Work in Progress: Designing for End of Life With Dignity

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Abstract

Engineers are trained to extend and improve life through technological solutions, yet end-of-life (EOL) experiences often reflect a tension between maximizing bodily longevity and supporting emotional wellbeing, spiritual closure, and planetary health. A disproportionate share of healthcare's environmental footprint – and resource consumption – occurs in the final year(s) of life due to carbon-intensive hospitalizations and "medicalized" deaths. This work-in-progress (WIP) describes a convergence-based educational intervention that integrates palliative nursing perspectives with environmental engineering design to strengthen "death literacy" among engineering students. A pilot module in a senior/graduate-level sustainability course challenged students to re-evaluate standard definitions of "needs" within the classic Brundtland definition of sustainable development while reframing EOL care as a design space where dignity and environmental responsibility intersect. Preliminary assessment data from a single 50-minute lecture offered in two different offerings of a 15-week semester-long course indicate positive student engagement with non-traditional dimensions of sustainability, including psychosocial and spiritual wellbeing. Future iterations are expected to incorporate technical design tools such as Life Cycle Assessment (LCA) to evaluate burial practices and identify opportunities for sustainable, dignified EOL systems. These future iterations will require additional course time, including an extended homework example. As a WIP, this ongoing work aims to prepare engineers to design not only for life, but also for the complexities and constraints of dying with dignity on a planet of finite resources.

Introduction

The engineering profession traditionally emphasizes extending life and improving public welfare through technological innovation. This framing often implies that death represents a "system failure," with consequences for how future engineers conceptualize sustainability, dignity, and care. The "paramountcy clause" included in most engineering code of ethics – "hold paramount the safety, health, and welfare of the public" - has increasingly been interpreted to include planetary health [1], reflecting a broader understanding that human welfare is nested within ecological boundaries [2]. Nowhere is this intersection more visible than at the end-of-life (EOL), where personal preferences, resource use, and environmental impacts converge, especially in the context of the Grand Challenges of Environmental Engineering that specifically mentions a "future without waste" as a goal [3].

In the context of environmental engineering, grappling with the complexities and constraints of dying with dignity on a planet of finite resources, represents a new frontier of engineering practice. Therefore, this educational work is necessary because while environmental engineering has mastered the management of municipal and industrial waste streams, the profession has largely ignored the impacts of the high resource intensity associated with a "medicalized death".

By framing EOL care as a design space, this educational intervention moves from "reactive" waste management to "proactive", human-centered sustainability that aligns with the goal of a "future without waste".

In contrast to many practitioners of engineering who view death as system failure, many healthcare providers, including nurses, have long recognized death as both an inevitable component of the human experience and a legitimate focus of care [4]. Virginia Henderson's influential nursing theory specifically states that, "the unique function of the nurse is to assist the individual, sick or well, in the performance of those activities contributing to health or its recovery (or peaceful death) that he would perform unaided if he had the necessary strength, will, or knowledge," [5]. Integrating Henderson's theory of caring into engineering education provides an opportunity to expand the profession's understanding of professional responsibility beyond mere "physical longevity" to encompass social, emotional, and environmental dimensions of dignity [6], [7].

At the same time, EOL care presents substantial environmental challenges. A significant portion of healthcare's greenhouse gas emissions and material use occurs during the final year(s) of life, driven by resource-intensive interventions and hospital-based care [8]. This raises difficult questions for environmental engineers: How might design decisions better align personal preferences with sustainable outcomes? What role can engineering play in systems that support dignified dying while respecting planetary boundaries? How can students be prepared to navigate emotionally sensitive, value-laden design contexts that include religious, ethical, and cultural diversity? And what is the role for multi-disciplinary collaboration among engineers and those more familiar with the realities of providing care during death and dying, such as nurses [9], [10]?

This innovative work-in-progress (WIP) builds on convergence between environmental engineering and palliative nursing to introduce these questions in the classroom as a prelude to exploring these concepts in greater depth through future research as well as in the full professional practice of environmental engineering by licensed Professional Engineers (PEs). By converging caring theory, sustainability concepts, and emerging design tools, the educational module described in this current paper is designed to challenge engineering students to reconsider what it means to "hold paramount" the health, safety, and welfare of people and the planet across the full life course – including to the end of life.

Background & Definitions

A shared vocabulary is essential for convergence education, particularly when integrating concepts from nursing and engineering. In the context of this educational intervention, Table 1 presents several terms that ground the framing of design for dignified end-of-life experiences.

Developing this shared vocabulary lays the foundation for integrating caring theory and sustainability frameworks into engineering design education, preparing students to recognize EOL contexts as legitimate design challenges—not only philosophical reflections or healthcare practice concerns.

Experiences of EOL occur within systems that shape both personal outcomes and environmental impacts. A substantial share of healthcare's material and carbon footprint concentrates in the final phase of life, where repeated hospitalizations, intensive interventions, and prolonged use of disposables contribute to disproportionate resource use [8]. The environmental burden is thus inseparable from the design of EOL systems, making it relevant to environmental engineers as well as clinicians.

Table 1. Terms used in this study

Term	**Meaning**
Palliative Care	Palliative care focuses on improving quality of life for individuals with serious illness by addressing physical symptoms as well as emotional, social, and spiritual needs. Its goal is not to extend or shorten life, but to relieve suffering and support wellbeing.
Hospice Care	Hospice is a specialized form of palliative care typically reserved for the final months of life when curative treatment is no longer pursued. Hospice emphasizes comfort, dignity, and support for both the individual and their family.
Bereavement	Bereavement refers to the period of grief and adjustment following death. While traditionally viewed as part of family experience, bereavement is increasingly recognized as an element of system-level care that informs how engineers design spaces, processes, and technologies that shape EOL experiences.
Death Literacy	Death literacy represents practical and conceptual knowledge about dying, death, and bereavement. Within engineering education, death literacy includes understanding how design decisions influence EOL experiences, environmental impacts, and resource use.
Sustainability and "Needs"	Sustainability is commonly defined as meeting present needs without compromising future generations' needs. However, "needs" are often interpreted primarily in physical or technological terms. In the context of EOL, needs may also include psychological closure, spiritual practices, cultural rituals, and opportunities for relational connection
Designing for Dignity	Designing for dignity involves creating systems that enable individuals to approach death in ways that reflect their values while stewarding environmental resources responsibly. This framing broadens engineering design beyond optimization for longevity to include supporting choices that respect cultural, religious, and personal diversity.

Quantitatively, the carbon intensity of care varies by setting. Hospital-based care often draws on energy-intensive infrastructure and single-use materials, whereas home or hospice care typically involves fewer consumables and reduced transportation demands [8]. These contrasts suggest that design decisions affecting the location and nature of EOL care create downstream consequences for resource use and emissions. For example, whether an individual spends their final days in a hospital bed or at home is not merely a personal preference—it also determines the energy, space, and waste streams associated with their care.

Equally important are systemic factors that influence EOL trajectories. Institutional defaults—such as automatic "full code" status, aggressive clinical interventions, or limited integration of palliative care consults—can indirectly nudge individuals toward hospital-based deaths, even when personal values may align with less intensive approaches [11]. These defaults are embedded in admission paperwork, workflow expectations, and organizational culture, functioning as design constraints that shape environmental outcomes.

When viewed together, quantitative burden and systemic nudges establish the relevance of EOL design for environmental engineering. The challenge is not only to measure impacts through tools such as Life Cycle Assessment (LCA) [12], but also to prepare future engineers to recognize how systems design influences both environmental outcomes and personal dignity. This perspective positions EOL not as an exception to sustainable development, but as a critical context where planetary boundaries, human values, and professional responsibility intersect.

Methods

Institutional and Course Context. The educational intervention was piloted at the Missouri University of Science and Technology, a public, Carnegie R1 university as part of an existing senior/graduate-level sustainability course entitled, "Sustainability, Population, Energy, Water, and Materials." The course enrolls students across engineering disciplines and introduces systems thinking for sustainable decision-making. Most of the students are from civil and environmental engineering degree programs.

The EOL module was incorporated as part of regularly scheduled instruction to situate discussions of sustainability within the full human life course, including the complexities and constraints of dying with dignity on a planet of finite resources. As presented in this article, the educational intervention was a single 50-minute lecture during a 15-week semester-length course.

Future iterations are expected to incorporate technical design tools such as LCA to evaluate options such as differences in burial practices as well as to identify and compare a range of opportunities to design for sustainable, dignified EOL systems. These future iterations are expected to require additional course time, including an extended homework example.

Convergence Pedagogy. The module reflects a convergence approach in which engineering education is informed by caring theory and palliative principles. The primary instructor is an engineer. However, the design and delivery of the module intentionally integrate professional practices from nursing to promote responsible engagement with sensitive material. This convergence is not metaphorical but operational: supporting dignity at the EOL is approached as both a technical design challenge and a human-centered responsibility.

Although not strictly required for the technical module, the curriculum integrates specific ethical and philosophical frameworks, including Virginia Henderson’s Nursing Needs Theory [5] and the principles of caring for the body, mind, and spirit of the whole person (i.e., *Cura Personalis*), to support the learning of engineering students as part of a value-laden design for EOL.

Emotional Safety Protocols and Participation Options. Because discussions of death may activate unresolved grief, personal trauma, or ongoing bereavement, the module incorporates explicit emotional safety measures. A written trigger warning is provided in the lecture materials and reiterated verbally prior to the session. Students are informed that participation in the lecture is voluntary, and they may step away at any time without academic penalty if they feel uncomfortable with the topic.

A licensed nurse or counselor is available to students throughout the module. Their availability is announced before the lecture begins, explicitly repeated midway through the session, and stated again at its conclusion to ensure that students retain awareness of support resources. The instructor does not assume that a single disclosure is sufficient. Instead, repeated reminders acknowledge that students' emotional responses may evolve during the session.

Students are encouraged to raise questions during the lecture, either aloud or through private communication following class. The instructor remains available after the lecture to speak individually with students, clarify points of confusion, and provide direct pathways to connect with the nurse or counselor. This combination of optional participation, continuous resource availability, and structured reminders reflects a commitment to minimizing potential harm while allowing space for transformative learning.

Assessment and Data Collection. To evaluate conceptual understanding of EOL contexts within sustainability, the pilot module incorporated a regularly scheduled examination question. Students were asked to critique conventional interpretations of "needs" within the Brundtland definition of sustainable development, with emphasis on whether psychosocial, spiritual, and relational dimensions are sufficiently recognized alongside physical and technological concerns.

Student answers were assessed on a 5-point scale based on their ability to critique the Brundtland definition. Lower scores (1-2) often reflected a lack of preparation or ignorance of the Brundtland definition; whereas mid-range scores (3) often indicated a struggle to move past cognitive bias – such as assumptions that "needs" are exclusively (or primarily) physical or technological.

Institutional Review Board. The results reported in this article have been determined to be IRB exempt category 1 as research involving normal education practices. Confidentiality of all materials was maintained by the instructor of record, and data were de-identified, aggregated, and summarized to ensure student anonymity.

Results

Quantitatively, baseline results from the initial pilot offering in Autumn 2024 indicated a mean score of 3.36/5, with approximately 59% of students receiving full credit. Qualitatively, written responses demonstrated an emerging awareness that "needs" may extend beyond bodily longevity to encompass wellbeing and dignity at the end of life. While variation existed among individual responses, students generally recognized that engineering frameworks for sustainability may underrepresent human experiences that are central to EOL decision-making (data were de-identified, aggregated, summarized and reported by the instructor of record,

personal communication). The preliminary analysis performed for this pilot study suggests that the distribution of scores for this value-laden EOL question may be broader than the distribution of scores on similar 5-point scale results for standard technical questions (i.e., mass balance or energy calculations). These results point to the possibility of unique cognitive challenges associated with death literacy.

The EOL module was delivered again in Autumn 2025 using the same instructional materials, assessment question, and support protocols. Preliminary analysis indicates that baseline trends from the second offering were consistent with the 2024 results, including enrollment size, performance distribution, and thematic patterns in written responses. In response to the exam question, the mean score was 3.92/5 with a median of 4/5, suggesting an improvement over the prior, Autumn 2024, lecture. Qualitatively, written responses noted: 1) subject was too vague, what is really a need? 2) needs change over time, so we can't anticipate what's needed in the future; 3) this is very human-focused presentation and neglects the environment; and 4) typically, needs are viewed as physical, thereby neglecting other needs for fulfilling life (data summarized and reported by the instructor of record, personal communication).

Taken together, these two pilot offerings provide stable baseline evidence that engineering students can meaningfully engage with EOL concepts when supported by structured emotional safety measures and clear expectations for participation. The consistency of results across two offerings suggests that the module's framing is accessible to students with diverse academic backgrounds while providing a foundation for future iteration.

Since the course enrolls students from varied backgrounds – including civil as well as environmental engineering programs among others – future assessment should explore differences in student considerations for the built and natural environment as well as student considerations for healthcare systems and medical devices to explicitly explore the views of students explicitly interested in improving essential medical services at EOL.

The next planned offering, tentatively anticipated for Autumn 2026, is expected to incorporate expanded design-based activities to further integrate sustainability analysis and dignity-centered EOL design. These will include an exploration of the LCA of burial versus cremation [12] as well as concepts of "environmental offsets" that may be identified from specific life choices as well as certain religious or cultural EOL practices.

Discussion

Experiences of EOL are shaped by personal values, cultural backgrounds, spiritual beliefs, and ethical priorities. These dimensions influence how individuals and families understand dignity, comfort, and choice during the final stages of life. Within engineering education, acknowledging this diversity is an important component of designing systems that support people and communities. The intent of this module is not to prescribe values or preferences, but to create space for students to recognize that design decisions may intersect with deeply held beliefs.

While the module does not attempt to resolve differences in values, it provides students with structured opportunities to consider how such differences may shape design constraints,

expectations, and system outcomes. For example, some individuals prioritize extending life through medical intervention, while others place greater emphasis on comfort, familiarity, or ritual. Engineering systems—such as the design of care facilities, waste streams, workflow processes, or data infrastructures—may interface with these preferences in ways that are not immediately visible without intentional reflection.

A key finding from the pilot offerings is that students demonstrated the ability to engage respectfully with varied perspectives without needing to reach consensus. The learning objective is not to determine which values should dominate, but to appreciate that sustainability-oriented design may require accommodating multiple definitions of wellbeing and dignity. By framing EOL contexts as legitimate spaces for engineering design, the module introduces students to the complexity of supporting people with different understandings of what constitutes a "good death," without asserting that engineers should adjudicate between those understandings.

This values-aware framing establishes a foundation for future work centered on technical design tools. As the educational module continues to evolve, activities such as comparative LCA of EOL practices [13] can help students examine how the material and environmental dimensions of design relate to individual and cultural choices [14], [15]. The goal is not to equate values with environmental outcomes, but to support thoughtful decision-making that recognizes both human preferences and resource considerations.

Future Work

Building on the baseline outcomes of the initial pilot offerings, the next phase of this educational intervention will integrate explicit technical design components to deepen student engagement with sustainability and EOL contexts. The primary planned addition centers on comparative LCA of EOL practices, enabling students to examine how different choices and systems influence material and environmental outcomes.

Future iterations of the module will require students to conduct simplified LCAs comparing practices such as cremation, conventional burial, green burial, and emerging human composting methods. These activities will introduce students to material inputs, energy use, emissions profiles, and land-use implications associated with each approach. The goal is not to evaluate personal preferences or prescribe decisions, but to apply engineering tools that support informed, sustainability-oriented design thinking.

To complement the quantitative analysis, students will map how EOL practices intersect with material flows and infrastructure systems, including supply chains for caskets and vaults, energy sources for cremation, and ecological considerations of burial grounds. These design-oriented reflections will reinforce how technical decisions influence broader system impacts while acknowledging the cultural and personal dimensions of EOL choices.

Alongside the technical components, future offerings will incorporate additional assessment elements to more comprehensively evaluate student learning. Planned additions include short written reflections connecting LCA findings to sustainability frameworks, and optional design briefs proposing interventions that balance environmental considerations with dignity-centered

care. These assessments will build on the baseline established in the Autumn 2024 and Autumn 2025 offerings and inform refinements for subsequent iterations.

The expanded module is anticipated for delivery in Autumn 2026, with the goal of iteratively improving the integration of technical sustainability tools and values-aware design considerations. Data collected during this offering will guide future refinements and support ongoing Work-in-Progress reporting.

Conclusions

This work-in-progress describes an educational intervention that introduces engineering students to EOL contexts as legitimate spaces for design, reflection, and sustainability analysis. By integrating perspectives from palliative care with sustainability frameworks [6], the module prepares students to consider how engineering decisions may shape experiences at the end of life while acknowledging the diversity of values that inform those experiences.

The two pilot offerings conducted to date provide a stable baseline of student engagement and demonstrate that engineering students can thoughtfully connect EOL contexts to broader questions of sustainability and dignity when appropriate emotional safety measures are in place. These early results support continued development of convergence-based educational activities that balance technical analysis with awareness of human needs across the full life course.

Future iterations will expand the module to include comparative LCA of EOL practices [12], enabling students to examine how material choices, resource use, and system design intersect with personal and cultural understandings of dignity. This balanced approach - combining technical tools with values-aware reflection - offers a path toward preparing engineers to design responsibly in contexts where environmental objectives and human experiences are closely intertwined.

Declaration on use of Generative Artificial Intelligence

Consistent with the recommendation of transparency, accountability, and verifiability (as described in [16]), Google Gemini version 3 Pro was used in the final editing of this manuscript. Specifically, the following prompt was used to improve the draft: “Assume you are the program chair for the American Society for Engineering Education. Evaluate the attached draft article considering the attached call for papers and the attached author kit. Identify any errors and evaluate if the paper should be accepted.” The author takes full responsibility for the content of the article.

Author approved TL;DR

Author approved TL;DR (as recommended by [17]): This study examines a single 50-minute lecture in an existing senior course on sustainability introducing students of environmental engineering to “death literacy” by converging terminology and concepts from palliative nursing. Pilot data from two course offerings indicate exposure to Virginia Henderson’s Nursing Needs

Theory expanded students' ability to critique the Brundtland definition of sustainability, moving beyond purely technological concerns to consider psychosocial and spiritual dimensions.

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Appendix A. Slides used in presentation.

Sustainable Development?
A World Without Waste?
Designing for Death With Dignity.

Sustainable development

- "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
- From: Our Common Future, 1987

"**Development** that meets the needs of the present without compromising the ability of future generations to meet their own needs."

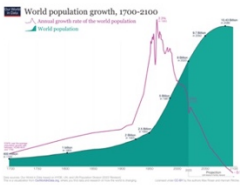
The problem with neocolonial views of "development"

- **First world**
  - **the highly developed industrialized nations often considered the westernized countries of the world**
- Third world
  - the aggregate of the underdeveloped nations of the world
  - a group of nations in Africa and Asia not aligned with either the Communist or the non-Communist blocs
  - an aggregate of minority groups within a larger predominant culture
- From: Merriam Webster online

From: "The Invention of Thanksgiving" in *The New Yorker*

"Development that meets the needs of the present without compromising the ability of **future generations** to meet their own needs."

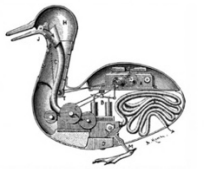
The problem with "future" overemphasizing people



- "The guardians of the world's official geological timescale have firmly rejected a proposal to declare an Anthropocene epoch, after an epic academic row.
- The proposal would have designated the period from 1952 as the Anthropocene to reflect the planet-changing impact of humanity. It would have ended the Holocene epoch, the 11,700 years of stable climate since the last ice age and during which human civilisation arose.
- The International Union of Geological Sciences (IUGS) has announced, however, that geologists have rejected the idea in a series of votes. **Those objecting noted a much longer history of human impacts on Earth, including the dawn of agriculture and the industrial revolution, and unease about including a new unit in the geological timescale with a span of less than less than a single human lifetime, it said. Most units span thousands or millions of years.**"
- From: https://www.theguardian.com/science/2024/mar/22/geologists-reject-declaration-of-anthropocene-epoch

"Development that meets the **needs** of the present without compromising the ability of future generations to meet their own **needs**."

The problem with a Cartesian view of "needs"



INTERIOR OF VAUCANSON'S AUTOMATIC DUCK.

A, clockwork; *B*, pump; *C*, mill for grinding grain; *F*, intestinal tube; *J*, bill; *H*, head; *M*, foot.

How about alternative models of "needs"

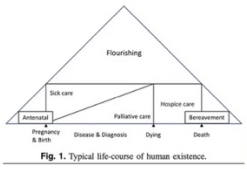


Fig. 1. Typical life-course of human existence.

- "At the base of Fig 1., the typical life-course of human existence is included in a chronology that begins on the left before pregnancy and extends beyond death on the right."
- "Above these five discrete areas of care is the concept of flourishing, which is presented as the apex of the pyramid of human exists. Flourishing includes health, which is not merely the absence of disease but also the promotion of physical and mental wellness. Flourishing includes close social relationships, character and virtue, meaning and purpose, as well as happiness and life satisfaction."

Virginia Henderson's Nursing Needs Theory

"[On needs, the nurse theorist,] Virginia Henderson, famously wrote, **"The unique function of the nurse is to assist the individual, sick or well, in the performance of those activities contributing to health or its recovery (or to peaceful death) that he would perform unaided if he had the necessary strength, will, or knowledge."**

Certainly, a mother would meet the needs of her child if she could, by providing a full belly of healthy food, the security of a loving home, and access to schooling to realize a brighter future. These would be examples of meeting needs, and nurses—working both at the beside as well as beyond the bedside in the community—would find unique professional satisfaction in helping a mother to meet these needs of her child.

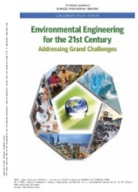
But this is not the complete quote from Henderson. Indeed, the text goes on to state, **"And to do this [meet needs] in such a way as to help him gain independence as rapidly as possible."** Henderson was clear. The practice of nursing is not an exercise in cultivating dependence, but rather the opposite. **The unique function of the nurse is to accompany a patient on a path toward realization of the patient's own goals of sustainable development."**

And implications for the Brundtland Report

"In a similar fashion, immediately after offering a definition of sustainable development, the "Brundtland Report" goes on to note, **"The concept of sustainable development does imply limits—not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities."** Brundtland, just like Henderson, envisioned a world where the sustainable pursuit of aspirational goals of personal and global development occurs at the interface of technological innovation and environmental limitations.

Thus, the successful practice of nursing to achieve sustainable development as envisioned by Henderson must reside at the successful convergence of multiple professions as envisioned by Brundtland. **This convergence—where deep integration creates new frameworks to solve societal challenges—includes the technological innovations offered by the practice of engineering as well as upstream policies that achieve equity.**

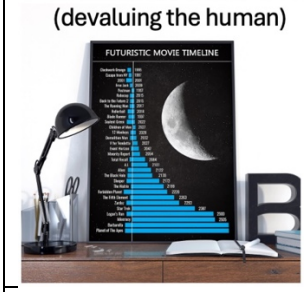
Grand Challenges and Opportunities in Environmental Engineering for the Twenty-first Century



1. sustainably supply food, water, and energy;
2. curb climate change and adapt to its impacts;
3. **design a future without pollution and waste;**
4. create efficient, healthy, resilient cities; and
5. foster informed decisions and actions

Per capita healthcare expenditures and life expectancy, 1970 and 2020 (technological fetish)

Is this how we achieve a "waste free" future? (devaluing the human)



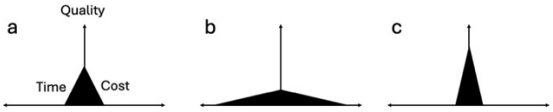
- 1973, Soylent Green (2022)
- https://www.youtube.com/watch?v=N_jGOKYHxaQ
- https://www.youtube.com/watch?v=b2aH9tu4s30
- 1999, The Matrix (2199)
- https://www.youtube.com/watch?v=lojqOMWTgv8

Designing for death with dignity

- Let's start with the question I ask in [redacted] how much would you pay for a sunset?
- Nothing because its free
  - yes, everyone dies and its only a matter of time
- Everything because its priceless
  - yes, every life is valuable
- So, how do we navigate the balance between what's technological feasible and what's socially acceptable? How do we identify the $300 per night for a beach front room in Hawaii on your honeymoon?
  - yes, everyone dies, but not too young and not from easily treated illness
  - AND, everyone should live a full life (i.e., flourishing in body, mind, and spirit)

Continuing to evolve a theory of needs

The iron triangle of time, quality, and cost where we can balance among all three, or emphasize two, or just one objective

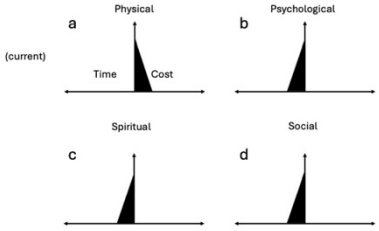


Balanced end of life

Prolonged life at all cost (current)

Quality of life goal (future?)

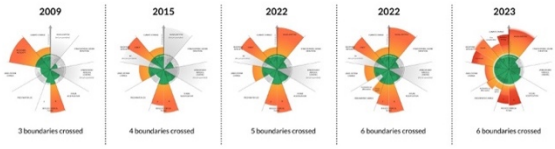
Currently, we spend a lot to achieve maximum physical time, but maybe we need to consider psychology, spiritual, and social aspects of health too



An example of designing to prioritize end of life (is this an example of designing for end of life with dignity?)

- UNOS MELD (model for end-stage liver disease) Score
- Watch: https://optn.transplant.hrsa.gov/data/allocation-calculators/meld-calculator/learn-about-meld/

What might be examples of designing for death with dignity in environmental engineering (which consider the concept of sustainable development)?



"Environmental engineers use engineering disciplines in developing solutions to problems of planetary health."

From: US Department of Labor, 2023

What is "planetary health"?

- Planetary Health is a solutions-oriented, transdisciplinary field and **social movement** focused on analyzing and addressing the impacts of destabilized natural systems on human health and **all life** on Earth.
- From: https://www.planetaryhealthalliance.org/
- 17 Sustainable Development Goals
- 5 Ps (people, planet, prosperity, peace, and partnerships)
- 3 universal values
  - Human rights-based approach
  - Leave no one behind
  - Gender equality and women's empowerment

How was environmental engineering rebranded?

Abstract

The definition of environmental engineering has been updated to be: develop solutions for problems of "planetary health," a phrase that concisely and inclusively captures the breadth of public health, global health, and one health. This new definition is consistent with the missions of the American Academy of Environmental Engineers and Scientists and Association of Environmental and Science Professors (AEESP), and it encompasses the environmental engineering grand challenges of the National Academies of Science, Engineering, and Medicine. The updated job description of environmental engineers is both an opportunity and a challenge. To solve problems of planetary health, environmental engineers will apply foundational principles of engineering science and engineering design, including sustainability and life-cycle assessment, all of which is well established in the ABET program criteria for educational programs in environmental engineering. It is also essential to improve social contracts to promote justice, equity, diversity, and inclusion across individuals, communities, and countries. The skills and practices to solve this second challenge, for example, environmental justice, are still emerging in the field. There are strong parallels between the field of environmental engineering and the profession of nursing, for which the 150-year-old mandate of Florence Nightingale is still relevant: promote wellness, prevent illness, and cure disease, which are best supported by a healthy environment, including fresh air, pure water, sanitation, hygiene, and sunlight. Environmental engineering, nursing, and other professions of caregiving can partner and share strategies to achieve planetary health.

Keywords: climate change; interprofessional; nursing; workforce

Now that we have an inclusive definition…

- If you'd like to know more or to **lead** in this work, please contact me: [redacted]
- Thanks for the chance to present!