David Angelo

Position as an Engineering Student

I The Thesis

*How I engineer **for** communities through different lenses*

My practice as an *engineering student* is driven by *five* core principles: stakeholder centricity, pragmatism, bounded rationality, impartial knowledge and sustainability. I strive to remain a learner and student first, bridging the gap between rigorous technical constraints and how human behaviour is, in nature, unpredictable.

My knowledge is always impartial, or *agnostic*, and this is reflected in the interpretive lens and humility I carry into engineering design. I *currently* see engineering design as an intersection between the *models* and *constraints* seen in my understanding of *engineering* and the value-driven decisions that end up shaping design. I also acknowledge that my position and understanding is continually growing and developing.

Models and verification are essential tools in progressing our understanding of our designs and the world, however they are inherently incomplete. I see true engineering design as when *informed, human judgment* takes over the limitations of these theoretical models.

I recognize that a design's ultimate success is determined by its real-world practicality and *validating* it with *stakeholders*. Prioritizing *iterative feedback* and *consistent communication* between the designer and stakeholders is essential to how I approach engineering.

Through new design work, my position has *evolved* to understand that a solution, amongst all other requirements, should be *sustainable* in order to function as a successful design. Society depends on sustainable practices and low-cost methods as our world's environmental longevity is slowly declining.

II The Development

How my experiences have developed my position

i *A Pragmatic Approach: How I balance models with real-world practicality*

In my academic path within the University of Toronto, we rely heavily on structural models to quantify reality. However, as the statistician George Box noted, models are inherently incomplete simplifications. This was especially noted within a group project for our structural engineering course. While our mathematical models could calculate the precise shear and bending moments of our bridge design, the physical construction of our bridge introduced material imperfections and human construction constraints which calculations ignored.

I recognize that models only exist in a vacuum. True engineering design *begins* precisely when the *model fails* to capture the whole picture, requiring me to step in and engineer for *practical realities* rather than theoretical perfection.

ii *Bounded Rationality: What frontline care taught me about designing for cognitive load*

Many classical engineering and economic models assume stakeholders possess perfect knowledge and infinite time to make optimal decisions. My frontline experience has constantly shown me otherwise.

When I supervise aquatic environments or teach first aid protocols, I am reminded that humans operate under bounded rationality. In a crisis, first responders do not always have the bandwidth to optimize. Instead, they must "satisfice" (Tragakes 74), finding adequate, rapid solutions to stabilize emergencies until hospital care.

Therefore, the systems I design cannot perfectly assume rational users, I must acknowledge the unpredictability in human nature. They must be intuitive, allowing stakeholders to act effectively even when time, information, and cognitive capacity are limited.

iii *The Agnostic Lens: How I embrace partial knowledge*

My philosophy involves holding my assumptions very lightly. Growing up around conflicting belief systems, I learned early in my life to reflect rather than follow. Many of my current understandings also trace back to the habits and open minded thinking my English teacher encouraged in his classrooms.

This cultivated what I consider an agnostic lens on life, not as a rejection of meaning, but as a humble acceptance that my knowledge is always partial. I carry this exact humility into my engineering practice. I am drawn to problems where precision directly affects people.

iv *Composure: How I translate musical discipline into technical execution*

Through four years of playing the bass guitar for a concert band, and recently making my transition from the bass to an acoustic guitar, it's clear that technical precision is fundamental in developing good technique and sounds. However, musical ability exists to be shared. The goal is not simply just to play correctly, but to perform for an audience, something I have done countless times.

I have also been on the receiving end of a performance, having attended Taylor Swift's Eras Tour back in late 2024. The performance brought together thousands of people who shared a common expectation: to be moved, entertained, and immersed in the music. It made me realize how strongly an audience's expectations shape the success of any performance.

Ultimately, this has shown me that executing a successful design requires the same discipline as mastering a complex physical skill. Technical proficiency, much like musical performance, only gains true meaning when it resonates with its audience. In engineering, this is the community of stakeholders who rely on it.

References

Tragakes, Ellie. *Economics for the IB Diploma Coursebook*. 3rd ed., Cambridge University Press, 2020. pp. 72-75.