

IEEE Humanitarian Technology Principles (white paper)

Building on decades of experience and recent research, IEEE Humanitarian Technologies identified 8 critical principles for humanitarian technology. Engineers who aim to have a positive and lasting impact should work towards these principles, which prioritize community agency, ethical responsibility and long-term sustainability.⁷

A core tenet of this framework is the recognition that complex challenges require diverse perspectives and interdisciplinary collaboration. Humanitarian technology efforts must integrate technical expertise with lived experiences and contextual insights to ensure solutions are holistic and equitable.^{1,3} In this approach, engineers cultivate curiosity and a willingness to engage with knowledge beyond their immediate field, fostering adaptability and responsiveness to evolving challenges.^{4,7}

Effective humanitarian engineering also embraces a data-driven, context-specific approach rather than relying on one-size-fits-all solutions.⁸ This means grounding interventions in both qualitative and quantitative analysis while remaining flexible to adjust strategies based on community feedback and shifting local conditions.⁹ By embedding community voices throughout the design and implementation process, engineers can help co-create solutions that align with local aspirations, capacities, and resources.¹⁰

Beyond immediate problem-solving, humanitarian technology must also prioritize long-term systemic change. A sustainability mindset requires engineers to consider not only the technical feasibility of their solutions but also their social and environmental impacts over time.^{5,6} Engineering education and professional practice should evolve to better equip engineers with the ethical and interdisciplinary competencies needed to navigate humanitarian challenges effectively.^{3,7} By integrating these principles, humanitarian engineering can move toward a more just, inclusive, and sustainable model of technological development that serves both present and future generations.

IEEE Humanitarian Technologies Principles

1. Community-driven problems

Engineering efforts should empower communities to identify their own needs and goals, positioning engineers as collaborators who provide the technical expertise to co-create solutions aligned with local priorities and visions.

2. Multi-perspective teams

Addressing complex challenges requires teams that integrate diverse perspectives, including technical knowledge, lived experiences, and contextual insights, to collaboratively address the interconnected social, environmental, and technical dimensions of complex challenges.

3. Curious engineers

Engineers must cultivate a mindset of curiosity, actively seeking to understand the broader socio-technical and environmental contexts of their work while being open to ideas beyond their immediate disciplines.

4. Context-specific and data-driven

Effective solutions must be tailored to local cultural, social, and environmental contexts and informed by data to ensure they are evidence-based, adaptable, and responsive to evolving needs.

5. Community-centered

The design process, including specific technical and implementation decisions, must actively involve community members as leaders and partners, fostering co-creation to ensure solutions align with local values, capabilities, and aspirations.

6. Sustainability mindset

Engineering practice should adopt a sustainability-first approach, balancing immediate outcomes with long-term impacts to avoid exacerbating existing inequalities or environmental degradation.

7. Continuous learning

Engineers should embrace lifelong learning to adapt to evolving challenges, integrate emerging knowledge, and remain responsive to advancements across disciplines.

8. Long-term vision

A commitment to addressing systemic and interconnected issues necessitates a forward-looking approach, prioritizing solutions that address root causes over quick fixes.



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