI and the PMN are supported by the Government Technical and Advisory Centre (GTAC) and The Jobs Fund, who are enabling other partners through an innovation fund as well as through an ecosystem manager. She explained that the national PMN works with numerous other industry associations and employer bodies and links up all existing networks serving young people to ensure that they are visible across the entire network. "Regardless of where they join, they are able to access all opportunities aggregated within the PMN."

This "network of networks" is led and coordinated by the Department of Employment and Labour and the Presidency. Ms Marock provided a closer look at how this network operates. "Key

27 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-james-keevy-day-2-panel-discussion

28 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-presidential-youth-employment-intervention-carmel-marock.pdf

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government departments are responsible for demand, the supply and in a sense, the linkages. Additionally, a number of committees have been established, recently joined by the PSET CLOUD, while the Technical Committee ensures that all the different systems speak to each other, and that there is ultimately interoperability. Meanwhile, the pilot Steering Committee looks at aspects such as "what meaning the pathway management network has in local communities and how it supports young people. Many of our linkage partners enable people to sign on to the PMN and to know what events are happening, what government and non-government services are being offered and what support is available in local communities. We are piloting that, [and] as well as an initiative that focuses on enterprise development, one that focuses on TVET colleges and one that focuses on expanding the capacity of the learning centres to support e-learning. So you can begin to see the possibilities and linkages. Other committees are developed as the need arises, including a linkage with the Technical Implementation Forum, which is driven by the Department of Higher Education and Training together with us but focused on demand-led skills training."

Ms Marock explained the idea behind the network: "It is not one single thing but interoperability across partners, which means that young people can access the PMN in whichever way works best for them – whether through the SAYouth mobi-site, the toll-free support line, or physical centres across the country of the Department of Employment and Labour and of the NYDA [National Youth Development Agency] and so on." She added that the PMN was beginning to work with the provinces in a more dynamic way and that Gauteng had been an early adopter, having worked for a long time with Harambee and the SAYouth mobi[-site], "looking at how a whole range of mechanisms, channels and partners come together in terms of supporting young people within local economic development to access and zig-zag through the economy and benefit through improved procurement processes". This is also being linked with the Department of Small Business Development and the portal of small and medium-sized enterprises. The idea is for people to access any of the partner platforms, "for example, CETA [Construction Education & Training Authority], which is offering career guidance through the Department of Higher Education and Training".

Concluding her introduction to the PMN, Ms Marock listed the network's accomplishments to date, noting that more than 2.35 million young people are already registered on the network across the different channels, with just over 600 000 of them placed in opportunities and an additional 144 884 having accessed work seeker counselling. Additionally, services and resources in communities are being mapped through Youth Explorer, which is supported by the Southern Africa Labour and Development Research Unit at the University of Cape Town and the University of Johannesburg. The Department of Science and Innovation that is supporting the recently launched mPowa app enables young people to access services and events in specific communities. There have been just under 5 000 downloads of the app.

Ms Marock then mentioned pilots that are underway to explore the ways in which the PMN can support TVET colleges. "Waterberg TVET college is looking at how young people can access this and how it can improve access to workplace exposure. Working through our development partners and donors as well as through the PPGI [Public-Private Growth Initiative], we are looking at how to access economic opportunities that are being generated in Waterberg. There is also the NYDA pilot, located in Richards Bay, where we are, with the support of our partners, supporting enterprise development."

Regarding the Innovation Fund of the National PMN, launched by GTAC in October 2021, final adjudication was completed, and the recommended partners were appointed. These contracts will be finalised by the end of March 2022.

Dr Keevy's response to Ms Marock's presentation was: "My takeaway is that you truly work systemically. You are firmly embedded in various national processes, and I think, just from the PSET CLOUD side, we are there to support you and to help where there are gaps that we can fill. But I give you that recognition, that the systemic way is the way to go. We cannot do this in our country if we do not work with government – alongside government."

Harambee Youth Employment Accelerator

The next speaker was Kuben Nair from Harambee Youth Employment Accelerator, which positions itself as a not-for-profit social enterprise, building African solutions for the global challenge of youth unemployment[29].

As the initiative's chief brand officer, Mr Nair, said, "I am excited to learn more about PSET CLOUD joining the National PMN conversations and how we can all work together." Thanking Dr Keevy for the invitation and introduction, he added, "You said it well; it is a systemic problem, and it needs systemic solutions."

By way of explaining the activities of SAYouth.mobi, he told "Hershel's" story. "Hershel, a 17-year-old, lives in Eldorado Park in a household of seven people. Their only income is her granny's grant. Hershel is, in fact, the 'mum' of the house. She's unemployed. She looks for work every week, or at least when she can afford to. Unemployed youth spend almost R1 000 a month just looking for work. Half of that is on transport, a third on data, and some of that amount is spent on printing. But Hershel is never successful. She has no work experience, no qualifications beyond matric, and she has no networks to recommend her for a job. She is basically invisible, excluded from the economy. And the economy is invisible to her."

Mr Nair continued: "But Hershel's story is that of many millions of young people." He said that they had asked a number of "What ifs". "What if Hershel could find opportunities without spending money? What if she did not have to leave home to look for work? What if she could find in-person support near her? What if she could be guided on her best next step? What if she could be seen by the economy as more than just her certificates? One of the solutions is us building a platform called SAYouth.mobi, which helps enable and power the broader National PMN. So instead of Hershel having to come to our offices, we built a zero-rated [no mobile data needed] mobi-site that aggregates all of the opportunities and services for her so that she can apply freely from wherever she is. This platform is **SAYouth.mobi**[30]."

Mr Nair explained that, because it is a mobi-site and not an app, there was no need for Hershel to download anything that would need data. Furthermore, it has the capacity to use her profile to recommend which best opportunities

29 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-complementary-platforms-in-south-africa-kuben-nair.pdf

30 https://sayouth.mobi/Home/Login

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are available to her, which are nearest to her location, and those opportunities most suited to her according to her profile. “But if she does need more help, she can call us toll-free for support – not just technical support but support on her journey to finding work. If she wants to start a business but does not know where to start, or if she is going to an interview and needs advice or maybe a practice interview, she can call us. She will speak to one of our guides, who is a young person like her and who has been where she has been.” He added that Hershel, or anyone in her situation, could also use social media and email to get help or use the chatbot on Facebook and WhatsApp, available “24/7”. He went on to add that “We know at Harambee and through all of our work that technology can only be part of the solution; it is not the full solution. Hershel will need in-person and more intensive help along the way. Maybe she needs an employability workshop at a labour centre or training or a start-up grant from the NYDA. Or skilling and career assessment at a TVET college. Maybe she could access online learning at a library or a DBSA [Development Bank of South Africa] DLab. She can find those services that are nearest to her via the mPowa app or by calling us toll-free.”

Mr Nair said that the work on APIs [application programming interfaces] between the different partner systems (many with their own systems and data) was ongoing. How would they bring their vision to life? “Whenever Hershel enters the system, she has access to and visibility of all the opportunities and services. That is what we have been working on – to make that experience good for her and to share opportunities and data. Data also helps us to learn which interventions are making an impact, or where she faces barriers that we must break.”

Mr Nair cited the lack of opportunities as the biggest problem for young people in South Africa. “We, as Harambee, work with all sectors to unlock new opportunities for young people and then help bring those opportunities into this platform called SAYouth. The employer interface is called the SAYouth Partner Network, and we have more than 2 000 employers and partners signed up. They are posting opportunities, matching talent and hiring young people inclusively. It is free for employers, and all we ask for is data and feedback so we can track impact.”

Regarding “inclusive hiring” and “matching”, Mr Nair said: “As in the case of Hershel, her CV is blank because she does not have any formal qualifications or experience. We must rely on a range of signals, assessments, proxies, alternative credentials that we are working on with different partners to bring into this ecosystem – so that we can understand what Hershel is really capable of. Those alternative signals are what will make her visible and help us match her inclusivity.”

Mr Nair concluded his informative talk by playing the one-minute video that the president played to launch SAYouth.mobi on 16 June 2021.

Credentials going digital – interoperability, privacy and integrity

“The qualification is dead! Long live the credential!” With this phrase, the same that he had used in his summary of the previous day, Dr Keevy set the scene for the next panellist[31]. He explained that what he meant by this statement was a more encompassing, broader understanding of credentials as more than just qualifications – “where we can factor in informal and non-formal learning and that a CV can become digital in a way that facilitates matching of supply and demand.”

Before handing over to Stephen Logan, CEO of PrivySeal, Dr Keevy offered a friendly warning: “We do not always agree with what is happening in the credentials space. Be ready to get some difficult questions on this. Because as much as we have this broader understanding, it is very difficult to apply it at the moment in our current context.”

Mr Logan responded by sketching the pioneering work of his company ten years ago in engaging with “credential issuers”. Their first client, the Institute of Directors of Southern Africa, understood what PrivySeal was trying to do – to switch or migrate from paper and PDF credentials to digital credentials.

He began his presentation by asserting that fraudulent qualifications are “a very significant problem” worldwide and that the problem has a high profile in South Africa too. The NQF Amendment Act had created a register of misrepresentation as well as one of fraudulent qualifications. “So it was with that qualification fraud problem that we started. The key was ‘how do we make genuine qualifications visible?’ The solution was to work with the original, trusted data source. For instance, to tap into the data of a recognised professional industry body and display their certificate data in an encrypted certificate and to pair this encrypted certificate with a micro-credential.”

Mr Logan pointed out that credentials take different forms; currently, most are in PDF [portable document format] format or printed (driver’s licences, regulatory licencing and graduation certificates). Since 2016, PrivySeal has been helping issuers such as SAQA, ZAQA [Zambia Qualifications Authority], SACAP [South African Council for the Architectural Professions], SACQSP [SA Council for the Quantity Surveying Profession], SACSSP [SA Council for Social Service Professions] and others to migrate to digital credentials. The process of migration from paper and PDF to digital requires the buy-in of the issuers, who will continue to be key in any credential-issuing process.

Insights gained over years of working with issuers such as UNESCO indicate that some of the practical problems issuers have with traditional printed and PDF documents include: lost certificates; certificates not getting to people; not being able to afford to courier certificates to different people when graduation ceremonies could not take place physically during COVID-19; people having their names changed; the need to protect people against others’ amending (doctoring) their certificates; and many other things, such as not being able to revoke the certificate.

Mr Logan demonstrated the micro-credential system that SAQA uses. It issues what is called an eSAQA Certificate of Evaluation, featuring a unique quick response code, which any smartphone can scan. These “PrivySeals” can be added to email footers, websites, documents, financial statements, architects’ plans and others. The “seals” link to real-time certificates that the company generates on behalf of its clients. “It is that real-time nature of the data that engenders trust and recognition that this is actually a valid and reliable certificate that people can share on LinkedIn and so on,” said Mr Logan. He emphasised that issuer buy-in is crucial: issuers control their data strictly and are concerned about misuse. “When they pass the data through an API to the PrivySeal platform, it is very secure, and the issuers control the process. They can revoke, bring back or delete the data; they have ultimate control over the data.”

31 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-digital-credentials-in-sa-stephen-logan.pdf

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Mr Logan said that PrivySeal clients control their data centrally, and the credentials change in real-time as they update their records. This, essentially, gives issuers confidence, as their control over the credential is increased. By using cryptographic keys, the issuer is able to trust a new decentralised architecture where the cryptography potentially "underwrites" the risk of fraud. According to Mr Logan, data interoperability builds confidence. "In interoperability, for POPI, GDPR and other data privacy regimes, it is really critical that the data is used in the right way and controlled and accessed only by people who have the appropriate permissions to do so."

Mr Logan cautioned that in terms of SSI, one must be very careful of bespoke data schemas. One should rather use an open standard such as JSON [JavaScript Object Notation]. APIs are critical in collecting data, as proprietary schemas may use different coding conventions that may require data parsing in order to be understood. He added that one should beware of "contested" information technology protocols.

Regarding data privacy, Mr Logan said that one cannot just scrape data but should gather and use data according to the GDPR or in a data privacy compliant way. "You need the data subject's permission to use their data, especially when you are combining it or not using it in the normal course. The data subject should understand what you are doing, and there should be strict limitations on how that data is used to avoid a high risk that the data could be used in ways that are not of benefit to the data subject."

To support the gist of his talk, Mr Logan highlighted the following points in his presentation: "Does PSET CLOUD have the data subjects' express permission to process and generate data? Does PSET CLOUD use data in the normal course, as the data subject would expect? Does PSET CLOUD combine different datasets when processing data? How intrusive, predictive or potentially damaging is the data modelling? Consider engineering safeguards to avoid unintended consequences."

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Panel discussion

The following questions were discussed by the panel:

How did you manage to get the young people to join the PMN? Any tips for the PSET CLOUD team?

How do you publicise these services amongst the rural youth?

Can training providers also access the tool?

How do you combat fraud within an institution?

How can the notion of individual ownership of data be introduced in our country? if a central server was manipulated or destroyed, how can the true owner of the data be sure they are able to access their data?

Any thoughts on how this can be used to recognise and share non-formal training achievement?

What advice do you have for us – with the PSET CLOUD project and where we are?

Stephen Logan: "Our platform has been used by training providers that are very small, as well as larger recognised professional bodies. We find that the biggest question – in terms of what you are going to face – is to get buy-in from the owner of the data. The other big problem is: will employers be willing to log on to a management system to find people? You must get the employers involved. One of the biggest problems that we found is that in South Africa, there is a big question mark around qualifications – claimed skills, claimed abilities; and you have this huge industry around validating qualifications. SAQA is meant to be the apex body but very frequently, people are using private providers at significant cost to validate qualifications. So, if you are looking at sovereignty and data privacy, you must get those issuers on board. It is really important to put these validations in the hands of the youth (real credentials can be easily shared) or the hands of the job seeker. Job seekers need to be able to take pride in their skill set, and they need to be able to showcase that. It is not something that they would be happy with, being left to one side while some system does some matching for them. How do you get them involved in the process? I think those are key considerations."

Kuben Nair: "How do you get young people to join and engage on this platform? It is not starting from scratch. The national PMN was a realisation that there are a number of organisations that already have large networks of young people, and work seekers, that we are trying to help, be it Harambee, be it Department of Employment and Labour, the NYDA or the Department of Higher Education and Training but, at the same time, having lots of young people on our databases does not get them engaged. What really gets them engaged is not just marketing. It is not even when the president announced SAYouth.mobi. It is when there are jobs. It is when there are opportunities. For example, when the Department of Basic Education launched their basic education employment initiative, they advertised close to three hundred thousand opportunities in 22 000 thousand schools all across the country and two weeks in which young people would apply. That spread like wildfire. We had over 700 000 young people making over a million applications on the platform in those two weeks. So that is the big drum we are trying to beat. What we need here are opportunities. That is what is going to keep young people engaged because that is what they come for, after all.

Panel discussion

Regarding rural reach, because this is a network of networks that already existed, all of the PMN networks have presence as well as outreach. Harambee used to do community outreach to get into rural, outlying communities to engage young people and get them connected. They existed already in the network. It is about working with partners. It isn't just technology. So, for example, a young person could go to a labour centre, a library or a community centre that is nearby if they need help. Or if they cannot access a physical site, or they cannot access connectivity for a mobile site – which is another big problem that we are working on with partners – they could call into the contact centre and find what opportunities are near them and the contact centre could apply on their behalf with their consent. These are some of the ways we are trying to be inclusive and engage all youth.

As to the question about guidance for the PSET CLOUD, I am certainly very encouraged and excited to see PSET CLOUD progress. If we had the luxury of time to design the right kind of system protocols to build this national pathway network, I think many of the principles and the design and work that you have done are what we would have adopted.

So right now, some of the challenges in working through connecting APIs bilaterally through different organisations is about how to get buy-in. Every one of us has competing priorities and different technical capacities; some of us are using service providers; some of us have in-house systems; and we have systems and data architectures and things that we are beholden to; and if it requires changes to our systems, there is some resistance that might need to be broken through.

There is also governance, and each of us has different governance procedures: POPIA, security, all these approvals and processes that need to happen. As an example, one of the partners we are collaborating with on an API, just to share opportunities between platforms so that the young person can see all of the opportunities whichever platform they are on, the technical work of that is actually simple and easy but by the time we are done, which should be by the end of this month, it would have taken 12 months from the start of the project. This time was spent getting the buy-in, getting the right people, getting the capacity, doing the due diligence, all of the governance, figuring out those data definitions that can be quite different between us and working through all of that – some of the red tape on both our sides. I would say that if we had a PSET CLOUD, as an example, as a central organising body that manages all of this, and we can just pull and push data from that, that sounds like a great future that we can work towards."

Carmel Marock: "For us, in terms of interoperability, first prize would be – for both the young people and for opportunity holders – that it is a seamless thing; that it makes no difference to them where they enter and where they put their data; it simply gets shared across the system. But we are a very long way from there. There are some apps where that interoperability has been achieved fairly quickly but when opportunity holders are involved, it is bound to be more complex, in part because of the complexity of the legal issues involved.

There are two main issues. The one is POPIA – How do you make sure everyone has given permission to share? What can you share? – That kind of insight would be very helpful. How do you make it possible? All of us have shared terms and conditions. What are we asking the young people to allow us to share for the purpose of

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Panel discussion

accessing work opportunities? If we want to aggregate the data, we want a sense of: Who *are* the work seekers? What kinds of skills and capacities do they have? What kind of credentials do they have, and what does that mean for things that are happening around us – such as the critical skills list? What sort of permissioning is possible in that regard? Those are complex sets of issues that we are grappling with, where insights would be important.

Where you store data has also become a huge issue. South African legislation is that you must store in South Africa but we know that various systems store all over the place. Where you live and where you store your data is a much more complex world, and insights around that would be very helpful.

There is the issue of one of the ways in which we access young people. In the past, people used to talk about – if a person goes to two programmes – double dipping, [which] used to be a big South African term. I am relieved to say that it is generally understood now that that is not a useful notion – that there is not simply one intervention, and then the young person has been helped, and they are now in the labour market. Instead, our responsibility is to work with young people not so that they merely *access* the labour market but until they *succeed* in the labour market. There are multiple touch points, and we must support that. That is what the PMN is about, which means that if young people have had opportunities and they are going to UIF [Unemployment Insurance Fund], then they are automatically going into the system. A lot of young people who are looking for that are going to the labour centres, particularly in rural areas.

The Department of Labour is also developing the capacity to do outreach work to try to reach those young people to see what is possible. Intervention partners such as the Basic Package are working particularly with young people who otherwise might be reluctant to join such a system and are working with the Department of Social Development to make sure that care workers, who are out in communities, youth workers, are able to reach that constituent and encourage them to become part of it.

Partly, it means that we must have opportunities for those young people, which includes that where there are no employment opportunities, how to access other economic opportunities and how to help young people build their profiles. The challenge in regard to credentials and profiles is how to ensure that young people know where these might take them, and what expectations are unrealistic. We have all lived through the period of a multiplicity of standards, where young people thought that if they just took their certificate of managing stress, they would get a job,"

Dr Keevy concluded the session by thanking all the panellists for their input and affirming complementarity. His final words were: "We are here to work together."

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Session 8:

Demo/Launch of the PSET CLOUD minimal viable product

Chaired by Kelly Shiohira, an Executive Manager at JET, this very practical session focused on showcasing the PSET CLOUD minimum viable product (MVP) and its functionality[32]. An explanatory demonstration video was played[33], after which each of the panel members described their experiences and understanding of the PSET CLOUD, and the audience heard first-hand the challenges of those involved in the journey of the MVP platform.

Ms Shiohira introduced her team, comprising both beneficiaries and developers: Kgothatso Tloubatla, a recent software development graduate from the Tshwane University of Technology "who is navigating the learn and then earn space – one of the types of beneficiaries that we are hoping to help with this platform"; Kirtida Bhana, a training executive at Plastics SA; Khetho Mtembo, a senior software engineer at JumpCO and now working on the PSET CLOUD project; Andrew Akpan, a senior consultant at Reos Partners; Barbara Dale-Jones, director of the Field Institute and an associate of JET leading the innovation team of the PSET CLOUD project. Ms Shiohira directed pertinent questions to each member of the panel.

32 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-kelly-shiohora-pset-cloud-platform

33 https://psetcloud.org.za/events/previous-events/digitrans-2022/pset-cloud-platform

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Panel discussion

Question: ***As an employer in the South African space, what are some of the challenges that you face in procuring the talent that your organisation needs?***

Kirtida Bhana: "One of the biggest challenges that we have in the plastics sector is a lack of undergraduate university programmes in the engineering discipline that focus on plastic materials and processes. Learning in this field is limited to TUT [Tshwane University of Technology] and NMU [Nelson Mandela University] and postgraduate specialisations only at the likes of the University of Stellenbosch. This mismatch between supply and demand is an obstacle for the industry, which has obviously adapted by employing people from other engineering disciplines and familiarising them with plastics, which is not ideal. A whole layer of people with plastics engineering skills is lacking. This impacts the industry in a number of ways, compromising the more sophisticated approaches to developing products in the industry."

Question: ***From your perspective as a recent graduate now navigating the space of your first official job, how easy has that transition been?***

Kgothatso Tloubatla: "Being a new graduate, what you lack the most is opportunities, and it is in the form of information, where you find your job opportunities and postgraduate studies. As Kirtida observed, many university engineering students lack information about opportunities in their fields, outside their universities. Information is not centralised, and one has to jump from one online site to another. A major problem in this regard is the accreditation of sites: it is difficult to tell if a site is a scam. The PSET CLOUD offers a source of help in this situation by centralising everything, including opportunities, which makes it much easier to navigate progress towards a transition to work."

Question: ***What was your first step in the development and how did you then engage the development process? Please take us through the process a little bit, taking the user journeys into account and the problems that we researched.***

Khetho Mtembo: "The good thing with our engagement was that we started by first considering what the user needs were, so we took a user-centric approach. As much as it is important to build the product correctly, it is more important to build the right product. We focused basically on the job seekers looking for employment opportunities, on our learners looking for education opportunities and then bringing them together with employers and educational institutes. This provides the foundation – understanding what is involved. Once we have an understanding of what is involved, that provides the basis from which to determine the scope. There are a lot of things that can be done but we need to focus on what we can do right now that is most urgent, coming up with an architecture that puts those things together into a formal design and then move into implementation."

Question: ***I would like to ask Andrew his initial response and reactions to the PSET CLOUD and what we have developed and are in the process of refining at this moment. What is your initial response; and how do you feel about this response to the stakeholders that you've interacted with through the course of your involvement in this project?***

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Andrew Akpan: "I am wearing multiple hats in this conversation, so I will be speaking from various perspectives and I think, with those hats, accommodate multiple commitments. The first commitment I have is to myself as an African. I reside in South Africa, so what happens here concerns me. My second commitment is to myself as an intellectual – a PhD student: what does it mean to be a student in the age of the internet? I also have commitments to my employer.

My initial impressions would be the broader observations, the broader points that we should consider going forward. I am very excited about the potential of this platform – its ability to work with other initiatives or other efforts addressing unemployment in our country. Unquestionably this could benefit a lot of people. But I am wrestling with the question of why we spent so much time developing this. The answer to my question, I think, is found in the conception of the meaning of life that we hold. The meaning of what a good life is … where people have meaningful work or where we might have the right skills that match the right job. I define the right skills as having any job that can get you an income or make you lead a meaningful, dignified life. The excitement that I have about this project is its capacity to map trends and show us what to study. This could have unintended consequences that could be that education becomes very instrumental – education is for a second job. If you are educated, it must land you the job. I want to posit that there are other non-instrumental goods that we should pay attention to. The danger with the trends is that certain things, such as poetry or philosophy or the humanities generally, might make people think that they do not need to study these things. But I would argue that these other fields are needed to live a meaningful life.

The other thing that excites me is the idea of financial fluency. My takeaway is: let us keep taking a systemic look at this intervention and be very careful of what we prize and value and what we count as a meaningful life."

Kelly Shiohira: "Those are some very astute observations. In fact, in this panel, you are talking to two people with English Literature degrees who have gone into the technology space and leveraged that in various ways. People underestimate us and the importance of being able to write and structure your thoughts and have that kind of literary background. It is a valid point that if we are focused on concrete skills and the types of competencies that are listed in job descriptions, what are we leaving out? What are we less focused on? That is a very important point that we need to consider going forward."

Question: ***How does this technology work, in terms of its interoperability on a technical level?***

Khetho Mtembo: "There are multiple stakeholders in this environment, so we must talk about qualifications, accreditations, educational institutions and employers running on multiple different systems. Technically speaking, this is a problem that has been faced in a lot of places. For example, in the enterprise space, there is talk about enterprise integration platforms. We are able to integrate many different systems together. There is a system for allowing these different systems to talk to each other. In a way, you can think of it as an interpreter for systems. This is what the PSET CLOUD is. Technically, it sits in the middle.

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If one system stores information in one format and passes it to another in a different format, PSET CLOUD can do the translation and pass it across, though, of course, it does much more than that. This is very much a possibility and is one of the premises of the PSET CLOUD. We can go into the stakeholder system to get information, or they can pass it on to us but the basic idea is leveraging all these data sets to get the maximum amount of value from them."

Question: ***What is the basis on which the PSET CLOUD would match Zanele's credentials to opportunities?***

Barbara Dale-Jones: "This brings us to the issue of self-sovereign identity (SSI), which I would like to take a step back and talk towards. SSI is one of the key innovations of this project. There are three key innovations: the idea of the sovereignty of individual data, credential fluency and interoperability, which are all connected. I would add that a fourth innovation is the process that we have gone through to unearth user needs as well as the solutioning process that we have gone through.

Those who were part of the SSI discussion yesterday will have heard some of this before but the key principle of SSI is that it flips data ownership away from a centralised authority to the individual. So, it decentralises data ownership and essentially allows an individual to own and have agency over their own data. This addresses a number of issues such as fraud, the privacy issue that is so important for us and administrative pain points.

One of the key things SSI allows for is a very clear handshake between what the labour market requires and what the education system is providing. By having decentralised data points that are stored on the blockchain and gathered in real-time with data about individuals' learning credentials, whether formal, informal or non-formal, what you are able to have is an education and training system that has very responsive real-time data that can be broadcast to the labour market and vice versa.

Without going into the technicalities of how this is constructed, the technology used is SSI; it is reliant on the blockchain, the decentralised nodes of data of the blockchain and the real-time exchange data. It answers a key requirement of all of the users that we spoke to. We did a lot of interviewing, not just of employers and individual citizens but also of education and training providers, TVET colleges, industry bodies and others, to understand pain points. A very common issue for all of them is the need for a responsive, real-time and intelligent data ecosystem, which is exactly what SSI eventually facilitates."

Question: ***Can you reflect on what is being proposed, as well as what the PSET CLOUD platform is doing?***

Kirtida Bhana: "I think if all those who are involved remain as passionate as they are, going forward, and if the project does not lose focus and energy, then this platform could end up being one of South Africa's innovative contributions to developing economies. It would be something very progressive to do.

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For me, the concerns are around the fit between the candidate and a career path and/or the candidate and the workplace, which needs to be refined to the best fit, with every stage being verifiable. This is where the tweaks and development areas will need to be focused once the access and accuracy of data challenges are ironed out. For example, if the student does not fit the job currently, what can be done to achieve that fit over a period of time? And then, what are those mechanisms that need to be built into the system from an 'evaluation' perspective for best fit, to achieving badges or micro-credentials to progress towards best fit for that particular job? Then, that progression needs to contain learning options with non-formal and formal channels or various other channels that are available. That is how I see the platform progressing into the future, but for now, it is an excellent start and definitely something that the country desperately requires."

Question: ***What are your thoughts on the PSET CLOUD platform?***

Kgothatso Tloubatla: "I love the colour scheme. It is built on pre-existing design principles. I like the limited amount of customisation you can do, especially with the list dropped on the first landing page. The fact that you can oscillate through a list, use cards and that you can have a level of customisation, that is amazing for the platform. The choice of icons is very intuitive as it is built on icons we are already familiar with.

The placement of everything, as well as how it translates to the mobile phone from the desktop; it collapses very nicely and also responds well to whatever device you're using. The way the data is presented under the insights – the pie chart is beautiful, as well as the detailing around it. It is very easy to use, and the fact that you do not necessarily need to sign in and have a profile: instead, you can be a casual user, which is beneficial because a lot of people do not like signing in and out, so it also gives that flexibility. I do not necessarily need to provide any of my details to have a look, and once you do provide your details, then you can access the dashboard and everything else, and the picture just becomes a lot brighter and a lot better. This is a brief summary."

Question: ***Can you elaborate on the innovations that you have built into this very user-friendly platform that Kgothatso described?***

Khetho Mtembo: "The interesting thing for me is if you want to match individuals to opportunities, it is very easy to do that based on a description. For example, if I am looking for someone in computer science, and I have some text, then if the text has 'computer science' in it, there will be a match. But you might find that they are actually individuals traditionally outside of the computer science space that we can fit in as well and certain organisations start to realise that and start employing, for example, electronics engineers in that role. So even though the text does not have the words 'electronic engineers', those engineers are being matched. The traditional matching would not pick that up but your machine learning will start to pick up that people taking up these opportunities actually have learned electronic engineering, and all of a sudden, that individual with electronic engineering can get off of that position. So there is some insight that comes in beyond just the structural approach that we take. It is an insight that comes from the experience of what is happening on the ground. Different organisations can then leverage the experience of other organisations through the machine learning algorithms that have picked

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up this insight. Similarly, individuals are at an advantage: perhaps I am an electronic engineer, and all of a sudden, I see this job coming up that does not have 'electronic engineer' but it opens up. I might say: 'You know what? I could actually move into this space.' Some people have done it. How have they done it? This is one of the innovations that has come into the PSET CLOUD – going beyond just your structure or just looking at the text but leveraging the experience that is out there in industrial machine learning."

Question: ***Can you explain how the PSET CLOUD will do the work to display the trends that could advise education and training institutions and their programmes and employers on the type of cutting-edge skills they might need to look for and recruit and for citizens to better understand what kind of skills they need to gain in order to achieve their goals?***

Khetho Mtembo: "When we talk about trends, the most important thing there is the data. The challenge we face currently is that this data sits in many different places. So for someone in real-time to get an understanding, for example, on the supply side and to link that to the demand side, those are two different sectors: some would say one is education and the other is labour. The PSET CLOUD aims to bring those two sectors together so that those two data sets become merged or logically related.

You can imagine if that is the case, as a student, I can ask right now: What is the major qualification linked to opportunities that are being taken up – that is in demand? The actual functioning side is something that I think we have nailed down in statistics but the challenge is bringing those data sets together and doing so in such a way that we present information to the stakeholder and to the decision-maker in real-time."

Question: ***The PSET CLOUD is as much about organisations, relationships, changing the ways of work as it is about the actual technology. What is the role of scenario building in that process, and what do you think it has achieved through this innovative process that Barbara was talking about?***

Andrew Akpan: "We have heard throughout this conference of the difficulties that this sort of platform could encounter – for example, people not willing to share their data. I was privileged to look at the MVP. As it stands now, we do not have a lot of data, so we need a lot of uptake, and the scenario process was essentially about building relationships. Reos Partners has been supporting JET and merSETA in the stakeholder engagements necessary to build the PSET CLOUD. We convened a cross-section of stakeholders to develop a set of scenarios of what the future of PSET CLOUD could be. Essentially, these scenarios were useful to enable this coalition to move forward together in their shared challenge of collaboration.

Typically, in many systems that we support, systems where people might not like each other or trust each other, particularly in situations where the stakes are high and there is a lack of trust, one of the ways to enable movement is for people to work together and create three or four stories of what the future could look like. These stories are what we call scenarios and are basically stories of what could happen in the future. The stories must be constructed in a way that is relevant and challenging, addressing appropriate circumstances and concerns. They make the invisible visible and must be plausible, evidence-based and believable, and they are not predictions or preferences or options.

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The stakeholders in the PSET system have different ideas of what the problem is in the sector and different ideas of what is needed as solutions. In the scenario process, we ask people to suspend their idea of what they think is needed and to simply come up with drivers and use these drivers to tell a set of stories of what might happen in the future. By working together, people begin to discover that their points of view alone will not tell a complete story, and they need to listen to other people's points of view too. In this process, they begin to build trust; they begin to collaborate. So essentially, this scenario process was for stakeholders to see that there are options and choices to be made.

If you are thinking about the future of PSET CLOUD, there are various options and various futures that could emerge through action or inaction, and perhaps we could work together to bring about a decided future if we do things differently. So, it was about building that joint vision but also about going beyond: given a set of scenarios, how could it be brought to life? People discover that they can build this platform together. In this way, the scenario exercise can lead to shared accountability, focusing on the principles that underpin this work and allow this innovation to be guided by people's experiences and insight and knowledge, allowing multiple points of view. I think we were able to create a sense of joint ownership that is aligned with regulatory concerns – to build a platform that is viable and useful. By working together, people began to address the dilemmas facing technological innovation – data privacy and how to get around it. The scenario exercise allowed people to foster collaboration in their development and roll out of this mission. It was not an end but a means to an end – a means for people to enable the collaboration and to see the vision, a means for people to collaborate."

Question: ***Could you tell us a little bit about the process of user journeys and what that contributed?***

Barbara Dale-Jones: "We adopted a user-centric approach to the journey that we have taken. That meant that we used design thinking as the key methodology and design thinking starts, fundamentally, from the user outcome backwards. So we started with the process of empathy mapping, where we went into a very deep discovery phase trying to understand what users' pain points are, what the issues are, what their hopes are, their thoughts, their feelings, their touchpoints with the education training system as they transition from learning to earning. Our main groupings of investigation were the individual citizens, the employers who were looking for skilled graduates, education and training providers, TVET colleges, industry bodies and so on.

Having gone through a whole process of empathy mapping and identification of opportunities and looking for common themes in terms of the unmet needs of these users and the outcomes that they require, we then went into an ideation process, and that led us to the innovative answers that we have identified, particularly SSI, credential fluency and interoperability. The important thing is that we are not working off the basis of technologies that have been created (not saying that those are the technologies we want and therefore crafting a solution around that). We are working off the basis that there are multiple pain points for the various users who are engaging with the education training system and the credentialling system and are either looking for jobs themselves or are looking for people to employ. We are working off what those pain points are and how we should understand them and address those unmet needs and those user outcomes.

Now we are in the process of prototyping. I want to emphasise that what you have seen of the PSET CLOUD today is not a final platform. This is an MVP – a minimal viable product. We are very intentionally and deliberately putting something out into the sector now to say: Have a look at it now and give us your feedback. Based on your feedback, we will adjust, reiterate, pivot and continue developing, learning and iterating. It is obviously a very fast-moving and interesting space that we are working in, not just in South Africa but internationally. We have heard speakers talking about a very different educational world over the past two years. Beth Havinga spoke about how Ed3 builds off web3, so suddenly, we have not only the idea of decentralised data but also the idea of decentralised learning. Kirtida spoke about learning tokens. There is the idea gaining much currency in the crypto world, for example, of play to earn. How are we, as the education and training system, going to adapt with the quick disruptions that are occurring in the world around us and in the education and training sector? That is our challenge with the PSET CLOUD, and we are staying true to the principles of design thinking where we keep our eyes firmly cast on the users and on what their unmet needs are. We try by all means to focus on those, with whatever we propose as solutions and what we develop as prototypes."

Question: ***Can you give us some final thoughts on what we should be watching out for, what lessons we should learn from your experience and what we should think about going forward?***

Kgothatso Tloubatla: "Regarding the platform itself, since it is already in development, I like where it is now, and based on all the discussions, I love where it is going. With young people, what tends to fly over our heads is how the message is formed and how it is presented to us, especially now with the more popcorn generation where everything needs to be shorter than a TikTok video. So that is something we must navigate around - how it will land to my peers because we tend to like small, bite-sized things."

Kirtida Bhana: "My last thoughts are around the disconnect that we currently have between key government institutions and industry in working together towards a growth agenda to create employment opportunities and jobs in South Africa. It is this disconnect and lack of alignment that prevents resources being directed in a focused way to achieve meaningful milestones for both government and industry.

I think we must start creating those opportunities because that is what people actually need to tap into. Our target audience, particularly young people, needs these opportunities. We must create them."

Key takeaways

The following are key ideas from the discussion.

1. While qualifications and degrees from initial education and training play an important role, new types of credentials (including digital badges, micro-credentials and others) are increasingly promoted as a complementary way of valuing learning, allowing individuals to collect and "stack" learning experiences in a flexible way, at their own pace and throughout their lives.

2. Labour market information – if it is reliable and effectively disseminated – can complement or enhance nearly all other levers that focus on labour market relevance and outcomes. Data is an essential complement to educational and labour market levers through signalling.

3. Interoperability issues are a surprisingly common impediment to the use of digital data in education. Interoperability refers not just to data sharing but to the capacity for different information systems, devices or applications to connect, in a coordinated manner, within and across organisational boundaries to access, exchange and co-operatively use data amongst stakeholders. While data interoperability involves considerable technical challenges, it is primarily a challenge of establishing consensus and compromise between a range of different data actors.

4. SSI is often cited as a human right that all nations need to embrace with as much conviction as education and lifelong learning are considered to be a public good. Although the blockchain has long been identified as an opportunity for driving much-needed change in the core processes of the education sector, use cases to date have been limited in scope and execution. The potentially symbiotic relationship between blockchain and education owes much to the self-sovereign affordances brought on by technology. As long as societies are structured in non-anarchical political systems with well-defined government structures that guarantee and enforce laws while allowing for the establishment of public and private trust frameworks, governments will still have the final sovereignty of the identification of citizens.

5. Strong interoperability partnerships with stakeholders across the PSET ecosystem are crucial for realising the goals of the PSET CLOUD. Additionally, there will be technical governance aspects to be considered, which are conditional on overall governance. This includes aspects such as purpose, ownership and responsibilities, decision flows, accountability, communication roles and responsibilities and exit conditions. While it may appear that data interoperability is a purely technical concept and one that PSET leaders and policymakers can simply delegate to data experts, the reality is that all identified stakeholders have a role to play in promoting the effective use of education and labour market data.

Closing

Dr James Keevy concluded the Day 2 presentations with a reflection that the PSET CLOUD is on the right path but acknowledged that the journey over the last four years has not been easy. Speaking about the journey, he introduced three early partners in the PSET CLOUD project and asked them to describe the role they played and what advice they have for the project going forward[34].

The first partner was Jeremy Gibberd, Chief Researcher, Council for Scientific and Industrial Research and Adjunct Professor, Nelson Mandela University. A small team from the CSIR worked with JET and the merSETA in the early days of the project and focused on three things: 1) Conducting a situational analysis; 2) Mapping the systems and stakeholders; and 3) Doing a feasibility analysis. The team had to understand what the proposed PSET CLOUD was and how it could be applied locally in comparison to international examples. Dr Keevy pointed out that the work of the team provided a firm foundation for the PSET CLOUD.

Asked what he had learnt during the conference, Dr Gibberd mentioned the huge potential that exists for the PSET CLOUD and the fact that the technology is available and workable. What is required to draw people in are the opportunities for work and for training, to "get them going with life".

He identified two key challenges for the PSET CLOUD: the idea of "local", that is, ensuring that people are linked to opportunities local to where they live; and to pull people in by making it attractive to and easy for people who have opportunities to offer (i.e. employers and trainers) to participate in the PSET CLOUD.

Sindiso Sibisi, founder and Director of COOi Studios spoke about the challenge of making the PSET CLOUD a viable commercial entity. COOi Studios' work involved examining how the PSET CLOUD would operate and what sort of entity it would be in the context of a challenging environment that requires government and the private sector, with their very different approaches, to work together.

Ms Sibisi said that going forward, the PSET CLOUD must be responsive to the rapidly changing environment. She cited the example of the COVID-19 pandemic exacerbating unemployment, with graduates who could previously find work being unemployed. Ms Sibisi emphasised that the PSET CLOUD must be agile and be prepared to change in response to changes in the environment. This is essential to keep the platform relevant.

Yamkela Spengane, working for Kai.Toma Creatives, built on the work of Reos Partners and COOi Studios to create a brand for the PSET CLOUD to enable it to communicate a clear message to the broader market, stakeholders and end users of the MVP. This work entailed designing a logo and setting up a website and social media pages for the PSET CLOUD.

Asked to describe the thinking behind the logo, Mr Spengane explained that the PSET CLOUD was perceived as being a balancing mechanism with many inputs from different sectors. The PSET CLOUD needs to find a perfect balance so that usability and interoperability make sense for all the different levels of stakeholders. The balancing tool envisaged is a gyroscope that balances all the inputs and outputs so that all stakeholders can get what they require from the PSET CLOUD.

34 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-james-keevy-day-2-summary

Going forward, the PSET CLOUD must "be on the pulse of what the people need". It should be prepared to change and develop rapidly and change things responsively when required: "Fail fast, adapt quickly and augment when augmentation is needed."

Dr Keevy highlighted the interdisciplinary relationship between technology and education that is a feature of the PSET CLOUD, pointing out the irony that "fail fast is the tech way of doing things", while educational change is a slow process.

Dr Keevy thanked all the conference participants and thanked the merSETA for "trusting, believing in and being an active partner" in the PSET CLOUD process.

Conference closing and conclusion

Sebolele Nomvete, Chief Operating Officer at the merSETA, closed the conference with a narrative of the important points that emerged during the two days[35]. Mentioning that each session had unearthed something important, she proceeded to highlight these nuggets, beginning with the notion that human development and inclusive socioeconomic development must remain central to the work.

Acknowledging the negative effects of COVID-19 on human development, especially in regard to the effects on lifelong learning and skills development and thus access to learning and career opportunities, Ms Nomvete painted the alternative picture of pushing back this barrier through the use of data and technologies while remaining cognisant of ethics, privacy and control of data. "We must, at all times, make sure that we do not get ourselves into a position where we go against the ethical usage of data and where we go against protecting data identity."

Listing the emergence of new opportunities during the 4IR – faster learning, smarter governance and new occupations – she said: "This is our opportunity as South Africans to take our skills revolution up a notch by implementing multiple ways of accessing learning at both institutions and workplaces, an opportunity for us to implement learning processes that bring together conventional learning processes and unconventional technology-based or technology-driven learning processes."

With reference to her opening statement about human development, Ms Nomvete highlighted the process of change management: "Taking people along is a critical element of the journey we are taking." The softer skills also shone through her reference to a governance model that "talks to co-operation, to consensus, a model that requires all of us to cede power and build trust amongst various members of the ecosystem".

She voiced the hope that, in a sense, underpins the work of all involved in the project: "to produce a product that serves the needs of the people and addresses large-scale unemployment".

She encouraged the audience to get involved in the nomination process of the Launch Group that "should be seen as a structure that will support the structure of a new social contract – one that brings together human creativity, intelligence and technology innovation" and concluded by thanking all the presenters, facilitators, guests and staff of JET and the merSETA.

The DigiTrans Conference 2022 was an overall success. It revealed that the PSET CLOUD operates within a multidisciplinary space that straddles education, labour market information and technology. The initial handshake between work and learning is definitely moving towards a healthy symbiotic relationship. Long live the PSET CLOUD!

35 https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-ms-sebolelo-nomvete-day-2-closing

Links to the DigiTrans 2022 conference and presentations

DAY 1	
PSET CLOUD Introductory video by Dr Rooksana Rajab	https://psetcloud.org.za/events/previous-events/digitrans-2022/pset-cloud-intro-video-by-dr-rooksana-rajab
Day 1 welcome - Mr Wayne Adams (merSETA)	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-mr-wayne-adams-day-1-welcome
Keynote address: Building bridges to better decisions – Interoperable platforms – A UNESCO perspective. Dr Borhene Chakroun	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-borhene-chakroun-interoperable-platforms
Session 1	
Credentials and micro-credentials in NQF (panel discussion) – Dr Julie Reddy	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-julie-reddy-credentials-and-micro-credentials-in-nqf
Session 2	
Differential privacy (panel discussion) – Dr Bangani Nngeleza	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-bangani-ngeleza-differential-privacy
Practical private data analysis. Mr Nicolas Grislain (slide presentation)	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-practical-private-data-analysis-nicolas-grislain.pdf
Session 3	
Self-sovereign identity (panel discussion) – Ms Barbara Dale-Jones	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-barbra-dale-jones-self-sovereign-identity-technology
Blockchain & self-sovereign identity. Mr Carel de Jager (slide presentation)	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-blockchain-self-sovereign-identity-carel-de-jager.pdf
Session 4	
Proposed governance for the PSET CLOUD (panel discussion) – Dr More Manda	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-more-manda-proposed-governance-for-the-pset-cloud
Data governance: Evolving platform cooperatives. Mr Jason Bygate (slide presentation)	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-data-governance-jason-bygate.pdf
PSET CLOUD governance guidance note. Mr Paul West & Mr Chris Beukes (slide presentation)	https://psetcloud.org.za/events/previous-events/digitrans-2022/pset-cloud-governance-guidance-note-paul-g-west-christopher-j-beukes.pdf
Day 1 Wrap up - Dr James Keevy	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-james-keevy-day-1-wrap-up

DAY 2	
Keynote address: The possibilities for the PSET CLOUD. Prof Saurabh Sinha	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-the-possibilities-for-the-pset-cloud-prof-saurabh-sinha.pdf
Session 5	
Toward an appropriate, relevant and representative governance structure – Ms Nicole Copley	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-nicole-copley-proposed-governance-model-for-the-pset-cloud
Session 6	
Demo of international interoperable systems – Ms Eduarda Castel-Branca	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-demo-of-international-interoperable-systems
Unlocking the power of big data to inform labour market and education policies. Mr Mauro Pelucchi (slide presentation)	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-education-policies-mauro-pelucchi-1.pdf
Towards smart labour market intelligence. Prof Mongi Boughzala (slide presentation)	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-labor-market-analysis-in-tunisia-mongi-boughzala.pdf
Session 7	
Complementary platforms in SA – Presidential Youth Employment Intervention – Ms Carmel Marock	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-presidential-youth-employment-intervention-carmel-marock.pdf
Complementary platforms in SA – Harambee Youth Employment Accelerator – Mr Kuben Nair	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-complementary-platforms-in-south-africa-kuben-nair.pdf
Complementary platforms in SA – Digital credentials in SA – Mr Stephen Logan	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-digital-credentials-in-sa-stephen-logan.pdf
Session 8	
Demo/Launch of the PSET CLOUD minimal viable product (panel presentation) – Ms Kelly Shiohira	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-kelly-shiohora-pset-cloud-platform
PSET CLOUD platform (video presentation)	https://psetcloud.org.za/events/previous-events/digitrans-2022/pset-cloud-platform
Day 2 concluding session: The journey over the last four years – Dr James Keevy	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-dr-james-keevy-day-2-summary
Conference closing and conclusion – Ms Sebolelo Nomvete	https://psetcloud.org.za/events/previous-events/digitrans-2022/digitrans-2022-conference-ms-sebolelo-nomvete-day-2-closing

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