Moonshot Research and Development Program

Cabinet Office
(Science, Technology and Innovation)

Challenge to Create Destructive Innovation

○ Many original research results have been created from the basic research field in Japan that holds the possibility of future industrial and social transformation.
○ However, the research and development system for implementing these research results in the industries and society speedy and internationally has not been completed yet.

H21

F I R S T

Advanced research and development aimed at creating world-class results
(Utilizing world-class researchers)

H25

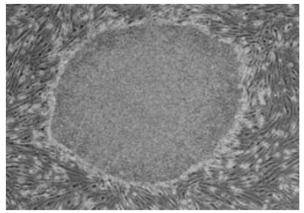
H26

I m P A C T

Challenging research and development aiming at destructive innovation
(Utilizing researchers (PM) with a powerful ability)

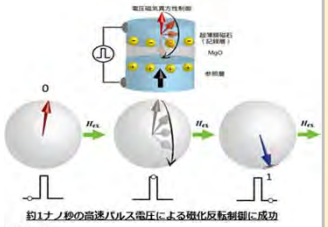
H30

IPS cells that form the basis of regenerative medicine and drug discovery



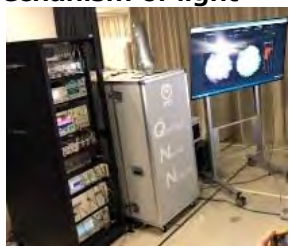
Shinya YAMANAKA
Kyoto University iPS Cell Research Institute / Director

Energy saving / power saving technology applying spintronics principle



Hideo OHNO
Tohoku University Energy conservation · Spintronics Integrated System Center / Director

High-speed computer applying quantum mechanism of light



Yoshihisa YAMAMOTO
Stanford University / Professor

Lightweight and toughening polymer material anticipating automobile EV *conversion*

Kohzo ITO
Bulletin of the Research Associate Professor

Excellent basic research results (treasure) of Japan creates destructive innovation abroad

○ We have found a repeating sequence of DNA called "CRISPR"

1987 Osaka Univ. · Professor Ishino papers

2012 genome editing technology (University of California, USA etc)

○ Establish "quantum annealing" theory

1998 Tokyo Institute of Technology Professor Nishimori et al.

Quantum computer in 2011 (Canada D-Wave)

Research and Development Trend in the World

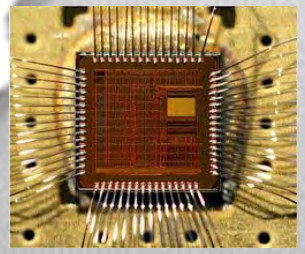
Each country in the world aims to lead destructive innovation, raises more ambitious ideas and social problems that are difficult to solve, encloses top researchers from all over the world and is expanding investment in challenging research and development. In addition, private investment that leads these research results to entrepreneurship and start-up has become active. Under a clear open-close strategy, international cooperation is aggressive.

<EU>

- ✓ Expansion of public investment in high risk research etc. (2.7 B € (equivalent to 350 billion yen in 3 years)
- ✓ Under Horizon 2020, it is oriented international collaboration and integration research
- ✓ Planning for the next term project Horizon Europe (equivalent to 12 trillion yen in 100 years from 2021 to 2027)

Fuel from sun
(Artificial photosynthetic technology)

Prediction of future infection spread
(Pandemic prediction)



Imitated the cranial nerve
Neuro computer

<China>

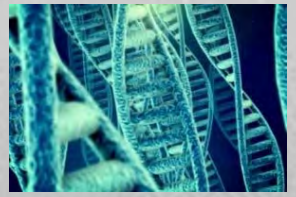
- ✓ Innovation policy "China production 2025" and others are launched to accelerate training of AI industry
- ✓ Investment expansion in basic research

Communication satellite "Quartz issue" using **quantum cryptography technology**

<USA>

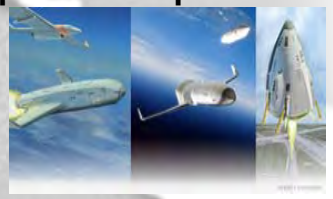
- ✓ AI, genome editing technology and other key technologies for destructive innovation are developed one after another
- ✓ Challenging development investment by platformer (GAFA)
- ✓ Business development of DARPA results (Speech recognition software Siri, surgical robot · Da Vinci)
- ✓ Strengthen challenging fundamental research support focusing on national important issues (NSF 2050 Fund)

Apollo plan of the brain
(Brain Initiative)



Elucidation of complex mutual mechanism between **organism (gene) and environment**

Immediate useable
Space transport machine



Creation of future work by **AI · robotics**

※Images cited from various government agencies (NSF, European Commission etc)

Moonshot Research and Development Program

- The Moonshot Research and Development (R&D) Program aims to solve various difficult issues in today's society, such as the declining birthrate, aging population, large-scale natural disasters, global warming and many others. Japan will promote international R&D cooperation to solve these issues.
- By aggressively promoting challenging R&D rather than improving conventional technologies, the Cabinet Office of Japanese Government and other relevant ministries will facilitate disruptive innovation through enhancing researchers' trials and errors.

＜Features of the Moonshot R&D Program＞

1. Set ambitious targets that attract people and researchers all over the world

   → *Create innovation through international collaborations!*

2. Promote innovative R&D through accepting errors and maximizing the basic research capabilities

   → *Create innovation from basic research and positive feedbacks that attract new basic research investments!*

3. Innovate research management methods, establish the newest research support system, and implement open and closed strategies

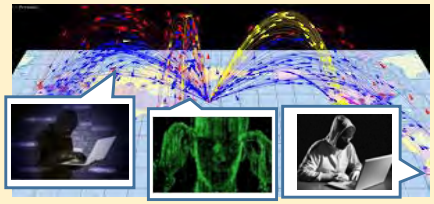
   → *Adopt world trends and establish challenging and speedy research management systems!*

Under the CSTI as the control tower, MEXT, METI, JST and NEDO promote R&D together.

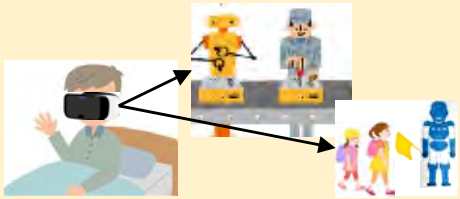
For example,

Stop global warming

Defend against cyberterrorism



Expand social participation in old age



Bedridden elderly participate in social activities

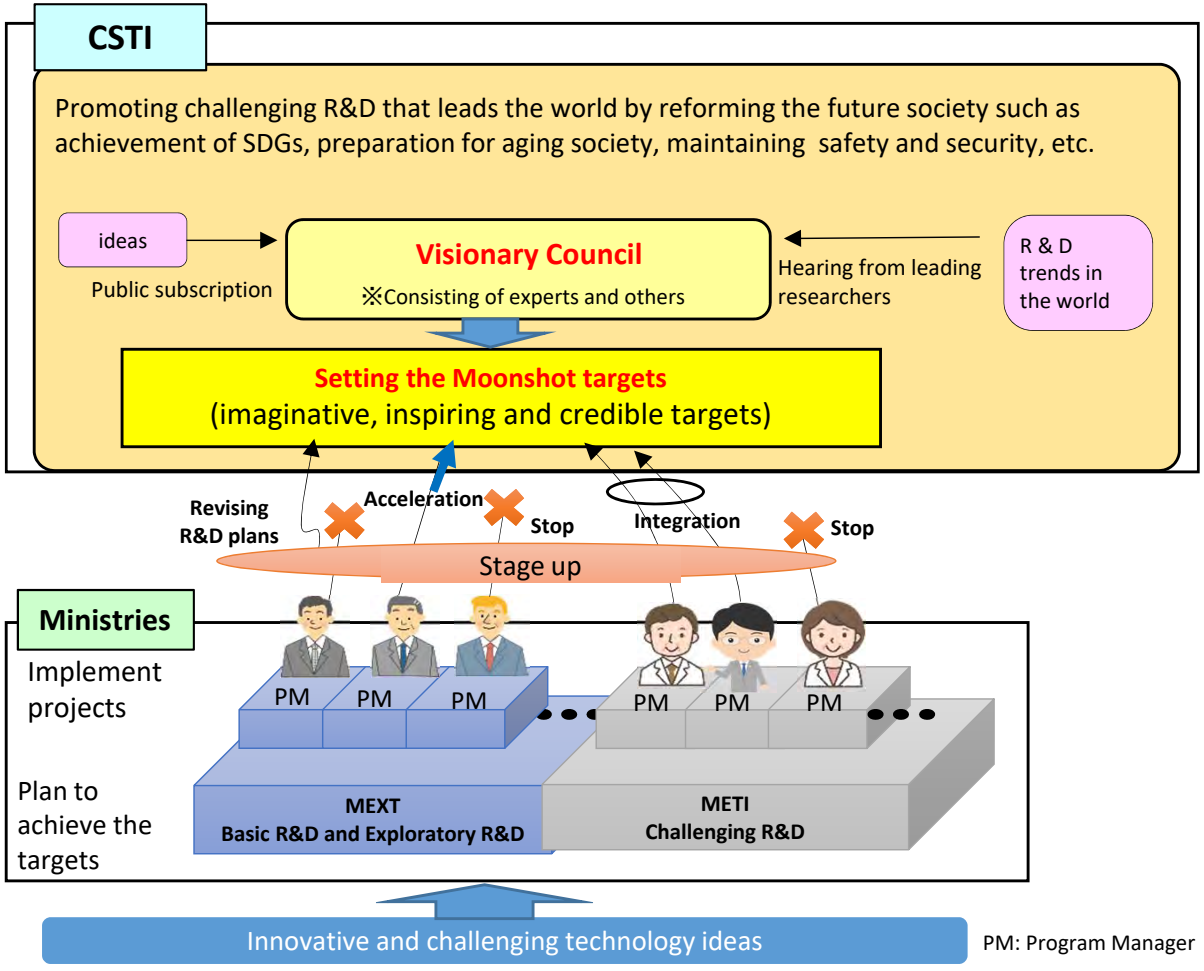
Budget Allocation and Scheme of the Moonshot R&D Program

The budget of Moonshot R&D Program is allocated to the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Ministry of Economy, Trade and Industry (METI).

（1） 100 billion yen (roughly 900 million US dollars) in the second supplementary budget of FY2018 (MEXT, 80 billion yen, METI 20 billion yen)

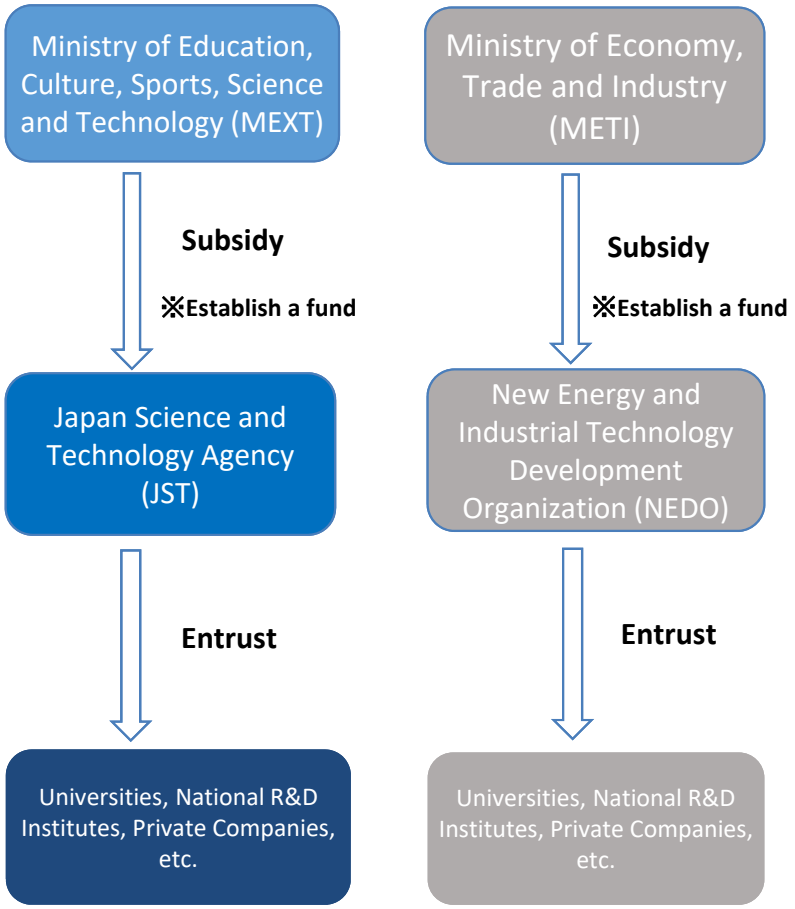
（2） 2 billion yen (roughly 18 million US dollars) in FY 2019 budget (MEXT 1.6 billion yen, METI 400 million yen)

【Framework of Moonshot R&D Program】



PM: Program Manager

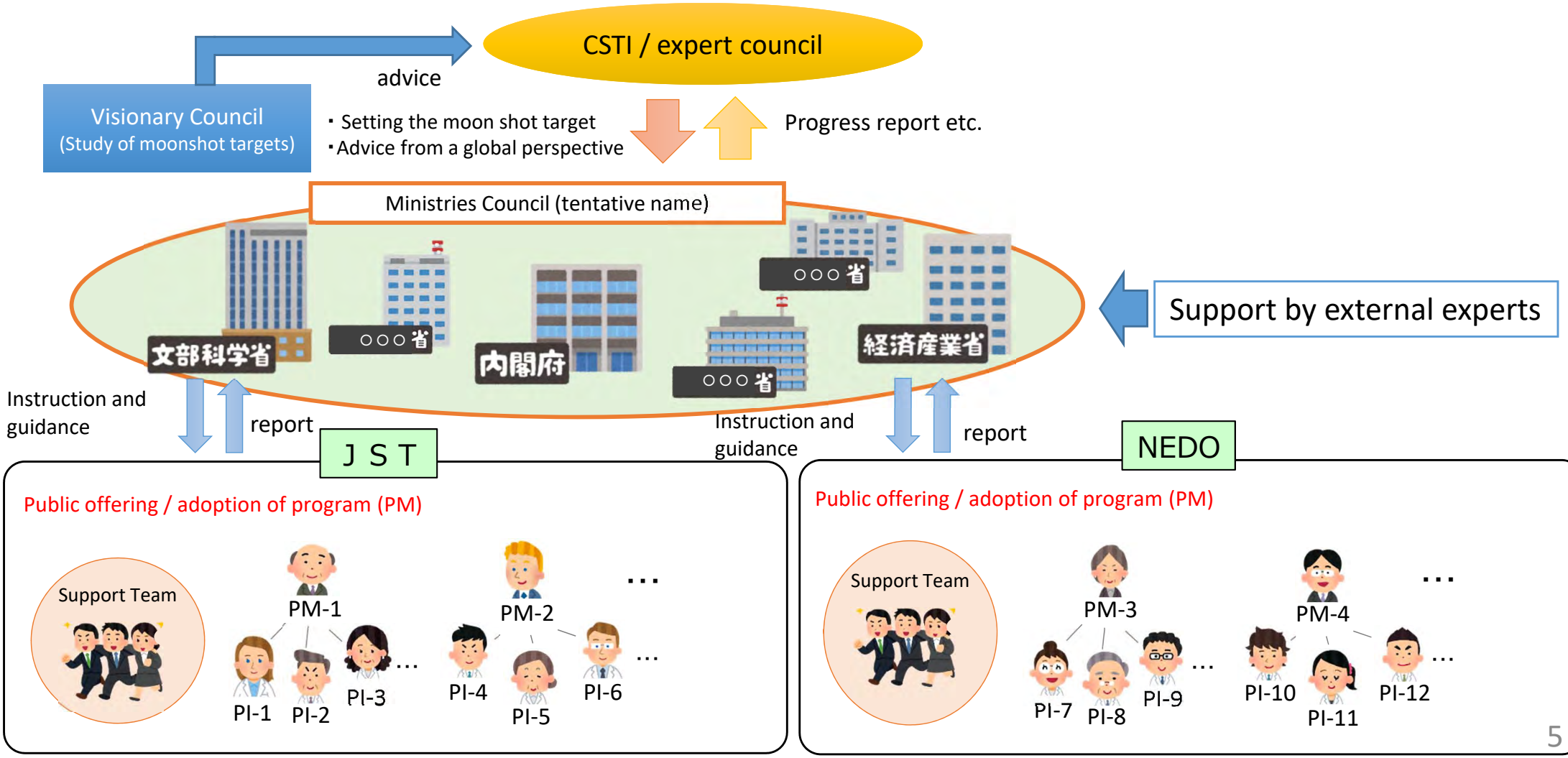
【Flow of funds】



Promotion System

○ For the social tasks and others that are expected to have great impact if realized, CSTI draws the figure of the future society, and JST・NEDO will call for innovative research ideas widely from domestic and foreign researchers and others.

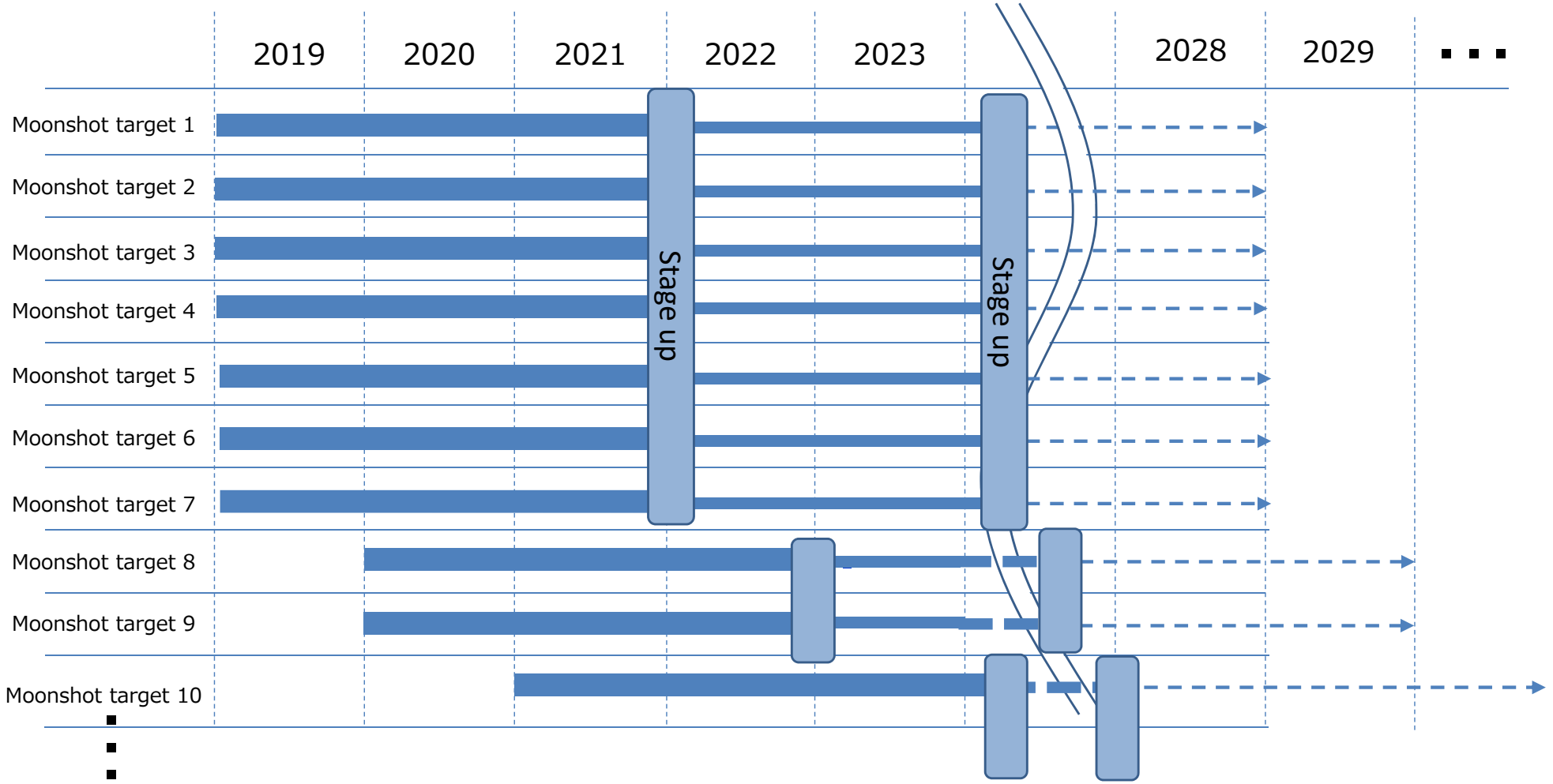
○ In implementing and managing individual programs, we appoint top researchers, etc. as PMs, flexibly manage according to the progress situation and overseas trends, while also obtaining the cooperation of external experts.



Long Term Schedule of Moonshot Research

○ Regarding the moonshot targets, we set it on an ongoing basis based on public ideas from the general public. Under the initiative of the CSTI, open efforts are continuously carried out by the concerned ministries and agencies annually and the government-wide R & D system is transformed into a more open, global and challenging one. Create a social momentum to challenge without fear of failure.

○ In addition, based on the "Act on the Activation of Science, Technology and Innovation Creation", we will utilize the benefits of the fund to promote a sophisticated program that will allow support for up to 10 years.



Incorporating Various Findings and Ideas in Basic Research

Ambitious targets to attract many people
(Inspire, Imaginative, credible)

application

Foundation

Moon shot

Including business, spiral up "value" of research results

Open / close
Strict strategy

Including wisdom from all over the world
(International collaboration)

PM support

Drive data management
(Virtual laboratory)

Spin out

Portfolio management
(Stage up)

Spin out

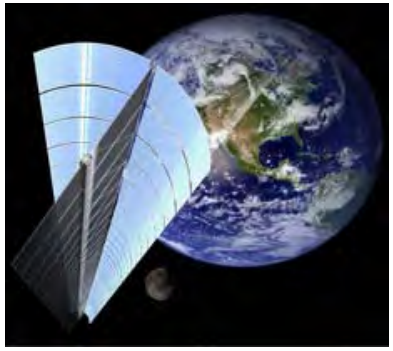
Discover and nurture to innovative achievements while allowing failure
(Consequently, the concept of "failure" disappears)

Various findings and ideas of researchers

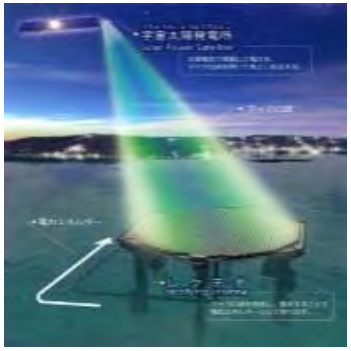
Moonshot Target Image ①

Target Example: Challenge to break away from carbon energy society

Research theme) Maximize utilization of solar energy



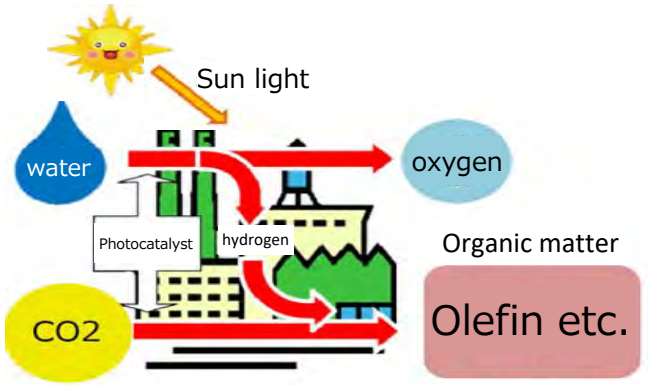
Space solar power generation



Wireless power transmission system

Target Example: Cool Earth

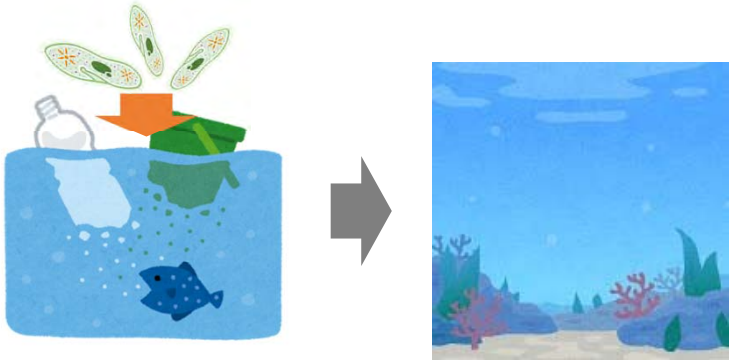
Research theme example) Effective use of CO_2 as resource



Artificial photosynthesis (olefin formation using photocatalyst)

Target example: Innovation toward realization of resource recycling society

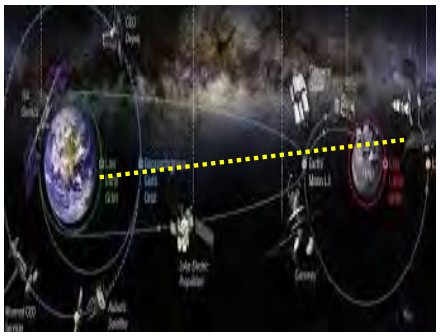
Research theme) Environmental restoration by bio



Marine plastics garbage problem solution by super microorganisms

Target example: Expansion of active area in space

Research theme) Exploring deep space



The number of people who are in charge of the event.

Extreme long-distance interstellar-planet sailing

Moonshot Target Image ②

Target example: Protect yourself from natural threats

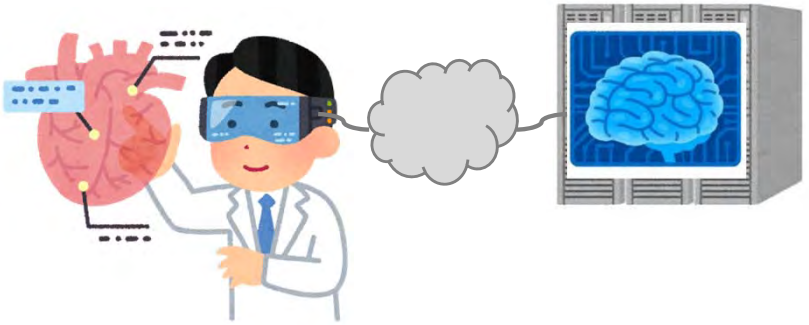
Research theme) Life prolonged until rescue by injured people with artificial hibernation

Longevity measures until rescue

Long-term delivery of seriously ill patients

Target Example: A society where everyone can connect, share and use

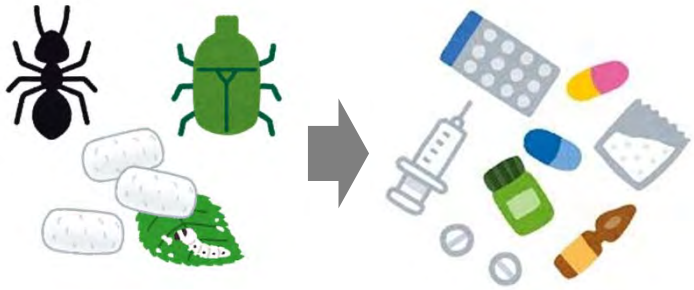
Research theme) Expansion of human ability



Everyone gets professional with AI support

Target example: prepare for unknown threat "pandemic"

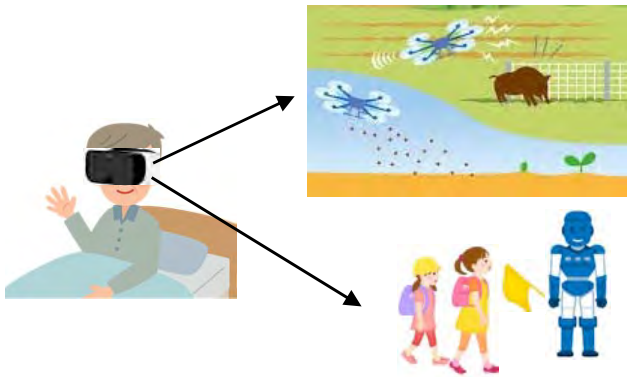
Research theme) Everyone in the world prepares for the threat of virus infection



Self-made-maid medicines using insects

Target example: lifetime active service

Research theme) Senior citizens participate in society



Control multiple robots by utilizing brain functions