

Attached Table 3 Generative Research Fields

This table applies only to the application section “Generative Research Fields” within the categories “Scientific Research (B)” and “Scientific Research (C)”.

The period for which proposals are solicited for these areas is fixed as 3 years, beginning with the first fiscal year when the areas is established. In the first fiscal year of solicitation, the research period for which application proposals can be made is from 3 to 5 years, in the second fiscal year from 3 to 4 years, and in the third fiscal year 3 years.

○Areas Designated for FY2018 Recruitment

Area	Detail	Area Number	Proposal Solicitation
Global Studies	As full-scale globalization started to take place at the turn of the 20th and 21st centuries, it gave rise to many issues that can be solved only by analyzing them globally, that is, as global issues. Among them are global warming and various environmental issues, infectious diseases, food shortages and overpopulation, competition for resources, humanitarian intervention, clash of civilizations, friction over the emergence and acceptance of immigrants and refugees, handling of property rights on the internet and the explosion of information, and the widening gap between rich and poor both domestically and globally. Characteristic of most global issues is the difficulty of logically linking their cause and effect, since those who benefit and those who suffer the burdens often do not correspond in time or space. That is, as issues with causes and effects spanning the globe, their existence is hard to recognize. Existing approaches to these issues, which tend to start their analysis from local units or national frameworks, are not adequate, since partial optimization does not necessarily lead to optimization of the whole. Instead, new global approaches are needed. In proposing such an approach, attention must be paid to a number of points. For example, what spatial scale should be adopted? What roles are played by the borders (gaps) created by legal systems, culture, language, life style and other institutions at the social, economic, political, cultural, and life style dimension? And what are effective means for encouraging communication that can cross these borders or bridge these gaps? It must further be kept in mind that globalization is not a priori justified or inevitable. The field of Global Studies thus includes the dimension of recognition and interpretation, dealing with a variety of questions such as the good and bad brought about by globalization, how to assess its legitimacy, and whether alternative forms of globalization are conceivable. This generative research field is not limited to studying the phenomenon of globalization, but covers the globalizing process and methods of solving global issues. Among the topics are logical predictions regarding the future of issues that can only be resolved through global research, and the search for global approaches; empirical and normative assessment of globalization; and also a reexamination of universality and the basis of spatial awareness as advocated by various existing academic disciplines.	N007	FY2016 — FY2018

Area	Detail	Area Number	Proposal Solicitation
Intensification of Artifact Systems	Examples of manmade (artifact) systems being properly designed initially but proving inadequate with the passage of time or spatial expansion, due to external (environmental) or internal causes, are too numerous to list. This phenomenon can be seen as arising because a solution partially optimized on a certain temporal or spatial level did not coincide with the required overall optimization solution. In some cases, the passage of time or spatial expansion leaves no choice but to rebuild the entire system anew. When this is not readily feasible, however, the existing system must be “intensified.” Here “intensification” means modifying a system to make it better suited to the newly defined system objectives. Concepts proposed up to now for intensification of artifact systems include robustness (ability to withstand turbulence), flexibility (ability to mitigate and overcome impacts), resiliency (ability to fulfill the purpose even with major state changes), and plasticity (ability to transform and adapt to the changing environment). These are now being taken up in various research fields. The academic field for addressing these areas comprehensively, however, is still in its infancy. A major feature of modern artifact systems is the unpredictability of the overall system behavior, as the huge scale and complexity make it difficult to grasp all the interactions among elements. Intensification of a system requires consideration both of the time scale on which the system renovation will occur and of the spatial scale for going from individual elements to the whole. In this situation, we need to utilize partial optimization solutions as the starting points to rationally derive the required overall optimization solution. The problem of sustainability we currently face came about because the partial optimization solutions initially proposed to fit contemporary society could not become overall solutions to satisfy the scope of the requirements posed by the expansion of time and space. We are said to be at the point where leaving things as they are could lead to breakdown. Today’s world is supported by an enormous number of artifacts and their systems. This generative research field, Intensification of Artifact Systems, addresses sustainability comprehensively from the viewpoint of artifact systems. It is therefore a field that not only studies the intensification of artifact systems, including hardware and software, but also covers research on the human factors of artifact system design, operation, and administration.	N008	
Complex Systems Disease Theory	Advances in evidence-based medicine and translational medicine are on the way to establishing modern medical systems in which knowledge from many years of experience and experimental research are combined with accumulated technologies to achieve an integrated, systematic “bench-to-bedside” approach. At the same time, reductive searches are taking place for disease-related factors that may serve as potential therapeutic targets, and research is being carried out into preventive measures and therapies that target these factors. Analysis of the millions of single nucleotide polymorphisms (SNPs) in the human genome and other related studies have led to a dramatic advance in the ability to identify genomic regions associated with diseases. This information, however, merely indicates a statistical relationship and does not necessarily explain the onset and pathological progression of diseases. The findings are therefore limited in their ability to predict how diseases manifest themselves and progress. Meanwhile, noninvasive examination of blood, urine, saliva, and other biological samples is becoming standard, while imaging technology has made a range of previously unobtainable data available for ongoing analysis in real time. The concept of complex systems is a mathematical science notion. When this is applied to prediction of disease onset, we find that diseases are caused by numerous factors and cannot be predicted simply by assembling the natures of each factor. Given “the repeated spontaneous creation and maintenance of order” realized by each individual, however, it might be possible to predict diseases by analyzing the processes leading to the onset of disease in large numbers of individuals and matching the results to specific individuals. This field, in other words, seeks to take advantage of our ability today to obtain information ranging from metabolism and signal transmission to networks of gene expression, in real time as to how human beings as complex systems maintain dynamic homeostasis at each level of the physiological hierarchy, including living organisms, tissues, and cells. It is possible that we can detect disturbance or destruction of the dynamic homeostatic state from these markers, as predictors for the onset of disease and as indicators of disease progression. It is clear that diseases are influenced by complex factors ranging from age and gender to the living environment. The correlation between fluctuations in a range of biological and environmental factors and the onset or progression of disease in an individual is under investigation. By applying the results of these analyses to many patients whose conditions are similar and thereby identifying certain signs, more general predictions concerning the onset or progression of disease may become possible. This generative research field views the onset and progression of diseases as a complex systems, and conducts research for the development of methods of predicting the onset and progression of diseases, verification of prediction factors by evidence-based investigation of the causal relationship between these factors and patients’ actual conditions.	N009	FY2016 — FY2018

Area	Detail	Area Number	Proposal Solicitation
Orality and Society	Orality is a concept typically contrasted with literacy. Whereas literacy refers to the culture of letters and the world of written language, orality means the culture of the voice and the world of spoken language. This research field is, however, not limited narrowly to the spoken language, but looks for a more extended concept of orality, that is, social relations characterized by co-presence. Face-to-face relationships such as parenting, nursing and clinical care, and casual or intimate conversations are examples of co-presence. Even though oral communication is the core, an important role is played by physical interactions that cannot be reduced to conversation alone. Orality further encompasses the ability to understand the other person's feelings from voice, facial expression, gestures, and narrative, to suggest that he or she is looked after, and to sustain co-presence. Accordingly, orality goes beyond conversation and other vocal communication and oral culture, but with the implication of co-presence and empathic abilities, to include gestures, physical expressions, sign language, emotions and affect, care, narrative therapy, life story, oral history, performance art, collective memory, and other such elements. Nor is it limited to human beings, as it includes also the vocal and physical communications of animals and the relationships between human beings and animals. Today, with the advance of media technologies such as SNS and mobile phones, the nature of co-presence having orality as its core is undergoing major changes. Our social activities have expanded greatly in scope and become more convenient. Attention is further being directed to progress in modern technologies for assisting with research on orality as co-presence (voice and image sensing and analysis technologies, SNS recording, content analysis, mining, etc.) and technologies applying such research results (nursing care robots, machine translation, e-learning, multimodal conversation, etc.). There are at the same time arguments that the spread of SNS makes co-presence less important, thus eroding the ability to understand other people, and causing various social and mental problems. This generative research field includes humanities and social science research on the nature of co-presence and empathy centered on orality, takes into account the contemporary situation as described above, and conducts research on new media and communication technologies and technologies for analyzing face-to-face social relations and SNS-based big data. It is a new field taking a diverse approach to orality with the implication of co-presence and empathic abilities.	N010	FY2017 — FY2019

Area	Detail	Area Number	Proposal Solicitation
Agricultural Resources for the Next Generation	Primary industry used to refer to economic activities based on sustainable use of abundant local natural and agricultural resources. More recently, however, due to market mechanisms that promote myopic pursuit of productivity and profitability, the concentration of resources in specific sectors and uniformity of resource-using industries have economically impoverished primary industries as a whole and substantially diminished the sustainability of local communities. For example, while humans in the past cultivated thousands of plant varieties for food, the pursuit of economic rationality for increasing food production and overcoming starvation have led to a decline in the number of varieties of farm products and a loss of biodiversity. Similar trends can be seen in all kinds of agricultural resources in the forestry, fishery, and livestock industries. The loss of biodiversity and the trend toward uniform use of agricultural resources (the trend to monoculture) have resulted in deterioration of the soil, reduction of productivity in agricultural lands, and an increase in the risk of disaster. Moreover, increasing urban populations and policies favoring convenience, combined with the loss of diversity in agricultural resource utilization, have led to the decline of self-sustained and diverse local communities. To create a sustainable society, in addition to a reconsideration of economic policies, research will need to be conducted from a long-term perspective, based on science, on the prospects for new uses of agricultural resources for the next generation. Aiming to create a sustainable society, this generative research field seeks to develop a field that comprehensively promotes research addressing a range of topics including (a) restoring diversity of agricultural resource use; (b) how restoration of biodiversity will affect long-term reduction in negative environmental impacts, including reducing the risk of disaster; (c) enhancing the functionality of agricultural resources and promoting technical innovations in the agriculture, forestry, fishery, livestock, fermentation and other industries (to be addressed through basic research); and (d) social and institutional systems that leverage these research findings and employ collaboration with community-specific industries in creating sustainable local communities. Possible examples of such studies are development and research on new agricultural resources that are marketable and will help promote the establishment of a sound material-cycle society, along with their functions; research on policies for utilizing research seeds based on agricultural science for sustainable local communities; research on social systems for taking advantage of the functionality of community-specific agricultural resources; and research on a technological infrastructure supporting diverse and region-specific local community formation. Another possibility is research seeking to discover a model for next-generation primary industry by tracing back in history and looking at the world from the perspective of how diverse agricultural resources have been maintained in various regions in harmony with nature hitherto. This new research field comprises a broad academic discipline encompassing, in addition to agricultural science, natural sciences such as ecology and environmental science, and social sciences such as economics and policy science.	N011	FY2017 — FY2019
The Information Society and Trust	With the rapid evolution of the information and communication fields, huge amounts of sensing information are being generated on networks of computers, sensors and other devices and are being stored as Big Data in cyber space, typically in cloud storage. As this information is flexibly utilized for combining people and things in real space, new services are being created that contribute to people's daily life, socio-economic activity, education and research activity, and administrative activity, moving us toward a new information society in which large numbers of people use these services as social infrastructure. To ensure sound advancement of the information society, it will be important to ensure trust without hindering the ubiquity of information and communication. Since long ago, connections between people have grown into organizations, markets, and society, and trust has been built on the foundation of personal relationships. That alone, however, is not sufficient for building trust in a society extending over networks of unseen faces, where various social problems have arisen concerning security and privacy. It is not easy to achieve trust in the information society, where multi-stakeholders exist. In many cases the preconditions for trust are not clearly defined among the people, organizations, services, systems and other constituent elements, namely, who (or what) is to trust what to what extent. Seen from individual elements or in the aggregate, often it is not clear how trust is realized. Objective measures and methods for evaluation of trust, as well as methods for properly designing and realizing trust based on a variety of constraints, have not been established, nor have methods for strengthening society's efforts to ensure trustworthiness of the target services and systems. In many different fields of society, including manufacturing, farming, commerce, finance, logistics, transportation, tourism, social services, healthcare, education, disaster prevention, energy conservation, and environmental improvement, the ability to combine and make use of various information obtained from people and things enables more advanced services to be provided, but at the same time it compounds the difficulty of preserving confidentiality and protecting privacy. What is the proper way to design the scope of disclosure and level of detail, based on trust, for various information including personal information, trade secrets, and intellectual property? What kind of legal institutions and norms are needed? What should be considered from the standpoint of ethics and morals? How can compatibility be achieved with technologies, systems, services, and business models? These are among the many questions to be addressed. This generative research field takes a multifaceted approach to the study of trust in contemporary society.	N012	