Large Facility Large Scale Research Project Master Plan

Humanities and Social Sciences

	Cate-gory *note 1	Project Name	Proposer	Implementing Institution, or Affiliation of Proposer	Financial Requirement (1billion yen)	Project Duration	Project Summary	Expected Outcome	International Collaboration Level *note 2	Status
1	B	Practical Intercommunity Platform for Facilitating Global Understanding of Regional Knowledge	Atsuyuki Okabe	Aoyama Gakuin University	Development cost: 1.88. Maintenance cost: 2.00. Digitization cost: 2.26. Operating cost: 1.91. (Total cost: 9.00)	2012 to 2021 (Development period: 2012 to 2016, Operating period: 2017 to 2021)	The objective of the project is to develop and fully equip the infrastructure information platform, which can construct spatio-temporal databases linked to location names and almanacs from information materials in field studies and manage regional knowledge in an autonomous and decentralized manner.	To construct the information system that feeds back knowledge to the study areas; To establish science and technology of regional spatio-temporal information; To assist regional policy science that conforms to understanding regional problems, such as international conflicts, environmental problems and disaster relief.	**d**) This project creates international collaboration networks, particularly a hub to serve for East Asia, so that the system can handle multiple languages, location names, almanacs, and ambiguity of information.	Theis project was proposed in "Master Plan 2010"To carry out the project, the Japan Consortium for Area Studies and the Japanese Organization of Geographical Sciences have been established. The steering organization has aligned by establishing a full-scale management framework. Essential element technology for the project has been developed by the organization.
2	B	Integrated Database of Classical Japanese Texts in the Pre-Meiji Period	Yuichiro Imanishi, Hiroaki Nagashima	IMANISHI: National Institute of Japanese Literature and NAGASHIMA: Graduate School of Humanities and Sociology, the University of Tokyo	Initial investment: 2. Annual operating costs: 19 (split over 10 years).	2012 to 2021	At present, there is no system in place for making use of the classic historical texts that form the core of Japanese culture. To remedy this situation, the project proposes the compilation of a new database. While taking into consideration legal issues involving copy and publishing rights, and developing new codes for the display of kanji characters, the database will be compiled with links to bibliographies, images of original manuscripts and transliterated texts. Also, it will be made available to the public.	The preparation of a comprehensive index covering all domains of Japanese culture will further enable the compilation of a large-scale Japanese dictionary, bringing Japan up to par with other countries in this respect. This will contribute greatly to the international dissemination of Japanese culture.	**d**) Japan will play a central role in the development of a new kanji code system. Toward this end a request for support has already been made to researchers of Japanese studies from six foreign countries.	The project has received the endorsement and full support from a number of academic societies and universities involved in Japanese studies in addition to the Committee on Languages and Literatures in the Science Council of Japan, and National Diet Library. The accumulated resources of relevant data at the National Institute of Japanese Literature allow this project to be undertaken immediately.
3	B	Web for the Integrated Studies of the Human Mind (WISH project)	Tetsuro Matsuzawa	Primate Research Institute, Kyoto University	Initial investment: 1.0. Annual budget: 0.9. (Total budget: 6.4)	2011 to 2016	The WISH project aims to promote research on the human mind and sociality from neural, evolutionary, developmental, cultural and social perspectives. It focuses on empathy, trust, fairness, reciprocity, cooperation, agression, discrimination and other aspects of human cognition and sociality through comparisons of primate and other species, brain activity measurements, and developmental, cultural, and institutional perspectives.	The WISH project will produce scientific knowledge to be used in devising innovative individual and social solutions to various mental health problems in contemporary society. The understanding of human nature must provide scientific guidelines for educational and social policy making.	**d**) The WISH project will provide a unique contribution by Japan to the six-nation HOPE project. HOPE is an anagram of "Primate Origins of Human Evolution", and unites researchers from Japan, Germany, USA, UK, Italy and France. Based on this established international network, the WISH project will promote research activities on the human mind and sociality from the neural, evolutionary, cultural and social perspectives.	The WISH project emerged through activities of a SCJ's Subcommittee division of "Toward a Core Institution for Research and Education in Psychological Science" at the Science Council of Japan. The WISH project has been partially funded by MEXT as a Cutting Edge Research Infrastructure project in the period 2010 to 2012.
4	B	Network Building of the Integrated Social Science Database Solution	Takatoshi Imada	Graduate School of Decision Science and Technology, Tokyo Institute of Tchnology	Initial cost: 2.5, for the first and second year respectively. Other expenses: 2.0 for the third year, 1.0 for the fourth and fifth year respectively. (Total budget: 9.0)	2011 to 2015	The objectives of the project are to establish an integrated social science database consortium and to develop a database solution network by connecting the major social science research centers in Japan. As the first database network in the area of social science in Japan, the database will enable us to provide solutions and suggestions to support highly advanced researches from various perspectives.	With this project, we will establish Japan's first database consortium in the area of social science. Database will promote collaboration among research institutions, enabling them to provide policy recommendations from various perspectives.	**a**) This project will promote international joint activities with foreign research institutions such as GESIS at the University of Cologne (a data archive base in Europe) and ICPSR at University of Michigan (a data archive base in the US). With this project, we expect that Japan will obtain the membership of International Federation of Data Organization (IFDO), to lead the international collaborations in Asia.	This project was approved by the Integrated Social Science Database Subcommittee, Science Council of Japan, and endorsed by five Committee Chairs of Social Sciences (Sociology, Economics, Political Science, Law, Business Administration) , those of the related academic associations and societies and Project leaders of five Global-COE programs (Center of Excellence).

*note 1 A: large facility project, B: large scale research project

*note 2 International Collaboration Level: **a**) jointly led collaboration, **b**) domestically led collaboration, **c**) foreign led collaboration, **d**) research level international collaboration/cooperation, **e**) other

Life Sciences

	Cate-gory *note 1	Project Name	Proposer	Implementing Institution, or Affiliation of Proposer	Financial Requirement (1billion yen)	Project Duration	Project Summary	Expected Outcome	International Collaboration Level *note 2	Status
5	B	Establishment of research center and researchers' network for the study of adaptation strategies of living organisms to the environment, based on next generation genome science	Kiyotaka Okada, Yuji Kohara, Tsuneyoshi Kuroiwa	National Institutes of Natural Sciences, National Institute for Basic Biology (NIBB); Research Organization of Information and Systems, National Institute of Genetics (NIG), Rikkyo University	Construction: 3.5 (2011 to 2012) Operation: 4.0 (2013 to 2020)	2011 to 2020	Through modifications in their genetic information, living organisms have adapted to various environments, spreading across the globe. Using next generation genome science, highly environmentally controlled facilities and bioresources, we hope to further reveal the mechanisms and strategies involved in environmental adaptation.	We will elucidate environmental adaptability and the records of life contained in the genome of living organisms. This research will have far reaching applications in bioenergy, in the production of climate-change resistant plants, and in structural biology based on medicine and pharmacology.	**d**) As there are no international examples of large-scale highly environmentally controlled biological cultivation facilities, we expect establishment of the center will lead to extensive international collaboration. We also intend to create a shared research network through cooperation with principal research and bioresource centers in Japan and overseas.	In order to quickly respond to environmental problems such as climate-change, the elucidation of environmental adaptation mechanisms among living organisms is an urgent issue. As such, starting this year, NIBB and NIG have begun cooperating with Japanese and overseas universities to perform necessary preparatory research.
6	B	Integrative Biological Network for Monitoring and Data Integration and Analysis of Biodiversity	Izumi Washitani	University of Tokyo	Initial cost: 5.6 Yearly cost total: 100(10/yr×10)	2010 to 2019	Development of ecosystem/biodiversity indicators for monitoring of biodiversity hotspots and methods to integrate and to analyze wide-range/long-term monitoring data. Assessments and predictions on effects of climate change, eutrophication, and biological invasions based on the integrative understanding of complicated dynamic systems.	Enhancing basic and integrative scientific understanding on biodiversity hotspots and providing ecological knowledge socially required for their conservation and sustainable use.	**d**) Standardization of observation and database construction are in close collaboration through the network of ILTER(International Long-term Ecological Research)	Planned through deliberations of the Science Council of Japan Committee for Integrative Biology, based on the results of activities of the "long-term ecosystem monitoring network" and others. Several new sites (such as for primeval basin containing primeval natural systems) are planned to be established by using unused facilities in underpopulated areas.
7	B	A network of cutting-edge international research centers aiming for the integrated development of glycoscience	Koichi Furukawa	Nagoya University Graduate School of Medicine	Budget of initial investment (first and second fiscal year): 4.11 Management budget: 9.24. (Total budget: 13.35)	2011 to 2017	The long-term international leadership of Japan in the fields of glycoscience is now critically endangered in the global competition. By establishing cutting-edge international research centers based on the fusion of national programs and individual researches, we will promote integrated development of co-ordinated structural and functional analyses, fostering young researchers, and collaboration with other fields and foreign countries.	We hope this research center will contribute to create a "Glyco-Atlas" as a fundamental system of Glycoscience, to further the understanding of life, to find solutions to medical issues such as emerging infections, cancers, and refractory neurological diseases, and to increase our international contribution.	**d**) Standard methods have been established by leading international collaborative researches such as the standardization of N- and O-glycan analysis by mass spectrometry. International research meetings have been frequently and periodically held for the communication of young researchers from Western and Asian countries.	JCGG (Japan Consortium for Glycobiology and Glycotechnology) was established 8 years ago. The community agreement was obtained from JCGG and JSCR (Japan Society of Carbohydrate Research). Integrated research bases of individual ministry programs and established co-operative systems also support our community agreement.
8	B	Center to accrue medical knowledge: development of infrastructure for informatics and research resources	Ryozo Nagai	Graduate School of Medicine, The University of Tokyo	Initial investment for constuction: 15, Annual Operating Cost: 3.0/yr. (Total investment: 45)	Period for construction: 2011. Period for operation: 2012 to 2020.	The function of new research center is threefold; 1)"translational research platform" to accelerate development and commercialization of research outcomes, 2) "international academic clinical research organization(ARO)" to promote global study ,and 3) "clinical information platform" to accumulate and analyze the clinical data on a nationwide scale. The establishment of the center will accomplish "accretion of medical knowledge" .and result in a smooth transition of research outcomes from basic research to clinical medicine and vice versa.	This center greatly contributes to the advancement of medical research through prompt commercialization and global deployment of innovative pharmaceuticals and medical devices, in parallel with development of new therapeutics achieved by epidemiological analysis of accumulated clinical data.	**d**) Collaborate with projects for developing nationwide clinical database by several countries and projects for international harmonization of clinical research and reviewing process.	Several projects of translational research have been already launched and there is a growing need for development of infrastructure for promoting translational research between academic, medical and industrial community in Japan. Also, for years, there has been an in-depth discussion about national clinical network and database in academic societies related with medical informatics. Therefore, this plan has a high feasibility.

9	B	Research center for medical genomics	Shoji Tsuji	The University of Tokyo	Initial investment: 12. Annual operating cost: 2.0	Construction: 2012. Operation: 2012 to 2016.	On the basis of massively parallel sequencing, analyses of human genome, molecular basis of diseases will be elucidated, and a number of disease-modifying therapies will be developed. With whole-genome sequence anlaysis as a powerful tool, peersonal genome-based medical practice to facilitate optimal diagnosis and highly efficacious treatment will be realized.	The molecular basis of diseases will be elucidated. On the basis of this accomplishment, highly efficacious disease-modifying therapies will be realized. This realization is expected to make the personal genome-based medical practice standardized medicine, which will facilitate accurate diagnosis as well as efficacious treatment and prevention of diseases.	**d**) Because the ethnic background has substantial effects on disease susceptiblity, international collaborative activities will be essential to elucidate the molecular basis of diseases and the ethnicity-dependent variance in disease susceptibility.	The research community in the fields of genome science, informatics and medical genomics proposes that the construction of core facilities is essential for accelerating efforts to apply large-scale genome analysis to the elucidation of the molecular basis of diseases, and to translate the accomplishments into medical practice.
10	B	Development of the research center for next generation high performance MRI	Teruhiko Higuchi	National Center of Neurology and Psychiatry	Total setting up :17. Total operating cost: 6.	Construction: 2012 Operation: 2012 to 2016	Development of MRI apparatus with ultra high field magnet, operating software, and analytical methods are needed to further improve their performance. Building research centers is essential to develop and operate stateof-the-arts over 10 Tesla MRI for clinical science and to facilitate multidisciplinary researches.	Ultra high field MRI will dramatically increase detectability for minute pathological changes of structure and function in vive.This information will be essential for the very early diagnosis of neurological disease, psychiatric disease, cardiac disease, dementia, and cancer.	**d**) Nearly 40 ultra high field MRI for human use are deployed in the world, whereas only one is built in Japan. Building MRI research centers will facilitate international collaboration.	Many countries push forward to building ultra high field MRI centers and 7Tesla MRI has been rapidly deployed in many sites in the past few years. Urgent development of research centers are needed in Japan.
11	B	Research Center for Drug Discovery	Tetsuo Nagano	The University of Tokyo	Initial Investment：4. Operation Cost：1/yr × 10 = 10 in total. (Total Budget：14,)	2011 to 2020	The progress in life science has deepen the understanding of disease and brought drug discovery to the attention of academic researchers. However there is no substantial infrastructure for drug discovery in Japanese academia. Thus, establishment of a center to support the drug discovery research is needed.	The research center enables full-scale research of drug discovery from hit finding to the stage of preclinical study, which has a significant effect on pharmaceutical education, cultivation of bio-venture companies, and development of drugs for rare diseases.	**d**) The infrastructure for drug discovery in USA is being established mainly based on NIH Molecular Libraries Program. Information exchanging and mutual visits are made between the Program and Japan.	A part of the infrastructure has been set up by a national project. Based on the remarkable results of the project, the proposal from the research community for the full-scale infrastructure and its continuous operation was made.
12	B	Formation of Metabolomics Research Center	Tadaomi Takenawa	Graduate School of Medicine, Kobe University	Initial investment : 13. Operating cost 1.2/yr.	2011 to 2018	Metabolites are barometers that reflect physiological state of our body. The establishment of a metabolomics research cente promotes metabolomics research that analyzes all metabolites in a comprehensive manner, and enablesits medical, pharmaceutical and agricultural applications.	Medical and pharmaceutical applications for early diagnosis of diseases, finding of disease-related biomarkers, prognosis of therapeutic effect, and survey of drug targets, as well as agricultural applications for quality control of foods are expected.	**d**) Japanese database construction and disease-related metabolomics research are leading the world. Considering its rapid spread and emergency, international collaboration is needed in the metabolomics research on infectious disease.	Since metabolomics research is highly applicable, small metabolomics facilities have already been founded in several universities or institutes. However, to further reinforce the research field in a cooperative manner, a core center for metabolomics research should be established.
13	B	Establishment of an integrated research network for verification and improvement of food function and safety	Makoto Shimizu	The University of Tokyo	Initial investment: 8. Operational cost: 1/yr.	2012 to 2021	Theis project purposes to establish a global research center for the promotion of science and technology on food function and safety. The center aims at the development of (1) scientific verification systems for food functions in terms of disease-prevention and health promotion, and (2) novel technology for risk management of such factors as food-related infectious diseases and toxicants.	Establishment of objective, quantitative, and universal methods to evaluate and verify food functionality and safety enables us to take food more safely and efficiently, which should promotes our health. .	**d**) Basic and applied sciences in Japan on the disease-preventive and health promoting food are in the world highest level. Japan has advantage over other countries in terms of the technology for food safety management. Japan can therefore contribute to the promotion of safety and functionality of food distributed worldwide.	Research proposal for a verification system of food functions has been drafted with repeated examination at JST workshops. Collaborative research activities for risk management have started with OIE on the infectious diseases and with African countries on environmental toxicants. Efforts to establish a universal verification system for functional and safety-guaranteed agricultural products delivered worldwide are being made in collaboration with the Ministry of Agriculture, Forestry and Fisheries.

14	B	Platform of Measurement and Manipulation Technology towards Creation of Seamless Brain Science	Nobutaka Hirokawa	The University of Tokyo	Initial Investment：5. Running Cost：3/yr ×10 = 30 in total. (Total Budget：35)	2011 to 2020	This project establishes a basic research consortium for "Seamles Brain Science", which connects and integrates different levels of the brain sciences, including molecular and cellular neuroscience, synapse and circuit research, and system and behavioral neuroscience. The aim of this consortium is comrehensive understanding of the brain function, with special emphasis on cognitive functions specific to humans, such as social cognitive abilities.	Comprehensive analyses of brain function by Seamless Brain Science will facilitate our understanding of information processing and cognitive functions in the brain, together with drug discovery and invention of new diagnostic and therapeutic tools for neurological and psychiatric disorders.	**d**) There are a number of leading imaging companies in Japan. By strengthning the interaction and collaboration with these companies, the consortium will develop highly original imaging and measurement technologies specialized for brain science.	The concept of this project was a part of the report ("On the basic concept of brain science and its promotion strategy from a long-term standpoint. ") from the Council for Science and Technology to the Minister of MEXT. The priority of this project was approved by the academic scientists.
15	A	Space Life Science Program in the International Space Station	Takayuki Hoson	Osaka City University	Construction: 10. Transportation and installation: 3. Operation: 1/yr.	Construc-tion: 2011 to 2014. Transpor-tation and installation: 2013 to 2015. Operation: 2014 to 2020.	The full operation of the International Space Station has just begun, but its research facilities have not been renewed after the start of construction. This project aims to greatly advance space life sciences by constructing five types of up-to-date facilities required for the forefront research in the Kibo Module.	The origin of life and its adaptation and evolution processes on earth will be clarified, which leads to better understanding of the fundamental mechanisms of life. This project enables healthy long-term manned stay missions at the International Space Station by providing the necessary scientific knowledge and technology, and also contributes to human life on earth through their applications.	**a**) The International Space Station has been constructed and is now operated as an international joint project among Japan, the United States, Russia, Canada and ten European nations.	This project reflects a broad consensus of community led by the Japanese Society for Biological Sciences in Space, and is ready to start under collaboration of the Japan Aerospace Exploration Agency, universities, and related research institutes.
16	B	Human Proteogenomics Network	Yousuke Takahama	Institute for Genome Research, University of Tokushima	Initial investment: 2. 6th fiscal year investment: 2. Operating expenses: 1/yr × 10=10	2011 to 2021	Human health and diseases will be analyzed through the establishment of a nationwide research network of proteogenomics, which integrates epigenomics and proteomics.	The outcome of the project will be made available as internationally shared databases and is expected to nurture future researchers in life sciences and promote the development of novel medical technology and drugs.	**a**) Tight cooperation will be commenced between the International Human Epigenome Consortium and the Japanese Society for Epigenetics and between the Human Proteome Organisation and the Japan Human Proteome Organization.	The Japanese Society for Epigenetics and the Japan Human Proteome Organization will support this project and plan cooperative activities including the co-organization of scientific meetings.
17	B	Systems and structural life science project	Tomitake Tsukihara	Department of Life Science, University of Hyogo	Initial investment 6 Annual operating cost: 6/yr × 10	2012 to 2021	Since biological phenomena within an organism are complex, establishment of new science (systems and structural life science) project, which reveals vital functions in an integrated way, is needed to visualize "biomolecules in action". This project is a fusion of structural biology, theoretical biology, and systems biology.	This project elucidates motions of biomolecules in cells and organelles at atomic resolution in a visible manner. The findings of this project will be fundamentals for life and green innovations.	**d**) Taking initiative in international community, the project develops dynamic and precise structure determination and interactive analysis technique, and promotes dissemination of the develped technique. The project also collaborate with international community in nurturing young scientists.	Techniques, facilities, and equipments developed in the existing protein research projects will be efficiently used. The project has obtained approvals from related science communities. There exists a proposal document describing a comprehensive vision of the project.
18	B	Research Center for Advanced Dental Medicine	Toshiyuki Yoneda	Graduate School of Dentistry, Osaka University	Initial investiment: 2, Annual operating cost: 1/yr × 10. (Total investiment: 12)	2011 to 2020	The aim of our project is to establish the "Research Center for Advanced Dental Medicine". This Center will help Japan to develop urgently needed cutting-edge dental medicine to treat various oral diseases, which are caused by decreasing birthrate and aging population in Japanese society.	Our project will promote health care in the community by developing high-quality dental science and evidence-based dental medicine. The project will also support and develop interdisciplinary research regarding oral diseases associated with other medical diseases and brain functions. Therefore, our project is expected to open new horizons not only in dentistry but also in medicine.	**d**) This project will develop innovative and high-quality international collaborative research with the world-leading Japanese groups in the realm of dental research and medicine.play center role.	Dentistry Committee of SCJ has already proposed this project in " Perspective of Dentistry" which is included in "Japan Perspective: Proposals from the Science Community 2010." . Our project is also supported by a large majority of dental schools in Japan and Japanese scientific societies related to dentistry.

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Energy, Environmental and Earth Sciences

	Cate-gory *note 1	Project Name	Proposer	Implementing Institution, or Affiliation of Proposer	Financial Requirement (1billion yen)	Project Duration	Project Summary	Expected Outcome	International Collaboration Level *note 2	Status
19	A	Demonstration of steady-state high-performance fusion plasma	Hiroshi Yamada	National Institute for Fusion Science, Japan Atomic Energy Agency, etc.	Large Helical Device; Capital investment: 8.2. Operational cost: 57.7. JT-60SA; Capital investment(Japanese allotment):21.7. Operational cost: 3.44 (additional costs for disassembling and rebuilding of the present facilities are required)	Large Helical Device; Operation and modification: 2011to 2022. JT-60SA; Construction: 2007 to 2015. Operation: 2015 to 2017.	Demonstrations of steady-state operation of high-performance plasmas as well as control of burning plasmas are indispensable for early realization of a fusion reactor. The Large Helical Device and the JT-60SA tokamak accelerate fusion science for steady-state operation complimentarily to ITER which is responsible for burning plasmas.	This project makes a critical contribution to early realization of a fusion reactor which is expected to be safe backbone power. Together with establishment of control mechanism of fusion plasmas, it also promotes creation of new physics paradigm and development of material science etc.	**b**) as a whole. This project consists of two large-scale experiments; LHD d) and JT-60SA a). LHD is based on the concept originated in Japan. JT-60SA is being built in Japan under the Agreement between Japan and EURATOM.	This project is supported through discussions in the Japan Society of Plasma and Fusion Research, the Fusion Network, etc. and has been approved as a priority project in the Basic Plan Special Committee of the Council for Science and Technology, MEXT. The project is in the executed phase.
20	B	Research Network on 'Non-equilibrium and Extreme State Plasmas'	Sanae-I. Itoh	Kyushu Univ. (RIAM, Itoh Research Center for Plasma Turbulence), Osaka Univ. (Photon Pioneers Center, Graduate School of Engineering), NIFS, Tohoku Univ. (Faculty of Engineering), Kanazawa Univ. (College of Science and Engineering), etc.	Instruments: 6.3. Operation: 20.	FY 2010 to FY2019	This project explores a frontier of non-equilibrium and extreme state plasmas, by uniting methods which cover expanding cutting-edges (e.g., fusion, high energy density, nano-bio), via a large-scale collaborative network. This project propels and takes advantage of advanced diagnostics and analysis methods for turbulence and fields.	By establishing physics methods of non-equilibrium and extreme state plasmas, fundamental laws of natural and laboratory plasmas will be presented. The academic achievement will advance the acceleration of new energy development (e.g., fusion) as well as creation of new functional materials.	**d**) International collaborative researches have been enthusiastically promoted via academic agreements with a number of countries and international laboratories (such as LIA (Laboratoire International Associe) 336, and ICHEDS (International Collaboration for High Energy Density Science) supported by JSPS), for which leading roles have been taken by the members of this project.	This project was proposed based on the accomplished collaboration of core groups, and on open discussions at society meetings and network meetings of community. The impacts of research were also assessed at the symposium of Science Council of Japan and supported by researchers at various community symposiums. Conceptual design of central devices is also in progress.
21	AB	Establishment of the Earth observing systems and promotion of atmospheric and oceanic sciences by use of satellites and aircrafts	Akimasa Sumi	Integrated Resarch System for Sustainability(IR3S), The Univercity of Tokyo and Earth Observation Research Center(EORC),JAXA	Satellites: Total 400-500 including 150 for satellite operation. Aircraft: 7 including operation (4), development of instruments (1), employ (1), typhoon research center (1).	2011 to 2021	With the progess of global warming, the need for accurate Earth observation data has increased in order to better understand the current status and future estimates of Earth's climate. Satellite observation systems have a current model of international cooperation in the "Global Earth Observation System of Systems (GEOSS)". In addition, aircraft observations add in-situ observations of various gas, aerosols, cloud microphysical parameters and meteorological fields near Typhoon events.	Continuous satellite and aircraft observation is expected to reveal the Asian contribution of anthropogenic materials, such as aerosols and green house gases, to global warming. This project also will aid the understanding of the relationship between global warming and Typhoon magnitude. The results are expected to contribute to Typhoon disaster prevention.	**d**) Satellite; a Japanese global observation plan is shared in the framework of the "Committee on Earth Observation Satellites; CEOS". Some specific projects, GPM and EarthCARE are international joint projects with NASA and ESA, respectively. Aircraft; b It is planned to lead cooperation with the international community, mainly with Asia. A framework is already established through previous projects, such as BIBLE, PEACE and A-FORCE. The newly planned Typhoon Research Institute will play a leading role in Asian Typhoon research centers.	Satellite: Most satellite development plans were already set and in the budget request phase. Mission requirements for these plans are under agreement by each science team, which consists of related area scientists. Aircraft: Framework of plan is going to be fixed, and a detailed plan is now under discussion. Cooperation with researchers from the USA, Taiwan and China is ready to start. The research community in the Meteorological Society of Japan leads these activities, and official MSJ support is under preparation.

22	A	Development and establishment of the integrated observation system for conservation of marine environment	Motoyoshi Ikeda	Hokkaido University	Facility (research vessel): 50. Operation: 30.	2011to 2020	The integrated observation system, comprised of research vessels, satellites, buoys and modeling, is indispensable to elucidate the feedback between climate change and ecosystem, and to understand radionuclide-related marine pollution. Since the Japanese fleet of research vessels are currently reaching their service life limits, they require refitting to continue operations as the core component.	This project will contribute to understanding complex marine ecosystems, improvement of climate change prediction as well as discovery and development of new energy resources in the ocean. This observation system will improve the realtime warning system of marine hazards, including tsunamis generated by plate subduction process.	**d**) We are participating in international collaborative partnerships on several global issues: e.g., climate change and marine ecosystem deterioration. In addition, we are working to establish international collaboration for tsunami monitoring.	This plan has been developed through deep discussion among Japanese SCOR (Scientific Committee on Oceanographic Research) Subcommittee and Marine Biological Committee, both of which are within SC, as well as the Oceanographic Society of Japan – so that the observation system may be strengthened with research vessels as a core component regarding coastal zones to seas, including the polar oceans.
23	A	Study of coupling processes in the solar-terrestrial system	Toshitaka Tsuda	Research Institute for Sustainable Humanosphere, Kyoto University	Equipment: 35. Operation: 3. (Total 38; Ground observation is for 10 years)	2012 to 2021	In this project we establish advanced ground- and space-based observation facilities to clarify energy and material flow in the Sun-Earth system. The ground-based facilities will consist of a comprehensive multi-instrument observatory in Indonesia including the Equatorial MU Radar to study the whole equatorial atmosphere, and global observation networks of magnetometers and radio and optical instruments to study coupling processes of the Sun-Earth system. The space-based observation facilities include the SOLAR-C satellite project to study detailed variability of the Sun.	Measurement of the Sun's internal plasma and magnetic fields would help resolve the dynamo mechanism of the Sun. Combined with ground-based observations the response of the Earth system to short/long period variability of the Sun will be elucidated, and these observations will help our quantitative understanding of the Sun-Earth environment as a whole system.	**d**) We have a contract for collaborative studies with Indonesia. Global observation networks have typically operated under the guise of international collaboration. Solar-C project planning has been carried out under international collaboration of instrumental developers. Through these observational studies, we have led international projects in the field of Sun-Earth systems, i.e., SCOSTEP/CAWSES, ILWS, and ISWI.	A budget request has already been made for the Equatorial MU radar after a technical study based on the current Equatorial Atmospheric Radar. Ground observation networks are continuously operated and being expanded. Detailed planning of SOLAR-C has already been started by the heliospheric research community.
24	B	International Ocean Discovery Program	Yoshiyuki Tatsumi	Japan Agency for Marine-Earth Science and Technology	200	2013 to 2022	To advance comprehensive understanding of the C-H-O cycle within the Earth system via ocean drilling, the scientific drilling vessl Chikyu will be up-graded to allow 7000 m penetration below the sea floor to the mantle and will be used, together with vessels operated by US and Europe, for the internationally-collaborated scientific project.	Decoding the element cycle within the crust and the mantle, the largest C-H-O reservoir in the Earth system, and the interaction between the interior and the surface of the Earth will provide better understanding of the essential causes of global change and Earth system evolution and will enhance efforts to understand and model future changes of this planet.	(**a**) and (**d**) Operation of three platforms via international collaboration. Research plans will also be discussed and evaluated in an international framework.	The overall science plan for IODP has been published by an internationally-organized committee. The science themes in which Japan will take leadership have been discussed within the Japanese community and will be published in the near future.
25	A	Prediction research on earthquakes and volcanic eruptions with on- and off-shore observations using seafloor and borehole systems	Naoshi Hirata	Earthquake Research Institute, The University of Tokyo	Equipment(initial cost including drilling): 150. Running cost: 30 (3/yr x 10) . (Total : 180)	2011 to 2021	The Japanese islands are surrounded by oceanic plate subduction zones, known to be one of the most active seismic regions. In order to better understand earthquake and tsunami generation processes, it is necessary to develop a dense network of ocean-bottom seismic, geodetic, and tsunami observation systems covering the deep-sea floor.	This program would provide real-time data acquisition for seismic, geodetic, and tsunami data from the sea bottom. Such data would contribute to the development of early warning systems for tsunamis and aid the study of working on the possibility of future earthquake prediction research.	**d**) Ocean bottom cable systems should be established with international collaboration. Japan has already implemented collaborative studies with the USA, China, and South Asian countries (e.g. Indonesia).	Nationwide universities and research institutes have worked on earthquake prediction research since 1965, and volcanic eruption prediction research ~~in~~ since 1974 in collaboration with central and local government agencies including the Japan Metrological Agency.

26	B	Comprehensive understanding of geothermal systems and energy/resources extraction	Hiroaki Niitsuma	Graduate School of Environmental Studies, Tohoku University	12-15	2013 to 2023	The previous geothermal researches have mainly focused on the target reservoir and development of the elemental technologies. This project challenges comprehensive understanding of geothermal systems from the heat sources to the surrounding recharge zones while creating new extraction technology for energy and resources.	This project will pave the way for drastic growth of geothermal utilization and extraction of precious element resources through creating 1) adaptive development and management technologies of shallow and deep geothermal resources, 2) energy extraction technologies from super high-temperature intrusive rocks, and 3) extraction and separation technologies of precious element resources from deep seated geothermal fluid.	**d**) Japan has the third largest hydrothermal resources in the world;. Also, Japan leads the world in key technologies including high-temperature drilling technologies exceeding 500 °C, and owns 70 % share of geothermal steam turbines in the world.	This project has been discussed and drawn up in the Geothermal Research Society of Japan since November 2010. Japan has been expected to participate in the International Partnership for Geothermal Technology (IPGT) in the Geothermal Implementing Agreement (GIA), International Energy Agency (IEA).
27	B	Creation of the Next-Generation Environmentally Harmonized Ocean Science and Technology	Masahiko Ozaki, Syuji Aihara, Toshihito Suzuki	Graduate School of Frontier Sciences, Graduate School of Engineering, and Institute of Industrial Science, The University of Tokyo	Construction: 4. Labour: 1 Operation: 1. (Total: 6)	2012 to 2016	In order to cope with global issues in ocean environments, such as the wise use of natural energy and marine minerals and biological resources, it is necessary to establish a next-generation ocean science and technology framework that entails developing an international cooperative mechanism. This project proposes a combination of engineering experiments and state of the art ocean observations that would promote a new perspective on our understanding of ocean systems.	This project will contribute to both the domestic and global ocean utilization, marine resources development, water security, and coastal disaster prevention.	**b**) Although there are large-depth water tanks in other countries available for subseabed oil development research, this project aims to establish a tank with more realistic parameters (e.g. tidal currents) and eventually will promote global research of ocean science and technology. This facility would be a center-piece of international research.	The Graduate School of Frontier Sciences, The University of Tokyo has already selected the presently proposed tank in its master plan in 2007. The Institute of Industrial Science, The University of Tokyo has worked on underwater technologies ever since the establishment of Underwater Technology Research Center in 1999.

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*note 2 International Collaboration Level: **a**) jointly led collaboration, **b**) domestically led collaboration, **c**) foreign led collaboration, **d**) research level international collaboration/cooperation, **e**) other

Material and Analytical Sciences

	Cate-gory *note 1	Project Name	Proposer	Implementing Institution, or Affiliation of Proposer	Financial Requirement (1billion yen)	Project Duration	Project Summary	Expected Outcome	International Collaboration Level *note 2	Status
28	A	Materials and Life Science with High Intensity Neutron and Muon Beams	[The Japanese Society for Neutron Science] Kanaya(Kyoto Univ.), Yamada(Tohoku Univ.), Arai and Kakurai(JAEA), Ikeda(KEK), Shibayama and Yoshizawa(ISSP) [Society of Muon and Meson Science of Japan] Torikai(Yamanashi Univ.), Nishida(Tokyo Inst. Tech.)	Overall operation: [J-PARC] JAEA and KEK [JRR-3] JAEA Joint-use operation Univ. of Tokyo, Tohoku Univ., Kyoto Univ. etc. CROSS Ibaraki Pref.	Construction Cost: 30.2. Running Cost: 3.8/yr	Construction: FY2011-2021 Operation: FY2011-	Upgrading of the existing neutron and muon beamlines and construction of the next generation beamlines at the Materials and Life Science Facility (MLF) of J-PARC and renovation of the neutron beamlines at JRR-3 provide powerful research tools.	High intensity beams of neutron and muon should open up a new horizon of materials science and life science.	**d**) J-PARC MLF and JRR-3 jointly play their role as a world research hub together with the counterparts in US an Europe.	Planning has been worked out through the discussions by the responsible organizations --- J-PARC Center, JAEA and KEK, and the respective commettees representing the user community.
29	A	Synchrotron Radiation Science in the Future	[The Japanese Society of Synchrotron Radiation Research] Oshima(Univ. of Tokyo), Shimomura(KEK), Amemiya(Univ. of Tokyo)	RIKEN, JASRI, KEK	Construction Cost: 48. Running Cost: 7.5/yr.	Construction Phase I: FY2012-2014. Phase II: FY2017-2019. Operation: FY2014-2019.	Installation of ultra-high emittance Soft X-ray/VUV light source in collaboration with the Super-KEK Project (KEK-X Project) and installation of a storage ring type X-ray light source with diffraction limited emittance by renovation of the SPring-8 (SPring-8 II Project)..	Elucidation of local crystal structures and local electronic structures by nano-beams probes. Reinforcemsnt of wide range of science and technology supported by the synchrotron radiation and pioneering of its new applications including industrial applications.	**d**) Promotion of photon science in collaboration with the leading synchrotron light source facilities in US, Europe and Asia.	This future plan has been worked out on the basis of discussion among the synchrotron facilities and their users, in Japanese Society for Synchrotron Radiation Research and Synchrotron Radiation Light Science Joint Symposium.
30	A	High Magnetic Field Collaboratory-High Field Facilities in the Next Generation	[High Magnetic Fields Forum] Nojiri and Watanabe(Tohoku Univ.), Kiyoshi and Shimizu(NIMS), Takeyama and Kindo(ISSP)	[DC field] IMR(Tohoku Univ.) NIMS [pulse field] ISSP(Univ. of Tokyo) CQST(Osaka Univ.)	Construction Cost; DC field: 11.7. Pulse field: 6. Running Cost; DC field: 0.9/yr. Pulse field: 0.7/yr	Construction; DC field: FY2012-2017. Pulse field: FY2011-2019. Operation; DC field: FY2017-. Pulse field: FY2016-.	Implementation of the network of the leading high magnetic field facilities in Japan (High Magnetic Field Collaboratoy) and promotion of joint-use and collaborative research utilizing both pulsed and steady magnetic fields.	By furnishing the high magnetic field experimental environments, developments of materials sciences including discovery of new material phases and further ripple effects to other fields such as functional materials and life sciences are expected.	**d**) The Collaboratory plays its part as a world research hub together with the counterparts in US and Europe.	The planning has been worked out on the basis of discussions in the high magnetic field research community (High Magnetic Field Forum). Promotion of high magnetic field science and nurturing of talents are persued by coordinated activities of the facilities each with own function and role.
31	B	Laboratory Network for New Materials Development	Iye (ISSP), Niinomi (IMR), Tokito (ICR) Okada (MSL), Misawa (RIES), Kawamura (IMRAM), Naka (CRL), Yamaguchi (ISIR), Nagashima (IMCE), Ohmine (IMS), Ushioda (NIMS), Noyori (RIKEN)	ISSP (Univ. of Tokyo), IMR (Tohoku Univ.), ICR (Kyoto Univ.) MSL (Tokyo Inst. Tech.), RIES (Hokkaido Univ.), IMRAM (Tohoku Univ.). CRL (Tokyo Inst. Tech.), ISIR (Osaka Univ.), IMCE (Kyushu Univ.), IMS, NIMS. RIKEN	Initial Cost: 10. Running Cost: 1/yr.	Construction: FY2012-2017. Operation: FY2013-.	Implementation of the network of joint-use and collaborative research organizations in the field of materials science in order to support such activities as search of new materials, preparation of high quality samples, structural analysis and materials characterization, Promotion of new materials research by sorting and providing the relevant information on new materials.	Expansion of condensed matter research by coordinated programs of materials development which is complementary to the research using big experimental facilities which leads to establishment of Japan's predominance in this field.	**e**) Japan is leading the world in the development of new materials. High quality samples provided by the Japanese team very often hold the key to international collaborative research	The basic idea is based on the Report put together by the 17th term Science Council of Japan. A more concrete plan should be worked out by the community with an eye on the evolution of the new scheme of joint-use and collaborative research hubs inaugurated in FY2010.

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Physical Science and Engineering

	Cate-gory *note 1	Project Name	Proposer	Implementing Institution, or Affiliation of Proposer	Financial Requirement (1billion yen)	Project Duration	Project Summary	Expected Outcome	International Collaboration Level *note 2	Status
32	A	Revealing the Origin of Matter with Upgraded J-PARC	Director of J-PARC Center	KEK, RIKEN	Construction: 38. Operation: 2.5/yr.	Construction: 2011 to 2015. Operation: 2016 to 2021.	Intensity upgrade of the J-PARC main ring and the neutrino beam line, and extention of the nuclear and particle physics experiment facility hall and upgrade of its beam lines, in order to investigate the origin of matter-antimatter asymmetry and the process of forming matter from quarks.	Elucidating the origin of CP asymmetry by measuring the quark mixing, the neutrino mixing, and the neutron electric dipole moment, and understanding many-body quark systems through investigating change of hadron masses in the nuclear medium modification and search for new hadrons.	**b**) More than 30 universities and institutes in Europe, US, Asia and Austraria will participate.	Intensity upgrade of the main ring and the extension of the hadron experiment hall with upgraded beamlies are the top priorities of particle and nuclear physics communities, respectively.
33	A	World Research Center for the International Linear Collider	Director General of KEK	KEK	Construction: 670. Operation: 20/yr.	Construction: 2015 to 2024. Operation: 2025 to 2034.	A proposed electron-positron collider, the international Linear Collider (ILC), will answer the questions about what the universe is made of and what is the dynamics that the vacuum follows. Planning, designing, funding and building will require global, multi-national collaboration.	It will explain the origin of mass and probe the theories beyond today's particle theory, such as the super-symmetric theory and the theory of extra dimensions. It will also enable us to discover new particles and new phenomena.	**a**) Global organization, including US, European and Asian counties, is being envisioned.	ILC is the top priority at the energy frontier after Large Hadron Collider.
34	A	Nucleon Decay and Neutrino Oscillation Experiments with Large Advanced Detectors	Director General of KEK, Director of Institute of Cosmic Ray Research, the University of Tokyo	KEK, Institute for Cosmic Ray Research, the University of Tokyo	Construction: 50-75. Operation: 2/yr	Construction: 2014 to 2020. Operation: 2021 to 2035.	Advance neutrino physics/astronomy and search for nucleon decays using a large water Cherenkov detector that is approximately 20 times larger in volume than Super Kamiokande and/or a large liquid argon detector.	It would discover the particle-antiparticle asymmetry (CP asymmetry) in the lepton sector by shooting a muon neutrino beam from J-PARC to the advanced large neutrino detector. It will also probe the grand unified theories by searching for nucleon decays.	**b**) This project builds up on the legacy of Super Kamiokande with a large number of international institutions.	The on-going longbaseline neutrino oscillation experiment T2K has obtained the encouraging result that enhances prospects for CP violation discovery.
35	A	Reaching Island-of-Stability via Upgrades of the RIKEN Radioactive Isotope Beam Factory	Director of Nishina Center, RIKEN	RIKEN	Construction: 15. Operation: 4/yr.	Construction: 2013 to 2017. Operation: 2017 to 2027.	Upgrading the ion generation system and providing high-intensity RI beams with a wide range of energy at the Radio Isotope Beam Factory (RIBF). It develops a new science of nuclear reaction that is necessary to produce nuclei of superheavy elements predicted to exist stably.	This project creates a new research field of RI nuclear reaction to produce variety of nuclei without limitation and establish the basis of nuclear transmutation technology. It will also have large impacts on astrophysics subjects such as nucleosynthesis and neutron stars.	**d**)	The RIBF upgrade plan enjoys a community-wide endorsemrent as a major future plan in nuclear physics. Detailed planning and R&D works are being undertaken primarily by the RIBF staff and users.
36	B	Network of Computational Facilities for Basic Sciences	Akira Ukawa	University of Tsukuba	4.1/yr.	2010 to 2020	Six research institutions in the field of computational physics and chemistry form an interdisciplinary research network for advancing computational basic science through strategic and collaborative use of the Japanese Next Generation Supercomputer and the supercomputer facilities provided by the member institutions.	Advancement in computational basic science is expected through the formation of a multi-layered supercomputer infrastructure necessary for supporting various stages of research.	**d**) The leadership in this field is severely contested among the USA, Europe and Japan. Asian countries, especially China and India, are rapidly coming up to the competitive level.	The formation of a network is already advanced in the respective fields of materials research, and of astrophysics and particle physics. Unifying the two networks to one for basic science is the next task.

37	A	Thirty Meter Telescope (TMT) project	Shoken Miyama	National Astronomical Observatory of Japan (Cooperating with California Institute of Technology, University of California, Association of Canadian Universities for Research in Astronomy, National Astronomical Observatory of China, Department of Science and Technology of India)	Construction cost: 130. Operation cost: 5/yr. (Japan plans to contribute 25% for both of construction and operation)	Construction: 2014 to 2021. Operation: 2019–.	By constructing an optical infrared telescope with a 30m diameter segmented aperture primary mirror on Mauna Kea, Hawaii, we open the new frontier of the universe. Dark matter, dark energy, black holes, early universe, exo-solar planets and habitable planets will be extensively studied eith hiper sensitivity and resolution.	The history of the early universe will approach the origin of space and matter. Search for Earth-like planets will bring us revolutional change of view of the status of life in the universe. Many new technologies will be devleloped, and the adaptive optics will bring innovations in the medical and industrial applications for example.	**a**) TMT will be an international project. Japan's contribution will also be important in its leading technology and scientific experties.	The community of astronomers in Japan agreed that te TMT is the highest priority project after the ALMA. Many recommendations for the TMT had been issued. We can start constructiont as soon as the financial support is secured from expected partner countries.
38	A	Square Kilometer Array Peoject	Shoken Miyama	National Astronomical Observatory of Japan	Construction: 200. Operation: 20. (planned Japanese contribution: 10% for each)	Construction: 2013 to 2022. Early phase operation: 2017–. Full operation: 2023–, more than 30 years	An international large radio interferometer with collecting area of 1 km^2. The SKA covers a frequency range of 0.1 – 25 GHz complementary to that of the ALMA. The SKA observations with high sensitivity, wide field of view, and high resolution provide us with opportunities to address to long-standing and basic astrophysical problems.	The SKA aims to push forward the cutting-edge scienses like astrobiology by searching for large organic molecules in dark clouds and star forming regions, detection of gravitational wave and test of general relativity, origin and evolution of cosmic magnetic field, cosmic re-ionization, formation of the first object in the early universe. Huge amount of digital technlogy development will be made.	**C**) Construction by an international consortium. Japanese contribution to the SKA is planned to be a level of 10% of the total budget for the construction and operation.	An international committee has been established for coordinating and organizing the SKA construction project. Japan is participating the committee as a member. In Europe, USA, Australia, and South Africa, planning and construction of proto type systems (called SKA path finders) are in progress. The decision of SKA construction site is due in the year of 2013.
39	B	Promotion of Leading Research toward Effective Utilization of Multidisciplinary Nuclear Science and Technology	Hirotake Moriyama	Kyoto University	Initial investment: 6. Maintenance cost: 3.8 (10 years).	2010 to 2019	Establishment of a center of excellence to grow and promote multidisciplinary nuclear science and technology with collaborative use of important research resources (as for example, reactors and accelerators). Efficient utilization of nuclear power and radiation provides solutions to maintain, sustain and even to improve development of human society, leading to improved quality of life for all.	To accelerate the accumulation of basic and fundamental knowledge necessary for the safe and effective utilization of nuclear energy, including the development of material science and the Boron Neutron Capture Therapy (BNCT) study, which benefits society as well as human resource cultivation.	**d**) International collaborative researches are being promoted under academic agreements with foreign institutions. Studies of the Accelerator-Driven System (ADS) and the BNCT application are recognized as among the best in the world.	The world's first ADS experiment has been conducted with the combination of an actual reactor core and a proton accelerator. In addition, the BNCT study has been intensively conducted at the world's largest scale. The progress of multidisciplinary nuclear science and technology is centered on these research areas, and is strongly supported by several academic societies, as well as by university organizations such as the Council for Nuclear Energy Research and Education in Universities.
40	B	Project for Developing Researches of High Energy Density Science	Hiroshi Azechi	Institute of Laser Engineering, Osaka University	Initial investment: 8.4. Operation: 0.6. (Total budget: 9)	Construction: 2012 to 2014. Academic Research: 2015 to 2017.	Unprecedented high fields will come true by development of Exa (ten to the eighteenth) Watt-class lasers. Relativistic plasma physics and nonlinear quantum electrodynamics will be pioneered under such high fields. The project also aims at establishment of a global center-of-excellence for high field science as a new frontier of high energy density science.	Deeply relativistic plasma physics and nonlinear quantum electrodynamics will be pioneered. This laser also contributes material science under extremely high pressure. Advanced technologies for lasers beyond Exa Watts will be established.	In the last three years, 37 institutions from 12 countries have participated in the laboratory's international collaborations on high energy density science. The world-highest fields, several-orders of magnitude stronger than those previously achieved, will be realized. Absolute synchronization of the high intensity laser with an implosion laser is available.	The project has been planned and agreed by the steering committee and the collaboration committee of the laboratory. Extensive discussions are made in a community of the laboratory's collaboration researchers. Elemental technologies for ExaWatt class lasers have already been developed. Further R&D's for implementation into actual laser systems are required.

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Space Science

	Cate-gory *note 1	Project Name	Proposer	Implementing Institution, or Affiliation of Proposer	Financial Requirement (1billion yen)	Project Duration	Project Summary	Expected Outcome	International Collaboration Level *note 2	Status
41	A	Space Infrared Telescope for Cosmology and Astrophysics (SPICA) Project	Takao Nakagawa	Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency	Construction: 33. Operation cost: 0.56/yr.	Construction: 2011 to 2018. Operation: 2018 to 2023.	An Infrared Space Observatory aiming to reveal history of the universe "from the Big Bang to Emergence of Life". Superior sensitivity in the mid- to far-infrared will be achieved by a 3.2m, large aperture telescope cooled down to 6K.	Scientific achievements: Solving key problems in modern astronomy: (1) Drama of the birth of galaxies, (2) Recipe of planetary systems, (3) Circulation of materials in the universe. Technical achievements: Development of strategic technologies for space missions including mechanical cryocoolers.	**b**) International infrared space observatory led by Japan. Substantial contribution from Europe. Collaborations with the USA and Korea are under discussion. Japanese lead is achieved scientifically by AKARI survey results and technically by cryocoolers.	Mission study and technology R&D program conducted by the community for more than a decade / Official status in JAXA as a pre-project since 2008. / Assessment Study has been done both in Japan and in Europe. The mission is aimed to be put into an official project in FY2011 under the collaboration between Japan and Europe.
42	A	Simultaneous Multi-scale Observations in the Earth's Magnetosphere (SCOPE) Project	Masaki Fujimoto	Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency	Construction: 18.5. Operation: 0.4/yr.	Construction: 2011 to 2017. Operation: from 2018.	SCOPE will perform simultaneous multi-scale measurements of space plasma dynamics. A spacecraft formation will be put into the earth's magnetosphere to make simultaneous in-situ observations at MHD, ion, and electrons scales. Elucidating the cross-scale coupling between the large-scale dynamics and the micro-physics is the key to the fundamental understanding of the magnetospheric phenomena.	A giant step towards the fundamental understanding of the magnetospheric dynamics will be made through unveiling observations of simultaneous multi-scale (MHD, ion, and electron). The giant step will lead to the Plasma Universe theme, where universality of the plasma effects in a broader context is studied.	**b**) SCOPE is planned as a Japan-led international collaboration with Canada. Interest in joining the mission have been expressed by the research communities in the U.S and in Europe.	SCOPE was proposed by the researchers of space plasma physics who had formed a working group (WG) and had studied the mission concept. The proposal had been submitted to and successfully passed a Mission Definition Review (MDR) by the Steering Committee for Space Science of ISAS, JAXA, in January 2009. On the Canadian side, a Mission Concept Review is expected to be completed in 2012. Risk mitigation activities on the elements such as inter-spacecraft communication technology are in progress.
43	A	Planetary exploration for comprehensive understanding of habitable planets	Takehiko Sato	Japan Aerospace ExplorationAgency	Development: 84.8. Launch 35. Operation 5.2. Ground facilities: 16.2. (Total: 14.12)	2012 to 2022	We explore solar-system bodies and perform in-situ measurements to understand habitable environments. Early stages of planet formation/evolution are studied through lunar exploration. Formation of the planetary surface environments, their stability and habitability are studied through the exploration of Mars and the Jupiter systems. We study the earliest stages of the origin of life by exploring the smaller bodies in the solar system.	The explorations should greatly contribute to our understanding of the co-evolution of planets and of life from the early stages of the solar system to the development of planet Earth, which gives crucial information about observation of exo-planets and exo-biology. Solar-system exploration utilizing Japan's scientific and technological expertise will greatly encourage people, especially the younger generation of Japanese.	**b**) except for the Jupiter system exploration program (d)	Each exploration plan is based on previous achievements and aims at an advanced stage. The objectives of each mission have been discussed with the corresponding international scientific community to make the exploration plans world-class level. Development and operations will be carried out by project teams, with JAXA as the central part and with strong participation and support from the science community.

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Information Science

	Cate-gory *note 1	Project Name	Proposer	Implementing Institution, or Affiliation of Proposer	Financial Requirement (1billion yen)	Project Duration	Project Summary	Expected Outcome	International Collaboration Level *note 2	Status
44	B	National Academic Cloud Computing Facility for High-Performance Computing and Shared Scientific Databases	Masao Sakauchi	National Institute of Informatics (NII)	First year; Initial cost & Operation cost: 0.7. Second year and after; Operation cost: 1.0/yr. (Total cost: 3.7)	Operation period: 2011 to 2014	In this project, a virtualized cloud computing environment will be implemented for academic research based on the network facility provided by NII and the computing resources of university computer centers, thus functioning as the information infrastructure necessary for the research activities in all fields.	The cloud environment for universities will greatly contribute strengthening Japanese scientific information infrastructure and improving scientific research quality level as well as provisioning the international research and development environment and fostering younger researchers.	**d**) NII has already made agreement with Microsoft on the academic use of Microsoft Azure cloud service and is seeking more possibility of collaboration with industries in view of the further expansion of cloud environment.	The preliminary research and development of academic cloud technology is now under way in the participating institutions, and the installation of base systems is ready to go.
45	B	Foundations of Innovative Algorithms towards E-Science	Naoki Katoh	Kyoto University	Total cost: 4.2 (Initial investment 0.7, Operation cost 0.5/year)	Operation period: 2011 to 2017	The project aims to establish a collaborative research center for solving currently intractable large-scale problems by developing methodologies of innovative algorithms based on mathematical analysis, and give a foundation of e-science as the fourth paradigm for scientific exploration.	We build a library of algorithmic tools developed in various research fields to provide them as standardized scientific methodologies sharable for all fields of science and technology. This contributes to the enhancement of broad scientific fields, the improvement of life quality, and to the creation of new industries.	**d**) We establish international collaboration with top-level research institutes as well as IT industries in Europe, North America and Asia , and pursue algorithm innovation to realize new e-science era.	Our project members have already obtained consent of major related research communities to establish a collaborative research center. Preliminary research results have already been obtained, and thus we are ready to start the project immediately when the research budget becomes available.
46	B	Fundamental Research for Spatial Information Infrastructure	Ken Sakamura	The University of Tokyo	Initial budget: 0.3. System development budget: 3.5. Operation cost: 1.24/yr. (Total cost: 10)	Operation period 2011 to 2015	A new research field "Basic Spatial Information Science" will be established to deal with massive semantic information generated by objects, human, and environment of the real space efficiently in real time. The ultimate goal of this study is to increase the quality of life. This study also develops cloud computing systems suitable for the massive real world data processing and performs various pilot experiments of applications.	New information infrastructure will be launched to implement low-cost applications quickly to address real-world issues such as smart cities, disaster prevention and relief, and the support for the aged. This will contribute to the solutions of the national problems of the aging society and shortage of energy.	**d**) Close corporative relationships with CASAGRAS Project of European Union, and several large-scale ubiquitous computing projects in China and Korea have already been established.	In our research community, the planning for the preparation and total design of this research project is about to be completed. We are ready to start the project according to the plan after the budget approval.

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