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National Skills Taxonomy Discussion Paper Response

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The Australian National University acknowledges, celebrates and pays our respects to the Ngunnawal and Ngambri people of the Canberra region and to all First Nations Australians on whose traditional lands we meet and work, and whose cultures are among the oldest continuing cultures in human history.

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Introduction

The ANU School of Cybernetics was established in January of 2021 to build national capabilities to navigate major societal transformations. In Australia and globally, we are facing many challenges from growing wealth inequality to climate change, diminished trust in social institutions and the role of new and emergent technologies in our daily lives, economies, and democracies, just to name a few.

The School's history can be traced to the Autonomy, Agency, and Assurance Institute (3Ai) founding at the ANU in 2017 under the leadership of Distinguished Professor Genevieve Bell, AO FTSE FAHA. 3Ai was established to help scale Artificial Intelligence (AI) safely, sustainably, and responsibly. Following the implementation of the ANU Strategic Plan 2021-2025, 3Ai became the School of Cybernetics as we expanded our programs and remit, with Genevieve Bell serving as the inaugural Director before she was appointed as ANU Vice-Chancellor in 2024.

We believe that cybernetics — an approach to complex, dynamic systems that recognises the relationships between the human, the technical, and the ecological — offers a way forward in building national capabilities. Our research, education, and public engagement focus on building and sharing new knowledge and practice in understanding and shaping systems cybernetically through communication and feedback.

At the core of the School's strategy is research-informed education and engagement. This includes:

- A one-year, intensive, cohort-based Master of Applied Cybernetics Program aimed at creating the next generation of cybernetic practitioners. Over six years, we have graduated over 70 students and have achieved national and international recognition and awards.
- A cohort-based PhD program aimed at creating new knowledge and the next generation of cybernetic expert practitioners with a strong focus on work experience.
- A suite of Learning Experiences to enable and empower participants with cybernetic tools and methodologies. These interactive short courses apply a cybernetic approach to AI, Leadership, Systems transformation, and Creating Futures. Since 2019 we have delivered learning for executives, board members, policymakers, and community members. We are currently training over 200 senior executive staff from an Australian Government agency in AI leadership.
- A commitment to partnerships with industry, government, and community. We have produced research reports and papers with the National Library of Australia, the Menzies Foundation, and Meta that inform our education programs. We are an active education partner with several industry, government, and community organisations.

Through an exploration of our journey as educators to support life-long learning, we wish to offer some of our lessons learned that would help inform the design, implementation, and governance of a National Skill Taxonomy.

A Systems View of Skills and Knowledge

The question is: How do we scale skills for leading change?

A key part of our Master’s Program is to enable our students to develop a wide range of skills in a mutually supportive cohort-based learning environment.¹ We believe this helps build strong ties and community and offers an important alternative to personalised and individual learning journeys. As the introduction notes, we face increasingly complex challenges with conflicting values, limited resources, growing inequalities, and distrust in social institutions. Our cohort-based learning is anchored on developing core skills to navigate these complexities. This includes but is not limited to:

- **Multi-modal communication approaches** including for memorable storytelling, learning/development of new languages (technical, theoretical, natural), and translation between these and others;
- **Multi-faceted approaches to creativity** through designing and prototyping technology;
- **Embodied, analytical and reflective exercises** to enhance critical and computational thinking, and self-reflexivity; and
- **Facilitation skills to support the collective learning** of others by effectively acknowledging multiple ways of knowing, being and doing.

We believe these are transferable skills in building consensus, creativity, resilience, and leadership across communities and circumstances, not just for developing and managing safe, responsible, and sustainable systems at scale. As educators, we note that skills are conceptually and practically linked to tasks and, ultimately, to purposes. More importantly, the tripartite constellation of skills, tasks and purposes are components of a knowledge system - a **complex, dynamic system** for generating, sharing, and applying knowledge and know-how to transform the world.

In the context of a knowledge system, skills are not solely attributes of an individual – they can be attributes of a group, a community, or an organisation. Through collaboration and teamwork, our cohorts learn to execute complex tasks collectively to achieve common learning objectives. At the level of a group, skills and knowledge are **emergent features** of the group that can amplify and transcend the sum of the parts. While we agree that a common vocabulary for skills is helpful for mutual understanding and practice, skills attributable to groups and organisations have a higher level of complexity - they are not just a combination of skills of individuals. Our understanding and taxonomy of skills and knowledge needs to have a sufficient level of detail

¹ We acknowledge ESCO’s characterisation of skills as

“the ability to apply knowledge and use know-how to complete tasks and solve problems. They can be described as cognitive (involving the use of logical, intuitive, and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools, and instruments),”

We also consider that knowledge and know-how can be deployed to positively ‘navigate complexity’ – a higher order challenge beyond ‘solving problems’. Within this frame, we find it problematic to take a completely instrumentalist view of “skills” (and knowledge) without considering whether they are used in a way that is “fit-for-purpose” in a positive and purposeful way. Lock picking is a highly valued skill for the work of a locksmith, but not when used for burglary. Some skillsets are only developed under strict ethical codes of practice or conduct (e.g., engineering, surgery) to prevent their misuse and mitigate risks to society.

and sophistication to reflect that complexity. We need to learn collectively. We need to develop an appetite for divergent thinking.

A Commitment to Diversity

One of our core principles is diversity, from hiring and student recruitment, through the selection of partners, to our research and education focus. Our commitment to diversity is both a social justice issue, as well as a pedagogical and intellectual stance. Ensuring diversity of voices in everything we do is essential to innovation and guiding societal transformation. This is embedded in a core cybernetic principle – that of **requisite variety** (loosely, the diversity among those who are designing and building needs to be as great or greater than the variety in the system they are seeking to intervene in).

Our very particular commitment to diversity is reflected in our staff and student mix. Beyond having a faculty that is more than 50% female (a remarkable thing inside a STEM organisation) our staff bring with them an incredibly diverse set of experiences, disciplinary training and background, worldviews, and ways of working. This includes anthropologists, policymakers, systems and environmental engineers, computer scientists, sociologists, lawyers, award-winning photojournalists, artists, technologists, communicators, physicists, historians, ecologists, and cyberneticists.

For our Master's program, we select participants for the program based on how they will interact and function as a cohort. To that end, we intentionally welcome participants with diverse backgrounds and disciplines, including those who have pursued non-traditional academic pathways – they may not have undergraduate degrees – but meet requisite levels of assumed knowledge through professional experience.

Since its inception in 2019 and including the current 2024 cohort, 87 students have enrolled in the Master's program. In terms of student gender profile, over this period there has been an equal ratio of male to female students, with at least 10% self-identified as gender diverse. Approximately 20% of students have been international, noting that during COVID international students were unable to travel and study on campus. In terms of academic and professional backgrounds, our students come from defence, banking, consultancy, law, social service, engineering, IT, software engineering, mathematics, science communication, journalism, entrepreneurship, economics, anthropology, environmental management, philosophy, theatre, and performance art to name a few. Of vital importance to the School and ANU with our National and regional mission, every cohort since establishment has First Nations representation (c. 10%), including Aboriginal, Torres Strait Islander and Pasifika (e.g. Hawaiian and Māori) students.

By assembling diverse individuals in a group learning environment, our students can explore divergent thinking and practice collectively – what we call 'critical thinking and critical doing.'

Our graduated Master's students have gone on to senior leadership roles in digital, data and AI fields in Federal and State agencies, think tanks and institutes, non-profits, and industry, creative industries, as well as on to PhDs with top universities, including our own unique cohort-based PhD program.

Co-Production of Knowledge Systems

Our Learning Experiences are oriented towards creating a culture at the university level of fostering lifelong learning and thinking more broadly about external organisations who would benefit from cybernetic skills and capabilities. Gone are the days when students could gain a degree in their early 20s and be set for life with the information they consumed there. Rapidly changing technologies mean constant upskilling is required. There must be a great focus not just on content, but also on developing core skills such as critical thinking, navigating complexity, and leading for change.

The School of Cybernetics offers short, interactive Learning Experiences to professionals and organisations to empower them with transformative cybernetic tools and methodologies. Our partners are looking for a model of co-production of value rather than one of passive knowledge transmission from an expert. Through our education partnerships, we cultivate an environment of two-way learning where participants can apply cybernetic tools to real examples from their own contexts, simultaneously affording opportunities to test the School's research.

To that end, through 2019-2020 we joined with Microsoft to deliver to corporate and government partners a one-day course to reframe understandings of AI. This was delivered multiple times over one day workshops to groups of around 15-40 executives. In 2021-2022 we developed a "bootcamp" format for hybrid delivery and used it to introduce cybernetic concepts and methods to the KPMG board and senior partners for 69 participants.

We have also provided content and learning to other programs and in different contexts; we have worked with the Cranlana Ethical Leadership program, Australian Human Resources Institute, the 2022 Spark Festival ("Imagining Better Futures with Cybernetics" workshop) to contribute learnings to their cohorts and audiences. We have also collaborated with various government agencies, other universities, community organisations, and industry partners to develop and deliver workshops to varied audiences.

When people take our courses, regardless of how short or small the interaction is, they become part of our network and community. We actively curate and support this community using the amazing digital tools that are available to us.

These non-award Learning Experiences are essential to our vision of remodelling what the University sector delivers to its societal and industry partners. It is a model of participatory partnership, one where knowledge sharing and application are **co-produced** with partners rather than being generated in a lab-like condition and from there commercialised or exported. There is still value in such a traditional research output and engagement model, but in the context of the rapid evolution of technologies and often turbulent socio-economic environments this model lacks flexibility and responsiveness.

What is the implication of a National Skills Taxonomy on our alternative participatory knowledge partnership? We think there is room for both to co-exist in the system. For education and training providers, NST can streamline certain processes and communicate to the public the skills and knowledge of their graduates. Employers can get a clearer sense of the skills and knowledge offered. For the School of Cybernetics, a joined-up, cross-sectorial model of NST governance is preferred, given our co-production approach to knowledge systems.

Lessons learnt

In this submission, we hope that in recounting our experiences as educators, it becomes clear that there are alternative ways to create, share and apply knowledge. This could help to inform the National Skills Taxonomy and its future iterations. Three key lessons are emerging for us that are relevant to re-thinking skills:

- ***Embodied, cohort-based, learning*** – knowledge of groups is distinct from knowledge of individuals. Multi-modal communication, multi-faceted creativity, embodied, analytical and reflective thinking, facilitation of collective learning are ingredients to build consensus, creativity, resilience, and leadership in a group.
- ***Diversity*** – in an increasingly complex world, a diversity of perspectives is needed to explore and investigate multiple pathways and alternatives to the future. A monolithic, one size fit all approach is not a viable option.
- ***Knowledge co-production*** – enduring partnership with industry, government and community is a viable alternative to link and speed up the process of knowledge creation, sharing, and application for societal benefits.

These are important ingredients that matter for building national capabilities to manage new systems – including AI and emerging technologies – safely, responsibly, sustainably at scale.

In our field, the emergence and adoption of new technologies has had a profound impact on higher education in Australia, transforming our practices and roles in knowledge systems. Along with the challenges and opportunities new technologies afford, we will also see new markets, capabilities and jobs open up. The higher education system will be an intrinsic part of this. We know that we have a part to play here, and we look forward to continuing this journey to support national capability building.