

**Co-Creation of the transformation platform technology for human and society by  
integration of the humanities and sciences**

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**Overview**

Social simulations for the purpose of understanding and solving various social problems ranging from disasters to everyday life, such as predicting COVID-19 infections, are attracting attention for their reflection in policies. For example, there are still many issues to be addressed in reflecting the economic impact of infection control and other complex social situations in social simulations. This is because, in addition to diverse data, information on the interrelationships among the data, such as interaction characteristics, interests, and preferences of individuals, communities, and society, is not fully utilized. There are also growing expectations for the use of generative AI for data analysis and social simulation. If such a variety of multi-scale (individual, community, and society) data can be analyzed and reflected in multi-scale social simulations, more complex policy scenarios, business strategies, etc. can be executed effectively and with high social acceptability.

This research area aims to co-create technologies by integrating humanities, social sciences, and natural sciences as a platform for society transformation, such as behavior modification: technology for analyzing people and society from data of various scales and types, and technology for deriving policy scenarios by simulation based on this analytical technology.

Specifically, we will conduct the following research on various social issues, including disaster prevention/mitigation/risk management, countermeasures against infectious diseases in After Covid-19, social and economic disparities, healthy use of the Web/social media, social issues of concern with the use of AI, and various issues related to education and well-being.

- 1) Multi-scale (individual-community-society) social activity data and derivation of behavioral characteristics and preferences of people and society, identification of factors that bring about behavioral judgment, modeling, and quantification of them, etc. based on humanities knowledge
- 2) Creation of multi-scale social simulation technology using multi-agents that incorporate modeled

and quantified human and social characteristics, and derivation of scenarios that contribute to policy making and decision making through simulation.

- 3) Search for effects of derived policy scenarios and methods for improving social acceptance, and feedback on 1) and 2)

This research area is managed as part of the artificial intelligence, big data, IoT, and the cyber security integration project (AIP Project) developed by the Ministry of Education, Culture, Sports, Science and Technology.

## **Research Supervisor's Policy on Call for Application, Selection, and Management of the Research Area**

### **1. Background**

Social simulations for the purpose of understanding and solving various social problems ranging from disasters to everyday life, such as predicting COVID-19 infections, are attracting attention for their reflection in policies. For example, there are still many issues to be addressed in reflecting the economic impact of infection control and other complex social situations in social simulations. This is because, in addition to diverse data, information on the interrelationships among the data, such as interaction characteristics, interests, and preferences of individuals, communities, and society, is not fully utilized. There are also growing expectations for the use of generative AI for data analysis and social simulation. If such a variety of multi-scale (individual, community, and society) data can be analyzed and reflected in multi-scale social simulations, more complex policy scenarios, business strategies, etc. can be executed effectively and with high social acceptability.

To realize this innovative approach, it is essential to create a simulation environment that highly integrates cyber space (virtual space) and physical space (real space). For example, by repeating (1) the analysis of data collected from physical space through IoT and vital sensing integrated with data obtained from cyberspace and (2) the feedback to physical space of the derivation of policies for behavior change to solve problems using the analysis results, it is expected that a variety of services will be provided to meet various needs. This will enable the solution of social issues and the creation of new value according to the scale of the individual, community, and region.

### **2. Research and development objectives and examples of research projects**

Based on the above background, this research area aims to integrate humanities, social sciences, and natural science to create an analysis platform that understands people and society from various

data of people and society and simulates society; and to promote workable decision-making, consensus formation, and behavior modification linked to social transformation.

Assumed social issues include, for example, disaster prevention / mitigation / risk management, infectious disease countermeasures / remote after COVID-19 society, social / economic disparity, sound utilization of Web / social media, social advancement of women, declining birthrate and aging population, education, etc. Specifically, the research will undertake the following (1) to (3) but will not be limited to them. Thus, freer, and more challenging proposals are required.

In 2023, it is especially looked forward to proposals on the following themes that are oriented toward collaboration within this area.

- Social resilience (disaster prevention)  
Ex: normalcy bias, impact of evacuation behavior on economic activity
- Health and medical care including measures against infectious diseases  
Ex: Restriction of social activities due to measures against infectious diseases
- Carbon-neutral society  
Ex: Restrictions on economic and social activities due to climate change measures

(1) Collection, analysis, and modelling of data from individuals, communities, and society

Research will be conducted on the derivation of behavioral characteristics and preferences of people and society, their modeling and formulation, and the identification of factors that bring about behavioral judgment by utilizing data from various strata.

[Specific examples]

- Derivation of behavioral characteristics, preferences, behavioral factors, etc. of individuals and communities and derivation of social structure like community and attributes, etc., from data such as SNS, web, transferal, environment, etc.
- Derivation of adaptive rational human and social model
- Derivation of a model for the emergence of multi-scale micro to macro organization
- Modeling and quantification of knowledge of humanities and social science on behavioral characteristics, preferences, behavioral factors, etc. of people and communities, like cognitive bias and reference dependence
- Behavior analysis by attribute, community, and area through field surveys, etc.

(2) The creation of multiscale social simulation technology for social transformation.

Research will be conducted to derive policy scenarios by comprehending the current situation, seeking the ideal future, and conducting simulations by adopting the modeled and formulated characteristics of people and society.

[Specific examples]

- Multi-scale simulation technology (multi-layering, multi-modalization, integrated collaboration, etc.), data assimilation, inverse estimation technology, construction of complex network systems and swarm intelligence technology, integration with statistics and machine learning, utilization of generative AI.
- Creation of real-time simulation technology using SNS and open data, and technology for visualizing bias in data used.
- Construction of a social model (social digital twin) that includes the legal system and diverse values.

### (3) Establishing methods for social process innovation

Research will be conducted by regarding the derived policy scenarios as effective and possessing high social receptivity to establish a methodology for linking them to social transformation, including the promotion of behavior modification. Research guidelines will also be established for how the research (1) and (2) should be to enhance the effects of social modification.

#### [Specific examples]

- Construction of analysis technology and impact assessment method for policy scenarios derived by simulation.
- Establishing methods to apply policies to the real world based on social receptivity.
- Search for modeling methods to introduce methodology simulations that promote behavior modification.
- Social process design of cyberspace and metaverse

#### (Other keywords)

- (1) Sensitivity engineering, information presentation psychology, cognitive bias, relationship modelling, reinforcement learning, ethnography, etc.
- (2) Risk analysis, induction/deduction integrated AI, complex network science, world model, behavior selection model, etc.
- (3) Scientific communication, timely and flexible macroeconomic analysis, social psychology, causal reasoning, noncooperative game theory, mechanism design, etc.

### **3. Assumed research progression**

This research area aims to establish a new fundamental technology by strengthening the integration of humanities, social science, and natural science with social simulation technology as a glue. To this end, research themes were selected from the humanities, social sciences, and natural sciences fields without bias. Although "PRESTO" is an individual-type research program, utilization of data by

selected researchers will be actively conducted by promoting intra-area collaboration and interaction with industries. Under this policy, researchers are expected to conduct more in-depth discussions on academic expansion, the path to problem solving, and how their research will develop and contribute to society by collaborating with other fields and maximizing the results.

#### **4. Research period and research costs**

The research period is three years and six months or less; budgets have an upper limit of a total of 40 million yen (not including indirect costs).

#### **5. Points to note when applying**

This research area expects the creation of prominent results that advance researchers to leaders of the next generation through research with a truly significant impact, even if it is difficult to achieve. Therefore, a budding and challenging proposal without fear of failure that may contribute to the goals of this research area and how their proposal can approach social issues was presented with the willingness of an applicant to be positively evaluated. This research area, assumes research in collaboration with other fields after the selection of a research project, from the viewpoint of the integration of humanities and sciences. Therefore, not only the application of their own specialized field, but also research applications that include collaboration with different fields is expected (however, collaborating partners are not covered by support). Please describe in detail the benefits your research obtains through collaboration with different fields, the benefits collaborating partner researchers receive.

This research area addresses research projects as a research area of “AIP network laboratory” that constitutes part of the artificial intelligence, big data, IoT, and the cyber security integration project (AIP Project) developed by the Ministry of Education, Culture, Sports, Science and Technology in collaboration with related research institutes including RIKEN Center for Advanced Intelligence Project, and will contribute to the integrated management of the AIP project.