Research Area in Strategic Objective *"Development of core technology platforms for understanding spatiotemporal multicellular interaction"*

"Fundamental technologies for next-generation IoT (Internet of Things) to create a future smart society"

"Construction of revolutional material development methods through fusion among experiments and theory/data science"

"Creation of integration technology to enable utilizations of diverse and massive data using Artificial Intelligence core technologies rapidly growing in sophistication and complexity"

"Establishment of environmentally-adaptive-plant design systems for stable food supply in the age of climate change"

"Trusted AI"

AI powered Research Innovation / Creation

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Overview of Research Area

As a result of the rapid development and popularization of information science and technology including AI (artificial intelligence), we are seeing the implementation of more advanced methods in various research fields. Alongside the dramatic improvement of performance and expansion of researchable object range, we are also seeing new possibilities for innovative project setting and frameworks and the creation of new academic fields.

In order to take advantage of all these opportunities for academic innovation and creation, and to guide progress in a way that will lead to the creation of future innovations, it is essential to utilize AI/information science and technology, and to predict, describe and pioneer the world that will be newly opened by transdisciplinary approaches involving AI/information science and technology, based on ideas that display extraordinary excellence in respective academic fields and embody flexible concepts by progressive thinking.

In this Research Area, we are seeking challenging research concepts by young researchers which aim at substantially strengthening and developing all academic fields, including both science/engineering fields and the humanities/social sciences, by introducing leading-edge AI/information science and technology in those fields, innovation in academic fields and creation of new academic fields by fusion with AI/information science and technology, and the creation of new value.

In promoting research, our aims are to develop research-related human resources capable of

promoting advanced research that contributes to the future and to build a human network of researchers that will lead to future collaboration by providing platforms for exchanges and mutual inspiration of young researchers in different fields, placing priority on human resource development.

This Research Area is managed in the course of “AIP Network Lab,” which constructs the AI, big data, IoT, and the AIP Project.

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

1. Background

Thanks to the astonishing progress of AI/information science and technology in recent years, it is now possible to obtain enormous volumes of data and dramatically more powerful search/analysis capabilities and simulation/composition capabilities than in the past, which is expected to contribute to the further development of academic fields. At the same time, in achieving the targets of the SDGs (Sustainable Development Goals), there are heighted expectations for the potential of cooperation with AI/information science and technology in many fields. On the other hand, at present, there is undeniably a shortage of human resources who possess appropriate data processing/analysis technologies and AI technologies, as seen in the fact that large amounts of potentially useful data have been left unused in many academic fields. To overcome this situation, it is essential to provide both the specialized knowledge unique to individual academic fields and a knowledge of AI/information science and technology, to further develop both academic fields and AI/information science and technology by combining them, and to train the research-related human resources who will bear the responsibility for those efforts, while continuing to promote challenging research so as to also create future innovation and new academic fields.

Therefore, in this Research Area of ACT-X, which is a program intended to “support the growth of young researchers as individual researchers” by promoting research based on original challenging concepts, we promote the development of academic fields by fully utilizing AI/information science and technology based on original/challenging concepts, and support and train young researchers who have ideas that will lead to innovation/creation in/of academic fields by a transdisciplinary approach and the creation of new value while actively involved in their respective academic fields.

2. Direction of the themes called for in this Research Area

This Research Area promotes research for the development of various academic fields, research leading to innovation/creation in those fields and the creation of new value by making full use of AI, data science, big data, cybersecurity, IoT (Internet of Things), next-generation communication technologies and other information science and technology, research will be promoted to establish the

new normal and promote Digital Transformation (DX) using AI and other technologies. To achieve these goals, it is important that young researchers who possess specialized knowledge in fields other than information science and technology have a deep understanding of AI/information science and technology and appropriately combine the two. Conversely, researchers in the field of AI/information science and technology can inspire innovative concepts in connection with issues in other fields. In any case, we are seeking proposals that are extremely significant or extremely advanced in the object field, or proposals that are innovative/original and do not fall within the scope of existing fields, and are also significant from the viewpoint of the progress of science and/or social value.

The target academic fields are not specified; all fields are possible objects. Research proposals can come from any academic field including natural sciences, mathematics, engineering and agriculture, humanities and social sciences, medicine, dentistry, pharmacology, as well as research being conducted in industry, government, and the private sector , including service science, to solve specific problems. Other Research proposals that aim to open up unimaginable academic fields are also welcome.

Moreover, considering the difficulty of fully mastering both a specialized field and AI/information science and technology, the possible objects of support include cases in which persons who have a deep knowledge of their own field and possess a far-sighted vision, originality and the ability to promote research can become research-related human resources with a mastery of both their own specialty and AI/information science and technology by allowing such persons to set objectives that are possible by fusion/utilization with AI/information science and technology or the object academic field based on partial knowledge, and then quickly deepen their understanding and experience of the other field while engaged in research.

We strongly hope to receive ambitious proposals that develop concrete efforts such as collection of new data and use of the accumulated data, construction of theory and techniques, experimental research and prototyping, fieldwork, etc., original research by new project setting and frameworks that are clearly distinguished from conventional approaches, and furthermore, proposals that will lead to innovation/creation in academic fields through a transdisciplinary approach, as can be seen in the examples of bioinformatics, material informatics and cheminformatics, so as to give concrete form to the aims described above.

3. Research Area management policy

This Research Area supports/promotes exchanges between young researchers in order to form relationships between fellow researchers in different fields that will become important in the future. Because collaboration between a wide range of academic fields and AI/information science and technology is expected, and proposals that transcend the boundaries between the sciences and humanities and proposals that address social issues are also expected, we are considering assigning

researchers specializing in fields related to humanities, social sciences and technologies as advisors, as part of a system that can provide advice and discussions from diverse perspectives.

Because ACT-X is a program for “supporting the growth of young researchers as individual researchers,” we have no objection to researchers submitting applications to the PRESTO program during the ACT-X research implementation period, provided those proposals are possible in the researcher’s field. (If a proposal is selected, transfer in the form of early graduation is possible.)

4. Research period and research funds

In the last call for applications in this Research Area in FY 2022, the research period in the Call for Research Proposals is 2 years and 6 months. The standard research budget per project is 1.5-2.0 million yen/year and a total of 4.5-6.0 million yen excluding indirect costs (overhead costs). In particular, in case a research budget with total amount exceeding ¥6.0 million is necessary, please clearly state reason for that in your proposal (upper limit: 10 million yen). The number of selected projects will be on the order of 20 to 30 proposals.* Applicants who are selected will receive a progress evaluation around 2 years after the start of the research, and additional support for a maximum of 1 year (maximum amount: approximately several million yen) as an Acceleration Phase will be provided for research projects for which even larger outcomes are expected by continuation of that research. We are assuming that the ratio of the research that will acquire support in the acceleration phase is approximately one-third to one-fourth the research of the successful applicants. *

*The number selected may vary depending on budget conditions and the research budgets of the selected projects.

5. Points to note when applying

All academic fields (not limited to existing fields) are eligible. Even if the applicant has only a partial knowledge of AI/information science and technology, an application is permitted provided that he/she plans to become proficient while conducting research. We expect a powerful, advanced, original, challenging and also clear vision of what will be changed by utilizing technology and a transdisciplinary approach. Please firmly emphasize the core aspects of your plan and your strengths as an applicant who is capable of promoting and realizing that vision.

In addition, Research proposals not only from academia, but also from ambitious researchers affiliated with companies who have concepts that will lead to solutions for industrial issues are strongly expected.

ACT-X put emphasis on diversity of participating researchers for emergence of fruitful interactions among them. Our system allows researchers to suspend or extend their research period due to life events such as childbirth, childcare, and nursing care. ACT-X welcomes applications from young

researchers who will pioneer the future by making full use of AI and other information science technologies.