



# Building responsible research and innovation through Ethics by Design and ELSI education

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<https://researchmap.jp/shikanoy/?lang=en>

## Abstract

The rapid advancement of emerging technologies such as AI and biotechnology is transforming society and creating new forms of value, while also generating complex ethical, legal, and social issues (ELSI).

To address these challenges, this study project develops a dialogue-based and collaborative framework for technology assessment grounded in the principle of Ethics by Design, which integrates ethical perspectives into the early stages of research and development.

This approach aims to enable researchers and engineers to critically reflect on their work from a societal viewpoint and to foster the capacity for responsible research and innovation.

## Background & Results

To address the complexity of ELSI, research and development must be situated within its social context and advanced through dialogue that embraces diverse values and interests, a perspective known as science and technology governance.

Building on the concept of Responsible Research and Innovation (RRI), this study project identifies and analyzes ELSI associated with various emerging technologies.

It then seeks to develop a framework and methodology for technology assessment that foster a more constructive relationship between science, technology, and society.

By incorporating insights from collaborative design, the framework helps bridge differences in values and language among stakeholders, facilitating dialogue and co-creation.

Rather than merely assessing risks, this framework encourages deliberation and multifaceted reflection on the broader social implications of technology, guiding research and development in socially desirable directions. In this sense, the project represents an attempt to contextualize and operationalize the principles of RRI within Japan.

Key outcomes include the establishment of a workshop methodology for implementing Ethics by Design and the development of the "Moral-IT Deck (Japanese version)", a card-based discussion tool that visualizes stakeholder perspectives and societal impacts.

Widely used in university education and corporate training, it supports multidimensional reflection on science, technology, and society.

In addition, the project offers ELSI capacity-building programs employing impact assessment tools, enabling researchers and engineers to evaluate and discuss the societal significance of their work.

## Significance of the research and Future perspective

The project regards ELSI in science and technology not merely as risks to be managed, but as opportunities to deepen research and development through social engagement and value creation.

Its initiatives form a cyclical ecosystem in which research insights evolve into technology assessment methods, these methods inform education and training, and the resulting expertise feeds back into responsible innovation practices.

By fostering this virtuous cycle, the study contributes to building a culture of responsible research and development attentive to ELSI.

Looking ahead, the project aims to expand this approach through co-creation among universities, industry, and government, further advancing ELSI-based capacity building and promoting a virtuous cycle of innovation and human resource development.

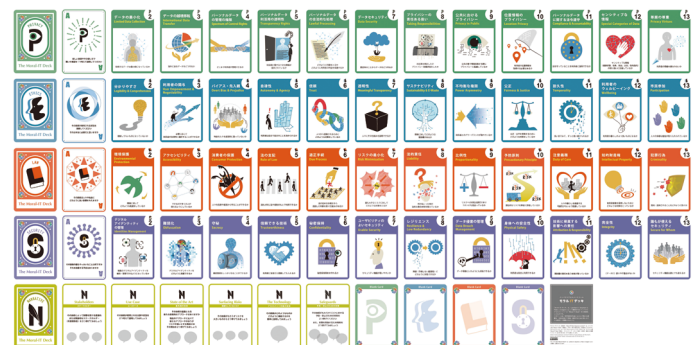


Figure 1. Card Set of Moral-IT Deck (Japanese version)



Figure 2. Classroom Scene in University Education: Workshop Using the Technology Assessment Framework

### Patent

### Treatise

### URL

### Keyword

Katirai, Amelia; Shikano, Yusuke; Shineha, Ryuma (2025). Introduction to ELSI. Maruzen Publishing. [in Japanese]  
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Ethics by Design, science and technology governance, Responsible Research and Innovation (RRI), collaborative design, ELSI assessment