

Making the Ecosystem Work: Designing the Capability System for the Minerals Industry



Over the past several President's Corner articles, I have explored people-centric operating models, the responsibility we carry as leaders to develop future practitioners, the implications of professional registration, and the need to strengthen the professional pipeline. More recently, I highlighted that this is not simply a pipeline problem – it is an ecosystem challenge.

The next step is clear. We must design the system that enables this ecosystem to function as a reliable capability pipeline for the minerals industry.

Starting with industry needs

Any effective system must begin with a clear understanding of its objective.

Over the past six months, I have engaged extensively with industry leaders, professionals, heads of schools, and key stakeholders. A consistent theme has emerged: the minerals industry is increasingly constrained not by resource availability, but by capability.

A mining business requires three things to create value: a resource endowment; the infrastructure, technology, and systems to exploit that resource; and a well-developed capability base. The emerging constraint is the third element – not the number of professionals, but the depth and integration of capability across the system. This includes engineers, technologists, technicians, and core technical skills, combined with the ability to operate, manage, and improve complex value streams.

This challenge is being amplified by an ageing cohort of experienced professionals and increasing industry complexity. It is a global challenge.

Just as we invest in exploration to grow our resource endowment, we must invest deliberately in building our capability endowment. Without it, we will not have the ability to develop the resources we hold.

The objective is therefore not to produce graduates. It is to develop industry-capable, competent, and professionally accountable practitioners across all levels – from technicians and technologists to registered engineers and future industry leaders.

This requires us to start with a fundamental question: what capability does the future minerals industry require?

A student entering university today will typically only reach full professional capability in eight to ten years. We are designing a system not for today's industry, but for the industry that will exist a decade from now.

From pipeline to value stream

We often refer to a 'pipeline' of talent, but this is better understood as a value stream.

In any mining operation, a value stream consists of interconnected activities that must work together to deliver a consistent outcome. When misaligned, performance is constrained. The same applies to capability development.

The flow is clear. Universities and technical colleges provide foundational knowledge and technical grounding. Industry provides workplace experience and application. Mentorship develops capability and judgement. Professional registration validates competence and accountability. Continuing professional development enables ongoing growth and adaptation.

When aligned, this produces capable practitioners. When fragmented, we see weak transition into industry, inconsistent development pathways, low conversion to professional registration, and skills mismatches across technical levels.

The ecosystem that enables the flow

Mapping the value stream is only the starting point. For the value stream to perform, we must deliberately develop the ecosystem that supports its flow.

Universities and technical colleges provide foundational knowledge and core technical grounding. Industry workplaces provide practical experience, capability development, and accountability. Regulators and professional bodies such as ECSA define standards, accountability, and legal requirements. Skills development and funding bodies such as the MQA and METF support training systems, funding, and skills development alignment. Industry bodies and associations such as the Minerals Council South Africa represent industry needs, demand signals, and strategic alignment.

Each of these stakeholders plays a distinct role in enabling the flow of capability, and the effectiveness of the system depends on how well these roles are aligned and integrated.

A functioning system requires alignment between academic output and industry needs, structured workplace development across all technical levels, coordinated pathways to professional registration, and continuous learning aligned to evolving capability requirements.

The ecosystem must be designed to enable flow across the value stream – not to operate as a set of disconnected activities.

Identifying the constraint

In any value stream, performance is governed by its constraint.

Across our industry, the constraint is not the number of people entering the system. It is the conversion of individuals into experienced, competent, and accountable practitioners across all technical levels.

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This breakdown occurs through limited structured workplace development, inconsistent mentorship, misalignment between education and industry expectations, and fragmented accountability across stakeholders.

Unless this constraint is addressed, the system will continue to underperform.

Inputs and outputs

Clarity of inputs and outputs is essential.

The inputs are ECSA-defined competencies through the Identification of Engineering Work, and industry capability requirements across technical and professional levels.

The outputs are an industry-capable technical workforce across all levels, registered professionals able to take accountability, continuously developing practitioners, and future industry leaders.

The role of the ecosystem is to reliably convert these inputs into outputs.

System components and roles

To enable the flow of the professional capability value stream, we must be clear on the roles of both the broader ecosystem and the SAIMM system components that integrate it.

Within SAIMM, the Young Professionals Council provides early engagement, mentorship, and transition into industry. Our CPD structures support professional registration pathways and ongoing development. The SAIMM Academy offers structured capability development aligned to industry needs. Our technical programmes enable knowledge sharing, exposure, and peer learning. And MEESA drives alignment between universities and industry.

Alongside these, our volunteer technical associations in disciplines such as rock engineering, ventilation, and surveying are a critical part of the system. These associations carry deep specialist knowledge, develop practitioners within their disciplines, and connect professionals through peer learning and applied technical work. They represent capability infrastructure that the industry has built over many years, and their role within the broader ecosystem must be recognised and strengthened.

Together, these components must operate as an integrated system, designed to support the flow of the value stream. SAIMM plays a central role in connecting and aligning the ecosystem.

The role of SAIMM

SAIMM is positioned at the intersection of industry, academia, and professional practice. This enables us to understand evolving industry needs, identify system constraints, align stakeholders across the ecosystem, and use our platforms to enable flow and address bottlenecks.

The role that is emerging is clear. SAIMM is becoming the integrator of the capability system for the minerals industry. Not by replacing existing structures, but by connecting them, aligning them, and enabling flow across the system.

Accountability and execution

A system only works when each component is accountable for its outputs. We must be clear on what each part delivers, how it is measured, and how it contributes to overall system performance. Without this, fragmentation persists despite good intent.

Reframing professional standards

Professional registration with ECSA is not only a compliance requirement. It defines the standard of competence and accountability required within the system. The responsibility of the ecosystem is to design and operate a system that consistently delivers practitioners who meet that standard.

But professional registration through ECSA is only one part of the picture. Across the minerals industry, competent person requirements are embedded in legislation and regulation for disciplines such as rock engineering, surveying, blasting, and ventilation. These are not optional credentials. They are legal requirements that determine who is permitted to take accountability for specific work.

When we consider these competent person requirements alongside professional registration, the full scope of what the capability system must deliver becomes clear. The industry will need to map these requirements to defined levels of work, so that development pathways are structured, competence standards are understood at each level, and the system produces practitioners who meet both professional and regulatory requirements.

This mapping is not a minor administrative exercise. It is fundamental to ensuring that the capability system is designed around the real requirements of the industry, not just the formal registration framework.

Building for the future

This system cannot be delivered by SAIMM alone. It requires universities and colleges aligned to future capability needs. It requires industry committed to structured development and mentorship. It requires practitioners taking ownership of their growth, regulators maintaining clear standards, and institutions collaborating deliberately. And it requires an innovative funding model to create a capability endowment.

Most importantly, we are building this system for the industry that will exist a decade from now.

Looking ahead

The future of the minerals industry will not be constrained by resources. It will be constrained by capability.

Designing the value stream is essential. Building the ecosystem that enables it is critical.

The work has begun. Now it must be executed with clarity, alignment, and discipline.

What we build today will determine the capability of our industry for decades to come

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