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Being-and-Becoming a Sustainable Practice

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This paper reports on the case of the Engineering Practice Academy, where an emergent transformational change process was designed and implemented to not only re-conceptualise engineering education but further transition the Engineering Practice Academy towards being-and-becoming a sustainable engineering practice. This paper presents a framework, grounded in the everyday social reality of the Engineering Practice Academy community and framed through a *Theory of Change* methodology. The Engineering Practice Academy utilised the strategic framework presented within this paper to guide its decision-making processes. This paper articulates both the framework developed and conceptualises why a framework designed to create a sustainable practice was utilised. The value of this paper lies in the communication the method used for transformational change, one of inclusion, collaboration and community of practice, used by the Engineering Practice Academy to create a distinct pathway by which to reach its goals and become a sustainable practice in line with shifting engineering and educational requirements.

transformational change; being-and-becoming; social sustainability; engineering education

1 Introduction

A central question for undertaking a transition is how the change will be brokered within the practice. Negotiating change is complex because it entails a dynamic interplay of actors each with their claim of competency, knowledge, and agenda that are aligned or misaligned to the overarching vision for the change. The *Theory of Change* method presented in this paper provided tools to initiate transition towards a sustainable practice. This paper reports on the reasons and processes undertaken by the Engineering Practice Academy located at Swinburne University of Technology to design a structure to assist the transition to being-and-becoming a sustainable engineering practice. The Engineering Practice Academy designed its strategic framework by using a *Theory of Change* method and produced the outcomes of a vision statement, high-level objectives, theory of change maps and the development of program narratives in consideration of definitions of sustainability utilised by the Framework for Strategic Sustainable Development. The change process undertaken by the Engineering Practice Academy was iterative and this paper presents only the initial phase of



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the process thus being the rationale for change within the context of the Engineering Practice Academy and the planning and participation processes pertaining to the *Theory of Change* method.

The term 'practice' within the context of this paper concerns the acknowledgement that individuals working and learning within organisations are being-and-becoming practitioners. An individual practice is complex, multi-modal, and continuously implicitly and explicitly responding and adapting to social, cultural, political, technological, economic and historical influences. Predominantly, this paper presents a case of a practice being-and-becoming sustainable and considering sustainability as an integral element to the core functioning of the Engineering Practice Academy's practices in a way that places sustainability as a cornerstone of its operations, functions and learnings.

1.1 Reengineering engineering: A complex sociocultural transition

There are many different aspects of organisational transition that are systemic and influenced by social, cultural, political, technological, economic and historical influencers. Within this study, the change from traditional academic and industry expectations of engineering education to a new practice-based approach presented a systematic transitional challenge for the stakeholders involved. The development and implementation of the Engineering Practice Academy and its associated Bachelor of Engineering Practice (Honours) degree transpired in part because of social, cultural and political influences and needs. Engineering education within an Australian context presently has systemic and structural barriers to overcome and has recognised that engineering education needs to consider the social, cultural, global, political, and environmental responsibilities of engineering education and the profession of engineering moving into the future. The field of engineering as a system has encountered continuous change "brought about by new scientific and technological knowledge, and to changing economic and regulatory forces" (King, 2008, p. ii). Beanland and Hadgraft (2014, p. 8) stated that engineering education within Australia "is still to implement the transformation that is required to enable the next generation of engineers to effectively operate within this changing profession". Engineers Australia, the national industry peak body, recently released its 'Implementing Sustainability,' report guiding the Australian engineering sector on the standards and responses to sustainability it has set across the sector. Furthermore, the report considered and encouraged the implementation of sustainability into the pedagogy of engineering education in order to develop a sector of individuals capable of responding to and influencing local and global sustainability challenges (Rice, Davies, Fitzhardinge, & Jones, 2017).

Negative perceptions towards engineering education and the profession of engineering are a further reason behind the need for systematic transformation. Engineering education and "engineering has not historically been on the cutting edge of inclusion and social justice" (Riley, Slaton, & Pawley, 2014, p. 350). Engineering education and engineering as a profession being profoundly exclusionary extends beyond gender diversity with diversity being a measure of heterogeneity across a given population; whether that be gender, sexual orientation, race, ethnicity, age, or socio-economic status (Hunt, Layton, & Prince, 2015).

Furthermore, the communication of engineering as a discipline within the context of Australia presents barriers in regards to attracting school leavers into the profession. Within Australia, there are:

widely-held concerns that the societal value of engineering as a profession, and the broad merit of engineering as a study pathway that increases graduates' career opportunities, are largely invisible to the public at large and within the school education sectors (King, 2008, p. iii).

Australian universities have been slow to address the negative perception of engineering and take responsibility "for the problems created by the current deficiencies in engineering education" (Beanland & Hadgraft, 2014, p.viii).

Engineering education within the context of Australia is in need of sociocultural change to not only transform the perception of engineering education but also engineering as a profession in a future dominated by questions of automation and algorithms. Transformational change is however complex and challenging to realise in an academic context. Change in universities is a multifaceted process because:

while there are many forces resistant to change in universities that need to be overcome for transformation to be implemented, there is also goodwill to consider changes that can be demonstrated to be justifiable. The difficulty of achieving change cannot be used as a reason to justify widespread failure to address fundamental problems associated with the design and delivery of a core activity (Beanland & Hadgraft, 2014, p. 62).

The Engineering Practice Academy is just one example of an Australian university initiative addressing the systemic barriers surrounding engineering education. The Engineering Practice Academy responds to the social, cultural, political, technological, economic and ecological contexts in which the Bachelor of Engineering Practice (Honours) degree operates within. The Engineering Practice Academy works as an engineering practice being both a professional service provider and a higher education institution. The Engineering Practice Academy reacted to the recommendations specified by King (2009) within the report published by the Australian Council of Engineering Deans. Specifically, the Engineering Practice Academy aimed to design and implement a curriculum “based on sound pedagogy, embrace concepts of inclusivity and be adaptable to new technologies and inter-disciplinary areas” (King, 2008, p. iv). Furthermore, the Engineering Practice Academy intended to:

address shortages in the engineering workforce by attracting and retraining people from non-traditional backgrounds e.g. women, mature age engineers, engineers with overseas qualifications, engineers who have left the profession, and engineers wishing to articulate between qualification levels (King, 2009, p. iv).

Additionally, the Engineering Practice Academy recognised that “engineering educators and industry practitioners must engage more intensively to strengthen the authenticity of engineering students’ education” (King, 2008, p. iv). The process undertaken to re-position engineering education requires transformational change and seeks to be done in a way that encourages the creation of a sustainable practice and model.

To transform and present an alternate model for engineering education that celebrates diversity in all its forms, provides an environment that challenges unsustainability and considers deeply the idea of ‘who an engineer is’, required the Engineering Practice Academy to transform their individual and collective vision of engineers, engineering education and engineering as a profession. This paper considers and articulates the process by which the Engineering Practice Academy undertook the conceptualisation and development, and implementation of this challenge.

2 Becoming sustainable: a framework to create sustainable practice

The definition of sustainability (and sustainable development) has long existed in a realm of ambiguous discourse. The heavily utilised Brundtland definition, “development that meets the needs of the present without compromising the needs of future generations to meet their own needs” (Missimer, Robèrt, & Broman, 2016b, p. 43), has been considered the universal definition. However:

the vagueness of the definition... allows business and ‘development’ interests (and their government supporters) to claim they are in favour of sustainable development when actually they are perpetrators of unsustainability (Jacob, 1994, p. 24 as cited in Missimer, Robèrt, & Broman, 2016a, p. 32).

With many definitions available, there has been a distinct challenge developing a scientific, robust understanding and definition of systematic sustainability and its models. John Elkington’s ‘Triple

Bottom Line' approach, that places environmental, economic and social systems in a tripartite model of equal weight (Slaper & Hall, 2011), is often cited and utilised by business sectors as a way of introducing sustainability into the language and planning of their practice. As has the 'Overlapping Circles Model' which places economic and social systems inside an environmental one (McKenzie, 1994) highlighting the social and economic reliance on a healthy ecological system. Yet to define sustainability in terms of compliance and violation, especially in its social realm, continues to be a challenging proposition.

2.1.1 Utilising a comprehensive sustainability framework.

In order to clarify this challenge and construct a definition of sustainability, a definitive robust scientific framework was developed by a group of academics in the early 1990's. The Framework for Strategic Sustainable Development (FSSD) is a structured and coordinating framework that includes a unifying and operational definition of sustainability at both ecological and social levels (Broman & Robèrt, 2015). The FSSD articulates the system conditions of sustainability using ecological and social sustainability principles to provide a robust definition of sustainability by providing an understanding of when sustainability is being complied with or violated. By creating the measurable conditions to sustainability these sustainability principles can be used to aid organisations as they transition from unsustainable to sustainable practices. It does this by creating a thorough understanding of the global sustainability challenge, how organisations are interrelated and entwined within the ecological system and the dangerous context of risk for organisations that refuse to adopt sustainable measures. The principles provide the conditions of sustainable success by which organisations are able to move strategically towards sustainability (Broman & Robèrt, 2015). The FSSD provides the robust definition that Brundtland lacks and is determined on the premise:

that humans are dependent on the ecological and the social system to meet our needs, what are the essential aspects of the ecological and social systems that need to be sustained (or restored) in order to not systematically undermine the capacity of people to meet their own needs (Missimer et al, 2016b, p. 43).

It was within this understanding that the FSSD provided the Engineering Practice Academy with a comprehensive sustainability framework.

2.2 The sustainability principles: Adopting a definitive understanding of sustainability.

The Framework for Strategic Sustainable Development (FSSD), originally consisted of four sustainability principles. Three ecological principles and one social sustainability principle. The three ecological principles of sustainability (Sustainability Principles 1,2,3) and the fourth social principle (Sustainability Principle 4) were developed over 25 years of robust, peer reviewed scientific investigation, and have been defined as:

In a sustainable society, nature is not subject to systematically increasing...

1. ...concentrations of substances from the earth's crust. (SP1)
2. ...concentrations of substances produced by society. (SP2)
3. ...degradation by physical means, and: (SP3)

In a sustainable society;

4. ...people are not subject to conditions that systematically undermine their capacity to meet their needs. (SP4)

However, the social dimension of the framework (initially Sustainability Principle 4) was found to be not sufficiently science based and operational, a challenge faced in the wider social sustainability field, requiring further scientific development (Missimer et al, 2016a & 2016b). This development has led to emerging models of social sustainability being defined and developed conceptually within

the FSSD expanding the social sustainability principles to become the sustainability principles 4-8. This expansion means the resulting definitions for ecological and social sustainability are:

Table 1: Adapted from Broman & Robèrt's (2017, p.7) definition of social and ecological sustainability principles.

Definitions for ecological and social sustainable societies	
"In a sustainable society, nature is not subject to systematically increasingly... 1...concentrations of substances from the Earth's crust. 2...concentrations of substances from society. 3...degradation by physical means".	[social] "people are not subject to structural obstacles to... 4...health. 5...influence. 6...competence. 7...impartiality. 8...meaning-making".

2.2.1 The challenge of social sustainability

Social sustainability remains a contentious topic due to the subjective nature of its form, the number of differing definitions that exist in the social realm and the difficulty in measuring these definitions. There is also the challenge that in many realms the term sustainability is associated with ecological and environmental contexts requiring 'social sustainability' to be discussed and emphasised as a separate individual area (often social impact or corporate social responsibility). While this has led to increasing awareness on the implications and considerations of social impacts "rigorous definitions for corporate social responsibility and social sustainability have yet to be established" (Hutchins & Sutherland, 2008, p. 1689).

The Framework for Strategic Sustainable Development (FSSD) aims to be a platform to tackle sustainability challenges and has focused on creating testable social sustainability definitions which unlike definitions of ecological sustainability remain under-utilised or considered in general terms. The research conducted by Missimer et al (2016a & 2016b) aimed to develop these social principles by investigating into the essential elements of the social system. From this investigation, the above social principles were created as part of the FSSD. However, measurement and understanding of the impact of the principles when used as the basis for developing strategic sustainable transitions and planning is still in formation and testing, however initial feedback concludes that the social sustainability principles are valuable in being able to provide an analytical tool to the sustainable transitions of social systems.

2.3 From principles to planning: Building a socially sustainable practice.

In order to create a community of practice in which actors are able to be-and-become authentic engineers and people (an aim in the Engineering Practice Academy vision). The system they inhabit must not violate the above principles of sustainability. This requires an awareness of and action that encourages:

the elimination of mechanisms of systematic degradation of essential aspects of both the ecological and the social system (Missimer et al, 2016b, p. 43).

Therefore, utilising the FSSD sustainability principles the Engineering Practice Academy created the boundary conditions in which the practice can move towards sustainability. For example, to comply with the social sustainability principles and create a sustainable practice, an organisation can use the SSP's to highlight the structural and systematic impediments for each indicator and create an action plan by which they can be removed (using the strategic processes of the FSSD). For example, the question could be asked for Social Sustainability Principle 1 - Health:

Are there health and safety concerns for employees? For example, excessive working hours, unsafe or unhealthy work environments, harassment and abuse of works, and forced labour / child labour? (Missimer et al, 2016b, p. 48).

In creating a process by which these challenges are identified and overcome, the transition towards a sustainable practice (in line with the vision) can be developed. The principles could be investigated within an organisation as such:

SSP 1... health.

(This means that people are not exposed to social conditions that systematically undermine their possibilities to avoid injury and illness; physically, mentally or emotionally, e.g., dangerous working conditions or insufficient wages).

SSP 2... influence.

(This means that people are not systematically hindered from participating in shaping the social systems they are part of, e.g., by suppression of free speech or neglect of opinions.)

SSP 3...competence.

(This means that people are not systematically hindered from learning and developing competence individually and together, e.g., by obstacles for education or insufficient possibilities for personal development.)

SSP 4...impartiality.

(This means that people are not systematically exposed to partial treatment, e.g., by discrimination or unfair selection to job positions.)...

SSP 5...meaning-making

(This means that people are not systematically hindered from creating individual meaning and co-creating common meaning, e.g., by suppression of cultural expression or obstacles to co-creation of purposeful conditions) (Missimer et al, 2016b, p. 47).

After the principles are investigated and once structural obstacles are removed (through strategic processes) the system reaches a level of compliance, thus creating the conditions for social sustainability to occur. Thus, the conditions of a socially sustainable practice as the condition in which individuals, as part of a community of practice within the social system, are freed from all structural hindrances to the social sustainability principles.

3 The case: Connecting being-and-becoming and social sustainability.

The Engineering Practice Academy is a case where a transformational change process (framework) was designed and implemented to not only re-conceptualise engineering education but further shift the Engineering Practice Academy and the individuals that make up its parts, towards being-and-becoming a sustainable engineering practice. A practice that is socially, culturally, economic and ecologically sustainable that addresses the challenges of current engineering and education paradigms. Being-and-becoming recognises that an individual's way of being provides meaning to what they do and who they are "both personally and as members of shared practice" (Dall'Alba & Sandberg, 2014, p. 292). Being-and-becoming and identity-forming processes are influenced by the social context an individual is exposed to. This includes engagement with peers, and practice members in conjunction with the material world, being the physicality of the environments the individual experiences and sees. While undertaking a university degree, students begin to identify themselves as being-and-becoming a practitioner within the field of their studies. For example, engineering students start to recognise themselves as an engineer as:

engineering education provides a crucible for becoming engineers – activities, historically salient understanding about engineers and engineering, and routines for recognition as engineers – all of which frame how students navigate educational opportunities and, for some, become engineers thought to belong (Tonso, 2014, p. 277).

The students who engage in the degree and experiences delivered by the Engineering Practice Academy are to become the future engineers who will go onto inform and construct the discipline of engineering. These students whilst undertaking their studies are establishing themselves as an engineer and:

being recognizable as engineers, and in time as engineers who constitute what counts in engineering education they mold educational processes (Tonso, 2014, p. 278).

It is thus important that the Engineering Practice Academy replicated practices that prepare the students for being-and-becoming an engineering practitioner and this is only possible in a space conducive to being a socially sustainable practice. Furthermore, it is important that the Engineering Practice Academy delivers and brokers experiences that inform the students and the collective cohorts recognition of being-and-becoming an engineer.

It is through mutual participation in a practice that individuals become part of a collective. However, this process of becoming part of a practice is individual, requires brokering from both the perspective of the individual and the collective and is impacted by time. Brokering entails an individual or a collective's articulation "of competence across boundaries" (Wenger-Trayner & Wenger-Trayner, 2015, p. 18). Articulation of competency is the "dimension of knowing negotiated and defined within a single community of practice" (Wenger-Trayner & Wenger-Trayner, 2015, p. 13). In other words, individuals obtain knowledge through participation in communities of practice and through the sharing of knowledge both an individual's knowledge and the collective knowledge of the community of practice changes. A community of practice is a complex, continuous, evolving learning practice where knowledge is aligned and realigned because of members competencies and personal experiences (Wenger-Trayner & Wenger-Trayner, 2015).

3.1 Implementing social sustainability in a complex system of practice

Humans themselves can be considered to acquire an individual landscape of practice that comprises of multi-membership to separate and interwoven communities of practice. Humans operate within, between and across communities of practice brokering boundaries of practice and obtaining new knowledge that informs their being-and-becoming process. However, brokering boundaries of practice is

never unproblematic, in the sense that they always involve the negotiation of how the competence of a community of practice becomes relevant (or not) to that of another (Wenger-Trayner & Wenger-Trayner, 2015, p. 17).

Brokering boundaries of practice can be moments of contestation because of the lack of shared experiences, meaning and knowledgeability between practices. Furthermore, brokering boundaries of practice can be considered thought-provoking events because it is through pushing boundaries, breaking boundaries and connecting boundaries that practices change and new knowledge is obtained. Moreover, knowledge is obtained through engagement with a socio-material world meaning, knowledge is a co-construction of engagement in a social world in conjunction with the engagement in the material world. In other words, individuals not only "learn knowledge or activities within practice, but also our relation to our world is transformed in the process" (Dall'Alba & Sandberg, 2014, p. 301). Engagement within this paper is defined as the activities of being-in-the-world and it is through engagement with the socio-material world that individuals consciously and subconsciously be-and-become.

Being-in-the-world from a *Heideggerian* perspective positions humans as being in a world of multiple practices where humans "grow up in, embody and enact various ways of being-in-the-world" (Dall'Alba & Sandberg, 2014, p. 286). The communities of practice that individuals are members of have variants in structure, engagement levels, context, history, culture and being self-organizing. These variants and the level of engagement individuals have within communities of practice can

span from being peripheral to full participation and are dependent on the individual, the community of practice and relationship to time.

3.2 Vision alignment coaches: Facilitating the transition.

In the case of the Engineering Practice Academy there was a nexus of connected and disconnected communities of practice exclusively within the landscape of individuals who were considered staff members and consultants of and to the Engineering Practice Academy. The communities of practice were both emergent self-organizing communities and communities formed because of project delivery requirements. This paper specifically looks at the *vision alignment coaches* who as a community of practice were individuals with domain specific knowledge, learning, designing and implementing an emergent transformation strategy for the Engineering Practice Academy. Learning within this community of practice was considered a “collective, relational, and social process” (Wenger-Trayner, 2015, p. 260). Each member within the community of practice contained domain specific knowledge and expertise to one of the vision elements and collectively the communities of practice wisdom informed the design of the vision elements and eventual change strategy. The *vision alignment coaches’* community of practice comprised of six full participant members and four peripheral members.

A community of practice should possess three basic attributes, “mutual engagement, a joint enterprise and a shared repertoire” (Wenger, 1998, p. 362). However, diversity of thought and opinion is paramount within a community of practice because it challenges the perspectives of the community and builds upon the joint knowledgeability of the practice. It is through the diversity of thought that a community of practice can develop and continues to become. Within the case of this project, the *vision alignment coaches’* community of practice developed through engagement with peripheral members. Peripherality concerns there being:

multiple, varied, more- or less-engaged and –inclusive ways of being located in the field of participation defined by a community (Lave & Wenger, 1991, p. 36)

In other words, a practice is entwined within the everyday events of a human, it is concerned with the ‘doing’ of everyday. Practice and the everyday coexist because humans exist within an entwinement of others and things that co-construct the specific practice world (Heidegger, 2011). Therefore, individuals’ alignment to a community or practice is dependent upon their position in the community which is both informed by them, the collective practice, time and the cycle of a community’s development. Time is important because it is through prolonged exposure with a practice that knowledge and understanding is obtained. In the case of the Engineering Practice Academy consultants, because of their diversity of thought, they challenged the community to approach the framework of being-and-becoming a sustainable practice from diverse perspectives. Being able to challenge the community extended beyond their articulation of competency as it was their position as being peripheral members to the core community of practice of the Engineering Practice Academy that presented the opportunity to look beyond the Engineering Practice Academy and bring external knowledge to the practice. The *vision alignment coaches* brokered knowledge from the following five domains which informed the strategic vision and the high-level objectives for the Engineering Practice Academy. The domains were:

- Future engineering practices
- Sustainability
- Being-and-becoming
- Diversity and inclusion
- Transforming engineering education

3.3 The Engineering Practice Academy's vision and the role of high-level objectives.

In the case of the Engineering Practice Academy the *vision alignment coaches* (coaches) were responsible for setting the parameters of the *high-level objectives* relative to the vision domain they were a coach of. The coaches employed a *Theory of Change* method to guide the planning, participation and evaluation of the transition process through the development of a domain narrative vision and four high-level objectives to complement that narrative. This paper specifically outlines the planning and participation process concerning the creation of a vision statement, high-level objectives and a program narrative.

3.3.1 Articulating the vision.

A transition process “needs to incorporate a vision of a future, a desirable sustainable society by which we can orient ourselves in the present” (Kossoff, 2016, p. 26). That is the transition occurs between the stated vision and the current reality of a practice. The vision domains had been predetermined by Engineering Practice Academy stakeholders and the coaches were required to use the domains to build a vision statement. A vision statements is a widespread tool utilised by management within practices to articulate the reasoning for a practices existence and to guide the direction of its strategic planning. Why practices use visions is a less clear and less studied phenomenon, and while:

most futures practitioners confirm that a (shared) vision is needed for successful action and the development of vision is therefore to be encouraged. However, theory development has been limited and many authors do not go beyond the confirmation that it is important to have or develop [a] vision (van de Helm, 2009, p. 96).

Understanding this and with the intention of creating a sustainable practice, the Engineering Practice Academy developed and utilised a vision statement for each domain, directly linked to a number of high-level objectives. In order to create actionable vision statements, the vision needs to be tied to more specific objectives because it provides the ability to move towards a desired future state by creating definitive actionable stepping stones towards success. However, articulating a desired future state using current trends and thinking can be problematic as it is often those current trends that have created challenges in the first place. Thus, to adopt a principles-based approach provides flexibility and allows the question to be asked, “what shall we do today and subsequently to get there” (Broman & Robèrt, 2017, p. 3) in order to reach the vision. The Engineering Practice Academy adopted *high-level objectives* to support its vision by utilising the high-level objectives as the principles, by which the Engineering Practice Academy can backcast towards its vision, rather than forecast which projects current trends into future states (Broman & Robèrt, 2017). In the case of the Engineering Practice Academy each vision domain had been allocated a coach who was supported by an external consultant. Thus, in total ten Engineering Practice Academy members, who were considered either core or peripheral to the Engineering Practice Academy constructed the Engineering Practice Academy's vision statement through a process of backcasting.

The Engineering Practice Academy generated the vision statement:

*The Engineering Practice Academy is a collaborative community and dynamic practice engaging and empowering engineers by disrupting convention to improve the world. We will do this by creating a culture and practice that develops **future engineering practices**, celebrates our community **being-and-becoming professionals**, operates in an advocates for **sustainability**, promotes and embraces **diversity and inclusion** and ultimately **transforms engineering education**. These are our five vision domains, chosen and owned by our community. They will keep us accountable, inspired and provide a clear direction forward in the Engineering Practice Academy journey.*

3.3.2 *Developing high-level objectives*

As the coaches were developing the vision statement, they were simultaneously developing high-level objectives. High-level objectives provide a flexible, non-prescriptive method by which planning and actions can occur as they create the boundary conditions by which a practice can define whether or not it is reaching its vision. For example, using a high-level objective that states *to actively become a sustainable organisation* (and understanding the definitions of sustainability utilising sustainability principles of the FSSD) you can maintain and reach that objective despite and shifts in the political, social, technological and economic environments (Broman & Robèrt, 2017).

The coaches constructed high-level objectives under the following predetermined categories:

- People and culture: The people we create and how we create them
- Service: The knowledge we create, value and exchange through our services
- Operations and infrastructure: The systems to support the delivery of the Engineering Practice Academy
- Community and clients: Our broader community and how we engage with external stakeholders.

An example of the realised high-level objectives (HLO) for the domain of sustainability were:

- HLO 1: The Engineering Practice Academy community understands sustainability and feels a personal responsibility to act on it.
- HLO 2: The Engineering Practice Academy actively becomes a (socially and ecologically) sustainable organisation.
- HLO 3: The Engineering Practice Academy supports and services its partner organisations as they undergo sustainable transitions.
- HLO 4: The Engineering Practice Academy promotes and advocates sustainability thinking to its wider community.

3.4 *Utilising program narratives*

The high-level objectives were enfolded into program narratives used to narrate what each “program aims to achieve” (Dart, 2012, p. 25). Program narratives outline the pathways to change addressing the incremental steps required to achieve the high-level objectives. These incremental steps were developed through a process of mapping, in the context of acknowledging any assumptions the underpin the program narrative. Each of the five vision domains had program narratives created to address their high-level objectives. Mapping the logic of each objective signified the relevance of the program and the incremental steps required to achieve the overarching strategic vision. Mapping further documented the element of time and resources presenting a comprehensive overview addressing both the macro and micro perspective of each high-level objective. The development of program narratives was an iterative process that discussed both the immediate now of designing and implementing a new engineering degree in parallel with strategically planning for and implementing practices for the transition to being-and-becoming a sustainable engineering practice.

3.5 *An inclusive framework*

Distributing a practice vision statement and high-level objectives require brokering as the buy-in of other practice members is paramount to the success of the vision. Without practice members accepting the vision and associated high-level objectives as being theirs, ownership and authorship to employ the vision can be limited. The vision alignment coaches were strategically transparent with their process of generating the vision statement and high-level objectives. The coaches utilised the Engineering Practice Academy existing project management tool to publish all work-in-progress and outcomes within the open platform. Meaning, external members of the vision alignment coaches community had visibility to the process being undertaken and could opt-in or out of being exposed to the work occurring. The coaches also conducted a formal meeting whereby they

presented a document outlining the vision and high-level objectives once they had reached a stage of high resolution and asked the Engineering Practice Academy members to comment.

Transformational change takes time and requires community members, both core and peripheral, to be brought into the process. The data and outputs generated from transformational change can “often be complex, and... difficult to demonstrate progress in the short term” (Dart, 2012, pp. 4-5). Therefore, such a process requires brokering and mitigating differences in competency and knowledge. In the case of the Engineering Practice Academy making the process transparent was used as a tool to reduce the complexity of negotiating the connected and disconnected communities of practice that co-exist within the landscape of the Engineering Practice Academy. The process of change within the Engineering Practice Academy is ongoing and will continue to develop as the Engineering Practice Academy matures and the future vision of the Engineering Practice Academy adapts to the changing landscape of engineering education and engineering as a profession. It is thus essential that the current community of the Engineering Practice Academy have shared-ownership of the strategic vision and objectives of the Engineering Practice Academy and become advocates of the transition process to being-and-becoming a sustainable practice.

4 Conclusion: Creating a sustainable practice - an Engineering Practice Academy framework.

With the intention of creating a sustainable practice in which the community can be-and-become authentic engineers and individuals and in order to respond to the evolving needs and requirements of engineering and engineering education, the Engineering Practice Academy, used a community of practice to develop and articulate a framework to achieve this. This framework included the creation of a vision, complemented by a number of high-level objectives that play an important role in the development of the Engineering Practice Academy by defining its success at an operational level. In the Engineering Practice Academy’s case, a vision was defined as:

a desired future state... [one that is] ambitious and challenging to achieve as was set far enough into the future to set goals that are aspirational and plausible (McPhearson et al, 2017).

By articulating the desired future state, the vision, with its high-level objectives creates the opportunity to introduce backcasting processes that promote a flexible, stepping stones approach to strategic planning that is required to fulfil the practices’ purpose through the creation of program narratives. This approach is used to identify both the point of success (vision) and the gap between success and the current reality (Broman & Robèrt, 2017) and plan how to reach that success.

While there are a number of ways to define a practices’ vision, which may include, traditional visions:

seen as a particular type of leadership, based on the leader's capacity to inspire and motivate his/her followers (van de Helm, 2009, p. 98).

The Engineering Practice Academy has chosen a process and articulation of vision developed (through participatory process) as a community vision during the infancy of the practice by and for staff. This method creates agency, ownership and shared purpose within the internal community. By utilising a participatory, community based approach, the Engineering Practice Academy vision:

fulfils an important function in research, planning and decision making, as it provides a key, shared reference point for developing strategies to transition from the current state to a desirable future state and to assess progress (McPhearson et al, 2017, 6).

Most importantly, through inclusion, visioning creates ownership and investment within the Engineering Practice Academy. Stakeholders are no longer simply producing outputs of work, rather they are contributing to something in which they built the scaffolding and determined the direction,

tied together by shared language, shared purpose and distinct direction. Broman and Robert (2017, p. 19) argue that the creation of a shared language allows for organisations to coordinate “across disciplines and sectors while avoiding creating new problems for each problem solved”. As the creation of being-and-becoming a sustainable practice within the Engineering Practice Academy takes shape, this commonality can be a powerful tool. It is this ownership and connection to personal values, created by inclusion, that has benefits. As Ellen Shapiro argues:

The reality of visionary management is that people do truly stretch more when they can put their actions in the context of goals that they can care about – and they truly do withhold potentially valuable contributions in the absence of such goals (cited in, van de Helm, 2009, p. 102).

The Engineering Practice Academy vision, in its ambition, has utilised a method on inclusion, collaboration and community of practice to create a distinct pathway by which to reach its goals and become a sustainable practice in line with shifting engineering and educational requirements. While many challenges lie in the conflict of undertaking a strategic and futuristic perspective of the role and function of the Engineering Practice Academy while it is in operation and ‘being.’ The method, understanding and use of distinct and robust frameworks create optimal conditions for success.

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