

Research area in Strategic Objective “*Technology infrastructure for the post-COVID society built by “Convergence of Knowledge”*”

Social and technological framework for pandemic resilience

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Overview

This research area aims to create a social and technological framework for a resilient society to any pandemics and develop a network of researchers, which leads to cross-disciplinary approaches in an emergency by mobilizing researchers from a wide variety of fields.

The spread of COVID-19 has had a long-term and significant impact not only on social and economic activities as a whole but also on the daily lives of individuals. Amid this pandemic, there are numerous ongoing research in various fields, including not only clinical medicine, virology, and public health, but also informatics, computational science, material science, and device engineering, and environmental science. At the same time, limitations of technologies and new challenges have become apparent in each field. Also, it has become evident that research in each field of natural sciences is not enough. The use of “convergence of knowledge” gained through proactive interdisciplinary cooperation, including cooperation between diverse areas such as the humanities and social science, is indispensable to fully understand how people’s activities spread infections in a complex society, and to take appropriate prevention measures while maintaining a balance with social and economic activities.

Therefore, this research area revisits the long history of how humanity has responded to the threat of recurring infectious diseases and assesses fundamental social and technological issues that have become visible in our response to COVID-19. It aims to create a social and technological framework for a sustainable society and develop a network by mobilizing researchers with diverse expertise. This framework would make a society where people in different positions can live together and take appropriate measures to an infectious disease.

Research Supervisor’s Policy for Application, Selection, and Management of the Research Area

1. Background and Objectives

Since the 1980s, people have realized the imminent threat of emerging infectious diseases as the world population increases. So far, we have been vigorously pushing research and development in the

medical field for vaccines, therapeutic agents, and diagnostic techniques for COVID-19, which is considered to emerge in 2019. However, the pandemic is still expanding, and in this situation, we cannot envisage the time to control the pandemic.

In this pandemic, we have faced many challenges that could not be solved by research in natural science alone then realized the importance of comprehensive strategies that include research in not only public health and clinical medicine but also social psychology, economics and policy studies. For example, it has become evident that we need to conduct complicated analyses on how living environment and social factors affect transmission and severity of illness in the complex reality of society, in addition to quantitative analysis of transmission routes and patterns and genetic factor. It is also important that we understand the nature of society from the perspective of history, humanities, sociology and social science. This world has become vulnerable against infectious diseases and many other social risks as globalization has progressed in 21st century. Since pandemic will occur again in future, it is an urgent issue to build a risk-resilient society. To implement effective measures against not only COVID-19 but also the next pandemic with the cooperation of the general public and international society while maintaining a balance with social and economic activities, we require interdisciplinary research from diverse perspectives.

Thus, this research area aims to build up a network that can develop different types of research from multi-faceted perspectives and make cross-disciplinary measures possible in an emergency. We will accomplish this by mobilizing young researchers with a variety of expertise, who will share their awareness of the issues concerning the themes below, and promoting their research.

- (1) Solving the essential challenges of COVID-19 and preparing for new pandemics that could occur in the future
- (2) Global health governance that focuses on the world, rather than just Japan
- (3) People's lifestyles and the status of social systems in a pandemic
- (4) Cross-disciplinary research that will guide us to optimal solutions in society
- (5) Constructing a platform that will make smooth collaboration between different fields and social implementation possible
- (6) Social structure from the perspective of the history of the coexistence of humanity and infectious diseases
- (7) Impact on people's behavior and psychological transmission of infectious disease
- (8) Risk communication as part of infectious disease crisis management

2. Examples of projects

- (1) Accumulating prompt and accurate scientific and social behavioral information to suggest measures to avoid the spread of infection (including clusters, etc.)

- A. Comprehensive evaluations of public health policies that can both prevent the spread of infection and maintain society and the economy
 - B. Evaluations of social system designs, such as measures to maintain health through multilevel surveillance that targets a variety of communities
 - C. Evaluation of the effects of behavioral change, including social behavioral and psychological perspectives, and development of new mathematical models
- (2) Application of social and humanistic knowledge to infectious disease control
- A. Considering social structures based on the history of the coexistence of humanity and infectious diseases
 - B. Relationship between historical turning points and infectious disease risk
 - C. Information infrastructure compatible with ELSI, and literacy improvement
 - D. National and global governance challenges in infectious disease crisis management
- (3) Developing and exploring methodology that aims to improve individual people's understanding and discernment of scientific information
- A. Examining effective intervention methods for high-risk groups and vulnerable populations, including the elderly
 - B. Social psychology evaluations and risk communication while infection is spreading
- (4) Prompt and accurate data analysis of a variety of combined factors behind infection and the severity of illness (genetic, underlying health conditions, social environment, social customs, etc.) and preventative measures for these
- A. Collecting and analyzing data from multi-faceted perspectives in different countries (genetic/underlying health conditions/social environment/social customs, etc.)
 - B. Clarifying transmission dynamics and predicting the severity of illness via mathematical models and AI based on comparative analysis of combinations of factors
 - C. Presenting public health measures and measures for preventative medicine/medical care based on analysis of combinations of factors
- (5) Prompt and accurate visualization and quantification of microorganisms discharged into the environment and evaluation of the infectivity according to the course of infection
- A. Developing technology that will promptly and accurately visualize/quantify pathogens discharged into the environment and the infectivity, and application of the technology for surveillance
 - B. Evaluation of infectivity according to age, severity, onset of disease, etc. in combination with social factors

*The above are examples for reference; eligible research and research approaches are not limited to these.

3. Application and selection policies

This research area calls for proposals that aim to solve social and technical challenges in pandemics, including the COVID-19 pandemic. Both proposals aiming to solve COVID-19 issues in the short term and the ones aiming for a resilient society in the view of the emergence of future pandemic will be considered. During selection, we will emphasize the necessity, originality, and creativity of the research over how advanced the proposal is academically, or its predominance. Furthermore, please state the proponent's approach, including how their own research will develop and contribute to society via collaboration with other fields, and its course for academic development and social implementation.

In a pandemic, when an infectious disease explodes across the world, we must accurately understand people's activities in society, and influence them. To accomplish this, we need more than research in natural science fields: we need research in the humanities and social science fields, and collaboration with these fields, and so this research area will also proactively select proposals in the humanities and social science fields (we aim for these to make up at least 30% of the total).

4. Research period and research costs

The research period is three years and six months, or less. The research budgets have an upper limit of a total of 40 million yen (not including indirect costs). During selection, we will also focus on evaluating whether research costs are being appropriately allocated according to project content. We will equally evaluate research proposals to be carried out with small budgets.