

# Impulsing PARadigm Change through disruptive Technologies Program (ImPACT)

Impulsing PARadigm Change through Disruptive Technologies Program (ImPACT) is a program established to create revolutionary STI, the success of which cannot be ensured given the difficulty of achieving goals, but which could greatly change industry and society if ventured and realized.

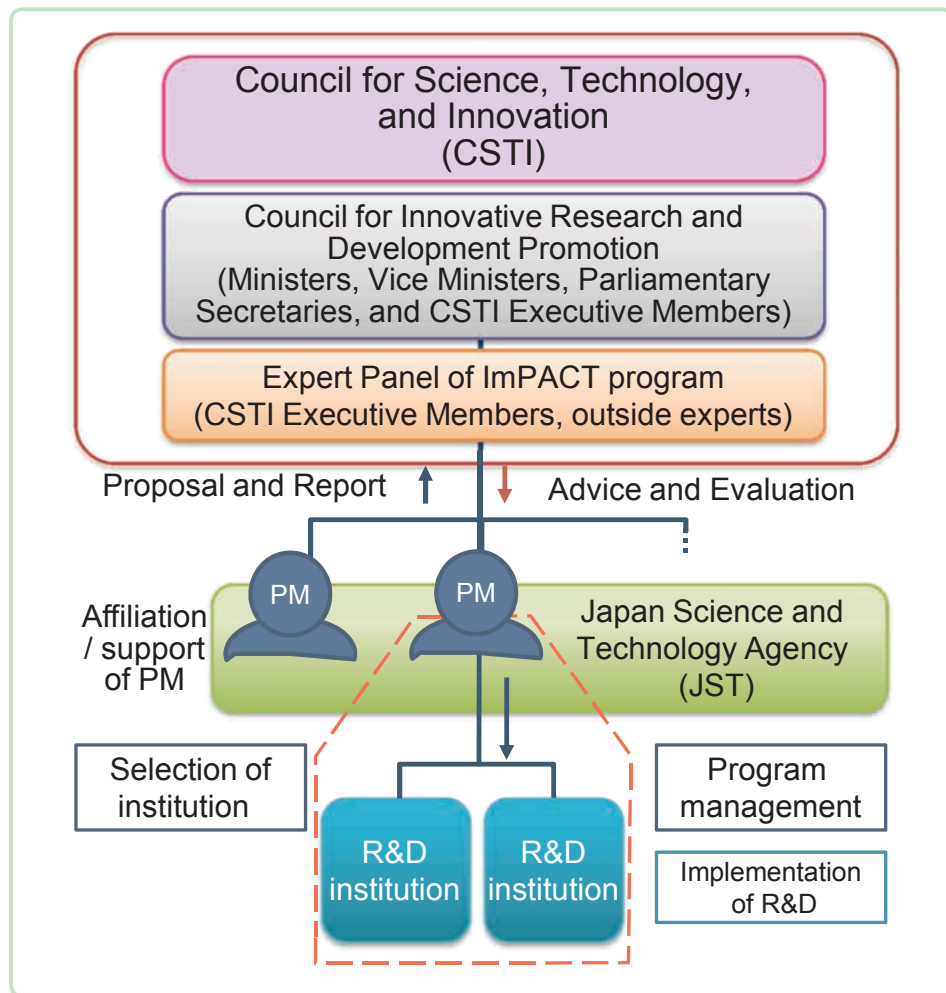
Based on 55 billion yen included in the FY2013 supplementary budget, the fund for operating ImPACT was established in the Japan Science and Technology Agency to conduct high-risk and high-impact research and development.

## Mechanism and Characteristics

A program manager (PM) system was introduced, by referring to a system in the Defense Advanced Research Projects Agency (DARPA) in the United States, which has been making epoch-making achievements in high-risk research activities.

Each program manager is required to design an entire

R&D program; select excellent researchers by using his/her ability to judge, and organize a team; and lead the team based on his/her authority and responsibilities to realize ideas. Each program manager does not conduct research on his/her own, but assumes the role of a producer.



## Program Implementation

The Council for Science, Technology and Innovation recruited program managers through public notice and selected 12 persons in June 2014. Diverse human resources

are expected to be found and given opportunities to show their talents to lead Japan's high R&D power to economic growth and creation of new industries.

## Program Managers and Overview of R&D Program



**Kohzo ITO**, Realizing an Ultra-Thin and Flexible Tough Polymer

The goal of this program is to create super thin and tough polymer exceeding the conventional limit, and change the society from materials innovation, leading to ultimate safe and energy-saving vehicles.



**Keisuke GODA**, Turning Serendipity into Planned Happenstance

The goal of this program is to develop a discovery-enabling technology that will turn serendipity in life science into planned happenstance. Specifically, the technology will enable fast sensitive detection, isolation, and analysis of needles in the haystack (rare, but important cells) for diverse life innovations.



**Yuji SANO**, Ubiquitous Power Laser for Achieving a Safe, Secure and Longevity Society

The goal of this program is to develop small and high-power devices generating photon and quantum beam by merging laser and plasma technologies which are applicable to infrastructures, security and advanced therapy for achieving a safe, secure and longevity society.



**Masashi SAHASHI**, Achieving ultimate Green IT Devices with long usage times without charging

The goal of this program is to develop technology for magnetic memory recording using voltage only, without current flow for reducing the power consumption of IT devices, and realization of an eco-society with no charging-stress.



**Yoshiyuki SANKAI**, Innovative Cybernic System for a ZERO Intensive Nursing-care Society

The goal of this program is to develop technology which is a fusion of human and robot and other devices, to improve independence of people who require nursing care as well as to dramatically reduce the physical burden of caregivers towards the realization of a society with zero intensive nursing-care. Another aspect of the program is to also set ourselves the challenge of constructing an innovative life personal-care / life support infrastructure and to implement it in society.



**Takane SUZUKI**, Super High-Function Structural Proteins to Transform the Basic Materials Industry

The goal of this program is to break through the fundamental principle and establish base technologies in order to enable the production of sophisticated configuration protein over the spider thread performance whose toughness per weight is over 340 times as much as steel.



**Satoshi TADOKORO**, Tough Robotics Challenge (TRC)

The goal of this program is to develop key fundamental technologies for remote autonomous robots that can toughly complete missions under unknown changing disaster conditions for future advanced outdoor robot services.



**Reiko FUJITA**, Reduction and Resource Recycle of High Level Radioactive Wastes with Nuclear Transmutation

The goal of this program is to challenge ecological recycle of platinum group and rare earth metals contained in nuclear waste by searching for nuclear reaction pathways to transmute long-lived fission products for which deep geological disposal has been the only option.



**Reiko MIYATA**, Ultra high-speed multiplexed sensing system beyond evolution for detection of extremely small amounts of substances

To realize a healthy and comfortable life, we aim to establish a simple and effective method to protect ourselves against noxious and hazardous substances by using the nano-electronics technology exceeding the excellent ability of insects. The technology to be developed will detect harmful and hazardous risks rapidly and easily, and realize a society where we can really feel safety and security.



**Takayuki YAGI**, Innovative visualization technology to lead to creation of a new growth industry

The goal of this program is to establish an innovative 3D imaging method with combination of cutting-edge laser and ultrasound to visualize invisible portions, and contribute to a healthier and prosperous society.



**Yoshinori YAMAKAWA**, Actualize Energetic Life by Creating Brain Information Industries

Visualizing and controlling brain information will become a platform for manufacturing and service innovation, which include equipments controlled by thoughts, or support multilingual communication. Anyone can understand and train their own brains to actualize rich and energetic life which meet their own needs.



**Yoshihisa YAMAMOTO**, Advanced Information Society Infrastructure Linking Quantum Artificial Brains in Quantum Network

The goal of this program is to establish the infrastructure for an advanced information society by developing the three key technologies: quantum artificial brain, quantum secure network and quantum simulation.

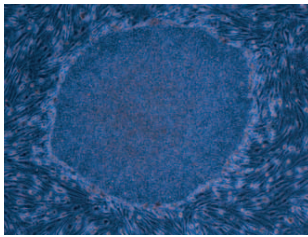
# Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST)

FIRST promotes leading-edge research in a variety of fields and at different stages of progress from basic research aimed at creating new knowledge to R&D focusing on near-future application, so that Japan will be a world leader within three to five years.

This program is a new unprecedented system with “first

priority given to researchers,” establishing support teams so that researchers can concentrate on their research, and adopting multi-year and flexible usage of research money by establishing a research fund. 30 research programs selected by this program are yielding excellent results. (Implementation period: 2009 to 2013. 100-billion yen fund).

## Examples of Research Results



iPS cells derived from adult human dermal fibroblasts  
Shinya YAMANAKA, Director, Center for iPS Cell Research and Application (CiRA), Kyoto University



Next Generation Mass Spectrometry System  
Koichi TANAKA, General Manager, Koichi Tanaka Laboratory of Advanced Science and Technology, Shimadzu Corporation



Andromeda Galaxy captured by Hyper Supreme-Cam (HSC)  
Hitoshi MURAYAMA, Director, Kavli Institute for the Physics and Mathematics of the Universe, Total Institutes for Advanced Study, The University of Tokyo

## 30 Core Researchers Selected for FIRST (as of the end of July, 2014)

 <b>Kazuyuki AIHARA</b> Professor Institute of Industrial Science, The University of Tokyo	 <b>Chihaya ADACHI</b> Director and Professor, Center for Organic Photonics and Electronics Research (OPERA), Kyushu University	 <b>Masayoshi ESASHI</b> Director, Micro System Integration Center ( $\mu$ SIC), Tohoku University
 <b>Shizuo AKIRA</b> Director and Professor, WPI Immunology Frontier Research Center, Osaka University	 <b>Yasuhiko ARAKAWA</b> Director and Professor, Center for Photonics Electronics Convergence (CPEC), Institute of Industrial Science, The University of Tokyo	 <b>Hideo OHNO</b> Director, Center for Spinronics Integrated Systems, Tohoku University
 <b>Teruo OKANO</b> Specially Appointed Professor, Tokyo Women's Medical University	 <b>Kazunori KATAOKA</b> Professor, Graduate School of Engineering, and Graduate School of Medicine, The University of Tokyo	 <b>Masaru KITSUREGAWA</b> Professor, Institute of Industrial Science, The University of Tokyo / Director, National Institute of Informatics
 <b>Hideyuki OKANO</b> Professor, School of Medicine, Keio University	 <b>Tomoji KAWAI</b> Research Professor, Institute of Scientific and Industrial Research, Osaka University	 <b>Tsunenobu KIMOTO</b> Professor, Graduate School of Engineering, Kyoto University
 <b>Masaru KURIHARA</b> Fellow, Toray Industries, Inc.	 <b>Tatsuhiko KODAMA</b> Professor, Research Center for Advanced Science and Technology, The University of Tokyo	 <b>Hiroki SHIRATO</b> Professor, Graduate School of Medicine, Hokkaido University
 <b>Yasuhiro KOIKE</b> Professor, Faculty of Science and Technology, Keio University	 <b>Yoshiyuki SANKAI</b> Professor, Graduate School of Systems and Information Engineering, University of Tsukuba	 <b>Hiroshi SEGAWA</b> Professor, Research Center for Advanced Science and Technology, The University of Tokyo
 <b>Koichi TANAKA</b> General Manager, Koichi Tanaka Laboratory of Advanced Science and Technology, Shimadzu Corporation	 (The late) <b>Akira TONOMURA</b> Fellow, Hitachi, Ltd.  <b>Nobuyuki OSAKABE</b> General Manager, Central Research Laboratory, Hitachi, Ltd.	 <b>Shinichi NAKASUKA</b> Professor, Graduate School of Engineering, The University of Tokyo
 <b>Yoshinori TOKURA</b> Professor, Graduate School of Engineering, The University of Tokyo / Director, RIKEN Center for Emergent Matter Science	 <b>Ryoza NAGAI</b> President, Jichi Medical University	 <b>Hideo HOSONO</b> Professor, Frontier Research Center, Tokyo Institute of Technology
 <b>Noritaka MIZUNO</b> Professor, Graduate School of Engineering, The University of Tokyo	 <b>Masashi YANAGISAWA</b> Professor, University of Tsukuba / The University of Texas Southwestern Medical Center	 <b>Yoshihisa YAMAMOTO</b> Professor, National Institute of Informatics / Stanford University
 <b>Hitoshi MURAYAMA</b> Director, Kavli Institute for the Physics and Mathematics of the Universe, Total Institutes for Advanced Study, The University of Tokyo	 <b>Shinya YAMANAKA</b> Director, Center for iPS Cell Research and Application (CiRA), Kyoto University	 <b>Naoki YOKOYAMA</b> Fellow, Fujitsu Laboratories Ltd. / Research Adviser, National Institute of Advanced Industrial Science and Technology (AIST)