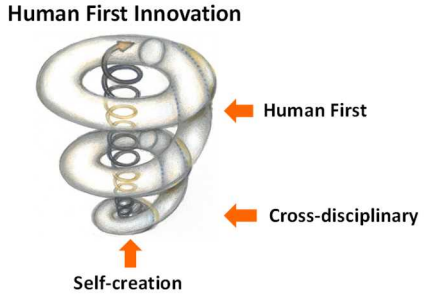
R&D Item

4． Practical measures for smart robots

Progress until FY2024

1. Outline of the project

This project is dedicated to devising strategies for the practical implementation of smart robots. We aim to contribute to social goodness through the realization of a future global society where individuals can lead good lives through the assistance of smart robots that are close to each person for a lifetime. In order to achieve this objective, the regional and cultural differences in the needs and social acceptance of smart robots have become international challenges. We are addressing this ambitious task based on the concept of Human First Innovation through



Toshie Takahashi (2019) "New Opportunities and Risks of AI" White paper information and Communications in Japan [Japanese Version], p.124, (Illustration: Yoichiro Kawaguchi)

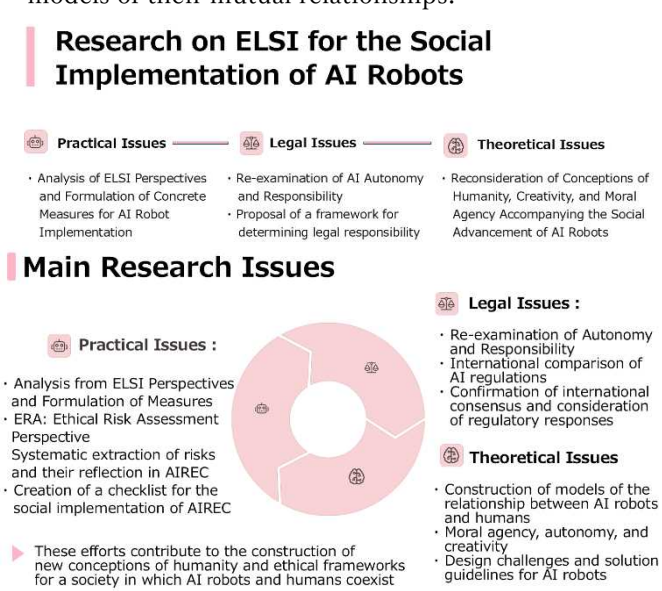
theoretical research and international comparative surveys from the perspective of ethical, legal, and social issues (ELSI). The global acceptance of smart robots involves the following four steps.
① Understanding of diverse needs and societal acceptance of smart robots across different regions and cultures through international comparative investigations. ② Formulation of Smart Robot Development Principles taking into consideration diversity and inclusion. ③ Implementation of the principles into the design and control of smart robots through empirical experiments④Development of a toolkit to enhance user literacy.

2. Outcome so far

1) Practical Issues: Analysis from ELSI Perspectives and Formulation of Measures. We analyzed ELSI perspectives and developed concrete measures for the implementation of AI robots. Through this research, we established guidelines for addressing ethical challenges in social deployment. For each introduction scenario—such as caregiving, convenience stores, and household tasks—we analyzed use cases from ethical, legal, and social aspects, and created the ethical risk assessments (ERA) and checklists. The ERA systematically identified risks including physical, psychological, privacy, and environmental factors, which are planned to be incorporated into the design of AIREC.
2) Legal Issues: Re-examination of Autonomy and Responsibility

We theoretically examined the legal aspects of AI autonomy and responsibility. We highlighted the "instability of autonomy" that arises when AI robots participate in decision-making, and indicated the necessity of reconstructing autonomy not as an abstract attribute, but within relationships with others and contextual factors. We conducted international comparisons of AI regulations among Europe, the United States, Japan, and other regions, and confirmed the international consensus required for the development and utilization of AI robots.
3) Theoretical Issues: Modeling the Relationship Between AI Robots and Humans

We advanced techno-philosophical research on the moral agency of technical artifacts, as well as on autonomy and responsibility. Drawing on approaches that critically address the limitations of modern Western-centric conceptions of humanity, technology, nature, and life—including theories of technological diversity and multispecies/more-than-human anthropology and design studies—we outlined pathways for articulating values concerning good relationships between AI robots and humans. By employing the conceptual distinction between theoretical autonomy and practical autonomy, we adopted a media approach as a guideline for addressing design challenges and solutions for AI robots embedded in social systems, and constructed models of their mutual relationships.



Future plans

1) Practical Issues: Analyze the current state of smart robots from the perspective of human interaction, develop practical strategies and principles, and reflect them in AIREC demonstrations at the Osaka Expo.
2) Legal Issues: Investigate methods to safeguard individual autonomy and freedom during AI-assisted decision-making, proposing directions for legal regulations and guidelines to prevent manipulation.
3) Fundamental Issues: Consider the conditions for smart robots to contribute to human well-being for 2050 societal needs.