Drawing up a Long-Range Plan for Astronomy and Astrophysics

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Japan Society for the Promotion of Science

NAOJ Future Symposium: Science Roadmap of NAOJ

November 7, 2023

Long-Range Planning for Large-Scale Research Infrastructure

In September 2023, the Science Council of Japan's Astronomy and Astrophysics Subcommittee (SCJ A&AS) published the "**Long-Range Plans for Astronomy and Astrophysics –Vision for the 2030s and 2040s–**"（天文学・宇宙物理学の長期計画 —2030-2040年代のビジョン—）
(https://www.scj.go.jp/ja/member/iinkai/kiroku/3-20230801.pdf)

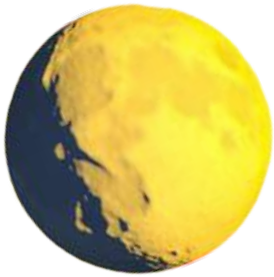
The committee compiled plans for large-scale research infrastructure recommended by **five "Kondankai" voluntary associations**

Capturing the Views of the Entire Astronomy Community in the National Science Policy

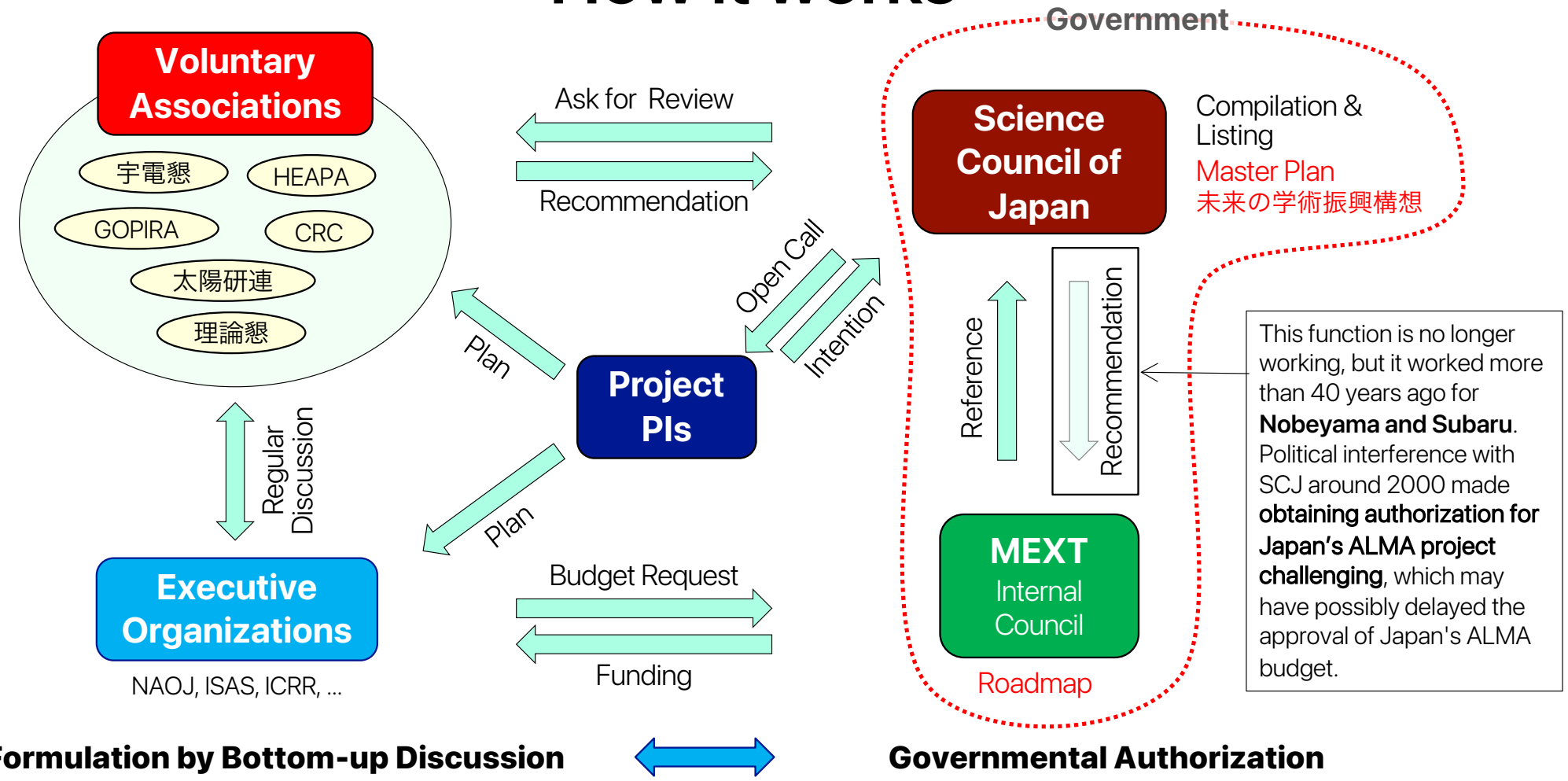
For over 50 years, Japan's astronomy community has followed a **bottom-up approach to develop large-scale research infrastructure plans**.

"Kondankai" voluntary associations play a crucial role in formulating long-range research infrastructure plans.

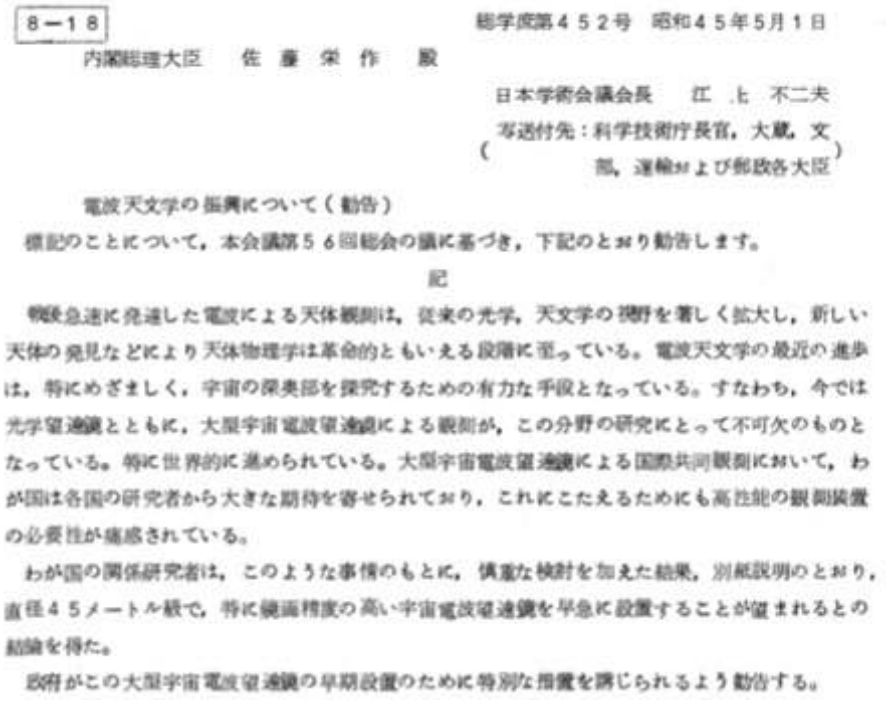
- Japan Radio Astronomy Forum (宇電懇), since 1970 (+ Japan VLBI Consortium since 1990)
- Group of Optical and Infrared Astronomers (光赤天連, GOPIRA), since 1980
- High Energy Astrophysics Association in Japan (高宇連, HEAPA), since 1999
- Cosmic Ray Researchers Congress (宇宙線研究者会議, CRC), since 1953
- Japan Solar Physics Community (太陽研連), since 1994
- Community of Theoretical Astrophysics (理論懇), since 1987



How it works


Government
Voluntary Associations
宇電懇
HEAPA
GOPIRA
CRC
太陽研連
理論懇
Ask for Review
Recommendation
Open Call
Intention
Plan
Project PIs
Regular Discussion
Plan
Executive Organizations
NAOJ, ISAS, ICRR, ...
Budget Request
Funding
Science Council of Japan
Compilation & Listing
Master Plan
未来の学術振興構想
Reference
Recommendation
MEXT
Internal Council
Roadmap
This function is no longer working, but it worked more than 40 years ago for **Nobeyama and Subaru**. Political interference with SCJ around 2000 made **obtaining authorization for Japan's ALMA project challenging**, which may have possibly delayed the approval of Japan's ALMA budget.
Formulation by Bottom-up Discussion
Governmental Authorization

Science Council of Japan and Astronomy & Astrophysics Committee



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総学度第４５２号　昭和４５年５月１日

内閣総理大臣　佐　藤　栄　作　殿

日本学術会議会長　江　上　不二夫

（写送付先：科学技術庁長官，大蔵，文部，運輸および郵政各大臣）

電波天文学の振興について（勧告）

標記のことについて，本会議第５６回総会の議に基づき，下記のとおり勧告します。

記

最近急速に発達した電波による天体観測は，従来の光学，天文学の視野を著しく拡大し，新しい天体の発見などにより天体物理学は革命的ともいえる段階に至っている。電波天文学の最近の進歩は，特にめざましく，宇宙の深奥部を探究するための有力な手段となっている。すなわち，今では光学望遠鏡とともに，大型宇宙電波望遠鏡による観測が，この分野の研究にとって不可欠のものとなっている。特に世界的に進められている。大型宇宙電波望遠鏡による国際共同観測において，わが国は各国の研究者から大きな期待を寄せられており，これにこたえるためにも高性能の観測装置の必要性が痛感されている。

わが国の関係研究者は，このような事情のもとに，慎重な検討を加えた結果，別紙説明のとおり，直径４５メートル級で，特に鏡面精度の高い宇宙電波望遠鏡を早急に設置することが望まれるとの結論を得た。

政府がこの大型宇宙電波望遠鏡の早期設置のために特別な措置を講じられるよう勧告する。

Recommendation from the Science Council of Japan to the Prime Minister urging the construction of the Nobeyama 45 m radio telescope (May 1, **1970**)

Recommendation for an Optical-Infrared Telescope to be built on Maunakea, Hawaii, July **1984**

– NAOJ left Tokyo Univ. in 1988 –

Long Range Plans for Astronomy in the 21st Century, June 27, **1994**「21世紀に向けた天文学長期計画について」

Prospects and Long-Range Plans for Astronomy and Astrophysics, March 19, **2010**
「天文学・宇宙物理学の展望と長期計画」

Prospects for the Astronomy and Astrophysics Mid-Scale Programs, September 12, **2014**
「天文学・宇宙物理学中規模計画の展望」

Long-Range Plans for Astronomy and Astrophysics –Vision for the 2030s and 2040s–, August 1, **2023**
「天文学・宇宙物理学の長期計画—2030-2040年代のビジョン—」

Developments in the A&A Committee over the Past 3 Years

2020 Oct — Start of the 25th Term of SCJ

year 1

Open call for **letters of intention**

Deadline for **letters of intention**

Recommendations from voluntary associations

2021 Oct

Online Symposium

No Master Plan 2023 announced

Start drafting the **Long-range Plan record**

year 2

Decision of recommended plans (postponed)

Open call for **Future Initiative** => **no need to select** long-range projects

2022 Oct — **Physics Committee Symposium** <= A&A Subcommittee's recommendation

year 3

SCJ's Formal list of proposed projects

Summary of proposed future research infrastructure plans with recommendations and a vision

2023 Oct — Release of the **Future Initiative** and **Long-Range Plan**

未来の学術振興構想

Long-Range Plan for Astronomy and Astrophysics –Vision for the 2030s and 2040s–

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(5) Our Science and Society

1. Achievements in the 2010s and Prospects for the 2030s and 2040s

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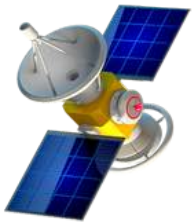
(2) Galaxies
(3) Active Galactic Nuclei and Massive Blackholes
(4) Stars, Compact Stars, and elemental synthesis
(5) Formation of Stars and Planetary Systems and Interstellar Chemistry
(6) Exoplanets
(7) Sun
(8) Cosmic Rays, Neutrinos, and Dark Matter
(9) Gravitational Waves
(10) Computer Simulations

2. Recommended Large-Scale and Medium-Scale Long-Range Projects

(1) Plan for Radio Astronomy
(2) Plan for Optical and Infrared Astronomy
(3) Plan for Astroparticle Physics
(4) Plan for High-Energy Astrophysics
(5) Plan for Solar Physics

Glossary
List of Authors
List of Proposed Large-Scale and Medium-Scale Long-Range Projects



https://www.scj.go.jp/ja/member/iinkai/kiroku/3-20230801.pdf

Future Academic Advancement Initiative
（未来の学術振興構想）

18. The Birth and Coevolution of Celestial Bodies and Life in the Universe

Summary: We aim to explore **the birth and evolution of celestial bodies** in the Universe to find **the origin of the diversity of celestial hierarchies**. At the same time, we aim to elucidate **the universality of life as a consequence**. The research is **interdisciplinary spanning physics, astronomy, earth and planetary science, chemistry, life science**, etc., and is based on **diverse and complementary observational projects based on international competition and cooperation**.

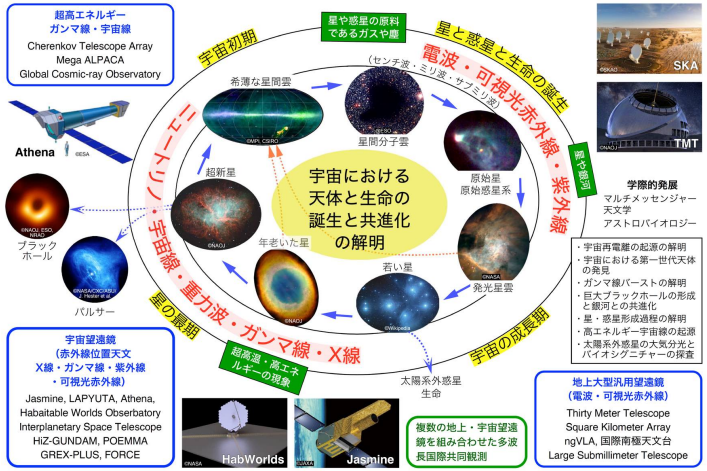


図 19　本グランドビジョンに関係する観測施設・プロジェクトの俯瞰
（日本学術会議「未来の学術振興構想」より転載）

https://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-25-t353-3.pdf

19. Fundamental Laws of Nature and the Origin of the Universe and Matter

Summary: By synthesizing the results of particle, hadron, and nuclear experiments with accelerators, underground detectors, etc., and theoretical physics and the latest computational science, we will **discover new fundamental principles of nature** that go beyond the known laws of physics and **elucidate the origin of the Universe and matter**.

図 20　本グランドビジョンに関係する実験・観測プロジェクトの俯瞰
（日本学術会議「未来の学術振興構想」より転載）

LiteBIRD, KAGRA, B-DECIGO, IceCube, Kamland, and Hyper-K are in this grand vision.

Issues to be Considered

Formulation by Kondankai

Currently, we **formulate plans by wavelength** (radio, optical-infrared, high-energy) and **methodology** (cosmic rays, neutrinos, gravitational waves, theoretical astrophysics). Should we do so from the **higher perspective** of astronomy and astrophysics?

The A&A Committee tried to implement this idea when developing the 24th Master Plan, but it did not work. The reasons may be:

- Science discussion may not have gone in-depth when we did so in a group of ≳100 people.
- Keeping all community members' (~1000) interest in all science discussions might be challenging.

The SCJ A&A Committee, and the Astronomical Society of Japan as well, may **continue to play a role in integrating and prioritizing proposals** from various communities.

Issues to be Considered

Role of NAOJ, ISAS, ICRR, etc.

It may be increasingly necessary for Inter-University Research Institutes and Universities to **share their respective roles** properly.

It may take time for the majority of researchers to realize this and act accordingly.

Large-Scale Space Observatories

Several space observatories are now being proposed as large-scale research infrastructure to cooperate with NASA or ESA.

Japan needs a new way, both in budget and framework, to contribute more and play a central role in these international space observatories.