

# Supplementary Resource

## CESTI Heatmap Tool

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The National Academy of Medicine’s standing Committee on Emerging Science, Technology, and Innovation in Health and Medicine (CESTI) developed the concept of a heatmap as a flexible visual tool to characterize the alignment of a technology with foundational ethical principles<sup>1</sup>. CESTI provided this material as input to the Committee on Creating a Framework for Emerging Science, Technology, and Innovation in Health and Medicine, the committee tasked with developing the governance framework described in the report *Toward Equitable Innovation in Health and Medicine: A Framework*.<sup>2</sup> A draft of CESTI’s heatmap tool is provided online as a supplementary Excel table and can be further adapted by stakeholders, interested parties, or decision makers.

The heatmap represents the results of a technology assessment process that evaluates how a technology is performing in comparison with guiding ethical principles such as justice, collective good, equity, or others. A particular technology at a given stage of development and associated with specific activities (top columns) is evaluated against example questions (rows on the right). CESTI’s heatmap is designed to capture both benefits and risks (alignments and misalignments) and their qualitative magnitude.

The heatmap is a general tool that can be customized to depict how a technology is performing – for example, how chosen clinical research targets, targeted markets, or insurance policies impact features such as existing economic disparities, personal privacy, or access to benefits. The assessment can thus provide indicators of alignment or misalignment with guiding principles and values and highlight areas where additional attention or targeted interventions may be considered.

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<sup>1</sup> Further information about CESTI and its work is available at <https://nam.edu/programs/committee-on-emerging-science-technology-and-innovation-in-health-and-medicine/> (accessed October 30, 2023).

<sup>2</sup> National Academy of Medicine and National Academies of Sciences, Engineering, and Medicine. 2023. *Toward Equitable Innovation in Health and Medicine: A Framework*. Washington, DC: The National Academies Press. (<https://nap.nationalacademies.org/catalog/27184>).

The heatmap depicts a specific technology's performance at a point in time, as deployed within the context of a particular activity or decision process and current governance mechanisms (for example, the laws, regulations, professional guidelines, and institutional policies) in place. The specific stakeholders/rights holders, innovation activities, and other features used in the heatmap are flexible and can be customized as relevant. This type of tool is intended to serve as a visual snapshot to facilitate a shared understanding of the impacts of a technology, inform governance discussions, and support decision-making,