

Expanding the Paramountcy Clause: A Proposal to Mandate "Public and Planet" for the Engineering Profession

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Abstract

The ethical foundation of engineering – to “hold paramount the health, safety, and welfare of the public” – faces a critical stress test in the Anthropocene, an informal nomenclature describing the period since 1950 when human activity disrupts the historical pattern of planetary processes. A significant gap exists in current professional codes and pedagogy: environmental protection remains largely aspirational and siloed from mandatory public welfare obligations. This reality contributes to a “culture of disengagement” among the social and ecological dimensions of the professional practice of engineering. This theoretical paper elaborates on a recent proposal to formally revise the paramountcy clause as, “Engineers hold paramount the health, safety, and welfare of the public and the planet”. To operationalize the change that has been proposed in the literature, we leverage the Nurse+Engineer model as a conceptual scaffold to synthesize the Ethics of Justice (from engineering) with the Ethics of Care (from nursing) as an example of V-shaped professionalism, where two parallel professions work towards a shared future. Our approach is intended to address the documented need for a socio-technical orientation by teaching concepts such as “Ethical Triage” (e.g., from healthcare) and “STEMpathy” (e.g., from economic development). We propose specific Student Learning Outcomes (SLOs) to bridge the gap between technical acumen and planetary stewardship.

1. Introduction

The engineering profession is anchored by a paramount ethical obligation to the public. Historically, this obligation has been interpreted through a human-centric lens, prioritizing immediate public safety (e.g., structural integrity of buildings and sanitation to prevent human illness) over long-term ecological stability. However, the accelerating reality of the current era – where human choices dictate the fate of planetary systems (also known as the Anthropocene) – demands a re-evaluation of this canon.

Recent scholarship formally proposed expanding the paramountcy clause to read: “Engineers hold paramount the health, safety, and welfare of the public and the planet” [1]. This proposal aligns with the strategic evolution of the profession of engineering including chemical engineering, which specifically mentions the public and protecting the environment in performance of professional duties. While all engineering disciplines (i.e., civil, electrical, mechanical, and others) play a role in protecting the environment, the discipline of environmental engineering has gone as far as to update the definition used by the U.S. Bureau of Labor Statistics (BLS), which specifically defines environmental engineers as those who “develop solutions to problems of planetary health” [2] [3].

However, reliance on market descriptions alone provides insufficient justification for an ethical mandate. The normative justification for this change in the paramountcy clause derives from the engineering profession's deontological duty. As the boundary between “public safety” and “planetary stability” dissolves in the modern era and new approaches to engineering practice emerge (e.g., Environmental Engineering 3.0 [4] [5]), the obligation of professional engineers to protect the public necessitates long-term stewardship of the planet [6]. If the profession of engineering adopts a mandate to care for the planet as a client on par with caring for the public, educators must adopt new theoretical frameworks. This paper argues that Peace Engineering provides the necessary “why,” while the Nurse+Engineer model provides the necessary “how” [7] [8].

2. Theoretical Context: Addressing Historical Critiques

The proposal to elevate “the planet” to the status of a paramount obligation is a direct response to historical critiques of engineering ethics, including those of P. Aarne Vesilind. Vesilind identified one fundamental flaw in traditional codes: the reliance on aspirational language for environmental protection (using verbs like “should”) versus mandatory language for public safety (using verbs like “shall” or “hold paramount”) [9] [10].

This linguistic distinction rendered environmental protection unenforceable. By adding “and the planet” to the mandatory “hold paramount” clause, the profession moves from an anthropocentric (human-only) bias to an ecocentric (system-wide) standard [1] [11]. This shift acknowledges a simple reality: human health and planetary health are inextricably linked [4]. Caring professionals – including engineers – cannot secure the safety of the public on an uninhabitable planet Earth.

This transition from anthropocentric to ecocentric standards is supported by earlier scholarship that identified a natural analogy between engineering and care, noting that both are action-oriented responses to fundamental needs. Specifically, the ethic of care provides a framework for engineers to integrate technical competence with the empathy and consideration of a caregiver [12]. By treating planetary life-support systems as the “cared-for” object, engineers can maintain and repair our shared environment as a life-support system for all life.

3. Defining the Frameworks: Planetary Health and Peace Engineering

To elevate this discussion into the public policy arena, it is essential to define the core theoretical concepts using accessible language and to address the practical challenges of enforcement.

3.1 Planetary Health: Healthy People Require a Healthy Planet

In everyday terms, the concept of “planetary health” assumes that human civilization depends entirely on the natural systems of the Earth. It moves beyond “environmental protection” (e.g., keeping nature clean) to “planetary health” (e.g., keeping the life-support systems of the Earth functional) [13]. If humans extract resources or pollute to the point where natural systems fail, human welfare fails with them. Therefore, the mandate to protect the “public” is impossible to fulfill in the long term without simultaneously protecting the “planet” [3] [5].

With a rich history stretching back to the predictions of Thomas Malthus through the more recent Simon-Ehrlich wager [14], experts continue to debate the realities of natural scarcity as compared to the ability of technological innovation to escape these limits. Assuming planetary limits are true, then critics of the proposed change to the paramountcy clause may argue that “planetary harm” is causally diffuse and difficult to adjudicate in licensure hearings. However, this tension does not negate the ethical obligation; rather, it requires engineers to consider the adoption of frameworks from adjacent professions.

For example, the framework of ethical triage (i.e., a transparent, defensible, and fair process) is employed by healthcare professionals – including nurses – to adjudicate competing claims in times of crisis or limited resources. In an analogous manner, engineers must learn to weigh the proximate, immediate public utility against the distal, long-term planetary viability; engineers must care for the local through actions that prevent irreversible systemic collapse at the global scale. Recent examples of such tensions include the issue of water quality in Flint, Michigan [15] and Jackson, Mississippi [16], among many other examples.

3.2 Peace Engineering: Proactive Conflict Mitigation

Originally defined by Vesilind [7] as the use of engineering skills to promote a peaceful existence and make military engineering obsolete, Peace Engineering recognizes that resource scarcity (water, energy, food) – whether in global Malthusian terms or in relative scarcity experienced in hyper local environments – is an important driver of conflict. Therefore, an engineer who designs sustainable, equitable systems may be considered to be involved in actively preventing war [8].

Closely related is the concept of Engineering Diplomacy. As defined by Shafiqul Islam and others, the “Engineer-Diplomat” is a bridge-builder who synthesizes “scientific rigor” (what is possible) with “societal sensitivity” (what is acceptable) [17]. While traditional diplomacy negotiates borders, engineering diplomacy negotiates the shared management of transboundary resources like water and air.

Finally, the humanitarian+technologist, defined previously as, “support[ing] the welfare of individuals and the public through fair allocation of emergency and preventative resources, which contribute to global sustainable development,” [18] reflects the growing reality that engineers and computer scientists actively explore these topics as part of an ongoing effort of the Institute of Electrical and Electronic Engineers (IEEE), the world’s largest professional engineering society. Since 2011, the IEEE Global Humanitarian Technology Conference (GHTC) has supported the presentation and publication of nearly 1,700 peer-reviewed conference proceedings articles on the use of technology for the benefit of humanity.

4. The Pedagogical Solution: The Nurse+Engineer Model

While the goal of Peace Engineering is clear, engineering education lacks a specific pedagogical model to teach the “caring” mindset required to execute it. Engineering curricula excel at teaching technical rigor but often struggle to teach relational empathy [19]. To bridge this gap, we propose adopting the Nurse+Engineer model. This is not merely a metaphor; it is the

theoretical integration of the Ethics of Care [20] (e.g., often considered a hallmark of nursing) with the engineering profession's traditional Ethics of Justice (i.e., promoting equity and fairness while minimizing harm).

4.1 The Planet as Patient: Leveraging Henderson and Watson

Nursing theory offers robust frameworks for defining the professional's duty to the patient, whether an individual, family, population, community, or the public. Virginia Henderson's Nursing Needs Theory frames the role of the nurse as assisting the patient in performing activities contributing to health – or a peaceful death – that they would perform unaided if they had the strength, will, or knowledge [21]. In the Nurse+Engineer model, students are taught to view the Earth not as an infinite resource, but as a “patient” with limits and vulnerabilities [22]. The engineer's role is to assist the planetary patient in maintaining the homeostatic balance required for life – a balance the planet can no longer maintain unaided due to anthropogenic pressure (i.e., as evidenced from the field of attribution science, recently reviewed by Otto [23]).

Furthermore, Jean Watson's Theory of Human Caring distinguishes between “curing” (technical intervention) and “caring” (relational protection of human dignity) [24]. For engineers, this distinction is vital. “Curing” a traffic problem might mean building a highway through a neighborhood; “caring” for the community requires a solution that preserves social cohesion such as supporting the community while the traffic problem remains (i.e., as evidenced from the use of attribution science to underpin financial loss and damage predicted by actuaries [25]).

While the integration of nursing theory may seem novel, recent systematic reviews of engineering ethics interventions in the U.S. and globally underscore a critical need for such socio-technical orientations. Hess and Fore [26] highlight that while case studies and codes remain dominant, there is a significant gap in interventions that utilize community-engaged pedagogy to foster an ethic of care. Furthermore, Martin et al. [27] argue that current ethics instruction often remains a “marginal add-on” due to a utilitarian educational norm that continues to emphasize technical acumen (e.g., “hard skills”) over social responsibility (e.g., “soft skills” or more recently “professional skills”). The Nurse+Engineer model addresses these documented institutional and cultural challenges by providing a structured, transdisciplinary method to move ethics from the periphery to the core of professional identity.

4.2 STEMpathy in Action: Peace and Power in the Classroom

Friedman [28] defined STEMpathy as the synthesis of technical science (STEM, which stands for science, technology, engineering, and math) and human empathy. To teach this effectively, engineering educators can adopt Peggy Chinn's “Peace and Power” framework [29]. Originally developed for nursing education, this pedagogy explicitly rejects the “power-over” dynamic (teacher over student, expert over community) in favor of “power-with” (co-creation and solidarity).

- **From “Fixing” to “Caring”:** Traditional engineering teaches students to “fix” problems using top-down technical authority. The “Peace and Power” approach teaches students to “care” for systems by first listening to the community to understand the root causes of

friction. Leading with listening is fundamentally different from stakeholder engagement as part of engineering design [30].

- **Operationalizing Ethics:** Just as nurses are trained to advocate for the patient’s well-being even against systemic pressure, the Nurse+Engineer is trained to “hold paramount” the health of the planet. This aligns with the International Council of Nurses' (ICN) #NursesForPeace campaign, which positions the nurse not just as a clinician, but as a protector of human rights and a stabilizer of social systems during crises [31]. This role can be adopted by engineers who will stand up for the public and planet, even if the client does not hold to the same view, including as part of the formal effort to “leave no one behind” [32].

5. Proof of Concept: Operationalizing the Framework

To move beyond “curricular slogans,” we propose early examples of specific Student Learning Outcomes (SLOs), which have been mapped to ABET Engineering Accreditation Commission Criterion 3 (Student Outcomes) [33]. These SLOs are derived from pilot implementations of STEAM/STEAMM (science, technology, engineering, art, math, and medicine) Diplomacy and interprofessional coursework [34] [35].

Table 1. Proposed Student Learning Outcomes (SLOs) for Peace Engineering

Concept	Proposed Student Learning Outcome (SLO)	ABET Mapping	Assessment Method
Ethical Triage	Evaluate design trade-offs between short-term public utility and long-term planetary stability.	Outcome 4: Ethics and Professionalism	Capstone presentation rubric
Planet as Patient	Apply Henderson’s Needs Theory to identify non-quantifiable stakeholder needs (e.g., cultural value of water) in a community system.	Outcome 2: Design within constraints	Case study analysis
Moral Courage	Demonstrate “moral courage” by identifying ethical friction points where technical codes conflict with planetary health boundaries.	Outcome 4: Ethics and Professionalism	Reflective journaling

6. Narrative Case

To illustrate the application of the Nurse+Engineer model, consider a civil engineering project involving a proposed coastal highway extension intended to reduce traffic congestion for a local municipality.

The “Curing” Approach: A traditional engineering assessment focuses on technical optimization – measuring traffic flow, considering structural safety of construction, and considering the cost-benefit of design options. The “public” likely is defined primarily by the immediate utility to commuters. Environmental impacts are treated as external constraints to be mitigated only as required by existing regulations.

The “Caring” Approach: Utilizing the Nurse+Engineer framework, the engineer views the coastal ecosystem as a “patient” with intrinsic limits. Following Pantazidou and Nair’s phase of “Attentiveness” [12], the engineer identifies the correct need: not just traffic throughput, but the long-term health of the coastal buffer that protects the community from storm surges during extreme ocean storms.

Implementation: As part of a capstone or an extended design project, students tasked with this scenario compare the immediate utility of the highway (i.e., short-term public welfare) versus irreversible habitat loss (i.e., long-term planetary stability). Limited resources are deployed fairly (i.e., Ethical Triage), and instead of a top-down “fix”, the students propose a multi-modal transit solution that preserves social cohesion and the life-support systems of the coast, embodying the Peace and Power dynamic of “power-with” the ecosystem (including the human community, the reality of weather in a changing climate, and nature).

7. Conclusion

The proposal to mandate that engineers “hold paramount the health, safety, and welfare of the public and the planet” is a strategic necessity for the 21st century. It resolves the historical inconsistencies identified by Vesilind [9] and aligns the profession of engineering with the modern definition of environmental engineering adopted by the Bureau of Labor Statistics [2]. However, a new mandate requires a new educational approach. By adopting the Nurse+Engineer model, educators can equip future engineers with the STEMpathy required to practice Peace Engineering.

While the proposal to converge “public and planet” in the paramountcy clause is a strategic necessity, several limitations and challenges must be acknowledged. For example, identification of the transgression of planetary boundaries may require decades of evidence, which could make enforceability and adjudication impractical. Furthermore, as noted in recent literature reviews [26] [27] an already “crowded” curriculum does not afford time or effort to consider additional “soft skills” that are poorly assessed (e.g., beyond student satisfaction surveys). Finally, engineering faculty may feel poorly equipped to adopt the proposed Nurse+Engineer model of V-shaped professionalism, which may necessitate reconsideration of limited educational resources (i.e., adjunct faculty from nursing to teach pre-licensure students of engineering).

Presuming these limitations can be addressed, the pedagogical shift proposed in this theory paper is meant to help ensure that the next generation of engineers is prepared not just to build infrastructure, but to steward the shared resources upon which all global peace and human flourishing depend.

Declaration on use of Generative Artificial Intelligence

Consistent with the recommendation of transparency, accountability, and verifiability (as described in [36]), Google Gemini version 3 Pro was used in drafting the manuscript. Claude Opus 4.7 was used in editing the final version of the manuscript. The following prompt was used with Claude: "Assume you are a program chair for the annual meeting of the American Society

for Engineering Education. Evaluate the near final draft of the manuscript being submitted by corresponding author Professor Daniel Oerther of the Missouri University of Science and Technology (attached) and offer specific recommendations to improve the manuscript given the following: 1) instructions to authors for the meeting as originally published by ASEE (attached); 2) call for papers as originally published by ASEE (attached); 3) feedback from reviewers and program chair on the original abstract and subsequent draft versions of the manuscript." The author takes full responsibility for the content of the article.

Author approved TL;DR

Author approved TL;DR (as recommended by [37]): Leveraging a prior proposal to update the paramountcy clause, this theory paper argues that protecting public welfare in the 21st century is impossible without simultaneously protecting planetary life-support systems. Through the model of the Nurse+Engineer as an example of V-shaped professionalism, this paper proposes a specific conceptual scaffold to converge engineering's Ethics of Justice with nursing's Ethics of Care to foster planetary stewardship protecting all life, including the human public.

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