

National Institute for Fusion Science (NIFS)

National Institutes of Natural Sciences (NINS)

Peer Review Reports in FY2012

March, 2013



External Review Committee, NIFS Administrative Council

Contents

Chapter 1	Background	1
Chapter 2	Reviews and Proposals	5
	2.1 Summary of reviews	5
	2.2 Proposals	9
Chapter 3	In closing	11
 Appendix: Charts of review results		

Chapter 1 Background

The National Institute for Fusion Science was established in 1989 as a national inter-university research institute aiming at promoting fusion studies in universities. A large-scale plasma experimental device, designed with the consensus of the fusion research community, was developed at the institute. This is called the Large Helical Device, or LHD, uniquely characterized by its superconducting Heliotron-type magnetic confinement system, which has been independently conceived and developed here in Japan. Through its high-power heating system, the device is capable of generating helically-shaped, high-performance plasmas.

Various experimental programs are being pursued with LHD for the purposes of understanding plasma physics and fulfilling engineering requirements, which are all aimed at achieving the realization of a toroidal magnetically plasma-confining fusion reactor. However, the physics of fusion plasmas is so complex that a solely experimental approach is not sufficient to understand it. Therefore, NIFS is conducting theoretical research in parallel. With the most-advanced dedicated supercomputer in service, NIFS has been running large-scale simulations, which are indispensable in understanding fusion plasmas, and at the same time, encouraging theory researchers across Japan to use the supercomputer for their pursuits. In doing so, the institute is leading the research in this field.

In 2004, Japan reformed its education sector. NIFS became incorporated and affiliated with a newly-established independent administrative entity, the National Institute of Natural Sciences. As a result of incorporation, NIFS as well as other similar institutions are now subject to external evaluation. They are required to make a plan every six years and undergo an annual assessment by outsiders, which basically focuses on administrative operation.

However, NIFS voluntarily exposes its scientific activities to external review as it considers it important. Its administrative council, comprised of both NIFS and non-NIFS members, determines what section would be reviewed each year. A panel is formed annually, consisting of non-NIFS members from the administrative council as well as experts from outside of NIFS including foreign researchers, to conduct an evaluation. The panel reports to the administrative council with their evaluation results, based upon which NIFS will make adjustments for better operation.

In 2010, NIFS began a new 6-year plan to run on three new Projects – LHD, Numerical Simulation and Fusion Engineering. The plan shows that NIFS is going to integrate results from the three projects into one direction headed toward a helical fusion reactor. To this end, NIFS removed the divisional barriers that might have limited the activities of research members. All the members are

now placed into one department so that they can freely take part in any of the three Projects. This newly-introduced framework is expected to increase cooperation among the three projects and has given them the ability to remain flexible in addressing new challenges.

A year later, the administrative council decided to evaluate the effectiveness of the project-based system. The LHD Project became the first target in 2011. In the following year, the committee decided to have another project, “the Numerical Simulation Research Project” evaluated. A panel was set up with 9 non-NIFS administrative council members and 10 invited experts (five Japanese and five foreigners).

In their first meeting held on October 4th, 2012 the members discussed the review process and determined the overall objectives and individual items. On December 2nd, NIFS presented Numerical Simulation Research Project (NSRP) activities in detail using view graphs and other materials, and answered the questions from the reviewers. On January 11th, 2013 reviewers gathered in subgroups and rated the activities after resolving any outstanding issues. The reviewers met on January 31st to finalize their review and document this report.

This report consists of three chapters; “Background”, “Reviews and Proposals” and “In Closing”.

The report will be submitted to the administrative council of NIFS. After gaining its approval, the Director-General of NIFS will hand in it to the President of its parental body, NINS. It will go through NINS to be given in to the Administrative Council and the Education and Research Council of NINS. After the approval of these councils, this report will be used as an appendix of NINS’s annual reports in “Annual Plan of NINS (JFY2013)” and “Report of Achievements of Business Work in JFY2012” to be submitted to the Ministry of Education, Culture, Sports, Science and Technology. The report will be open to public on the web as well as in print.

The following is a list of this year’s evaluation points on the Numerical Simulation Research Project (NSRP):

The points mentioned hereinafter consist of all the aspects that are indispensable in evaluating the performance of NIFS's Numerical Simulation Research Project under the mid-term plan given by the NIFS parent organization of the National Institutes of Natural Science. Reviewers will basically assess the levels of goal attainment and scientific quality.

Notes from the last Peer Review in 2007 :

1. Does NIFS play a leading role in extracting the potentials of universities and institutes across Japan for the development of integral transport codes and other long-term large-scale simulation research?
2. Does NIFS aid in the nurture of young researchers to maintain the advancement of fusion research in the long term while providing an internationally-opened research environment?
3. Is NIFS an organization that is able to develop research extensively in all areas of fusion science? Is its inter-university collaboration system capable of working in that way?

[1] Development of research system and environment

- (1) Are the objectives of the Numerical Simulation Research Project (NSRP), which was introduced in 2010, appropriate?
- (2) Is the research system for promoting the NSRP suitable for its objectives?
Does it function appropriately?
- (3) In the NSRP, is the environment on the “Plasma Simulator” system and its related researches appropriate?

[2] Research achievements

Does the NSRP produce high-level achievements in accordance with international standards for the following research areas, by promoting theory and computer simulation researches utilizing the Plasma Simulator?

- (1) Construction of Numerical Test Reactor for a helical fusion system (including contribution to the development of high-performance LHD plasma, to the design of a helical demo reactor, and to the sophistication of computational science)
- (2) Physics mechanisms of fusion plasmas and their theoretical systemization

[3] Promotion of collaboration regarding the NSRP

- (1) Does the NSRP promote collaboration researches as a center of excellence, by integrating the high capabilities of the universities and institutes?
- (2) Is the Plasma Simulator effectively utilized for collaboration research?
- (3) Does the NSRP function as a research hub for the dissemination of academic information to other fields, by promoting NINS (National Institutes of Natural Sciences) interdisciplinary cooperation research and so on?
- (4) Does the NSRP contribute to the development of research in universities?

[4] Promotion of international cooperation and collaborations

- (1) Does the NSRP play a role as an international COE through international collaboration

research?

(2) Does the NSRP promote cooperation with and contribution to ITER and BA activities?

[5] Human resources development

Does the NSRP contribute to the human resources development of the international scientific workforce required for long-term fusion studies through simulation research?

[6] Future plans

Is the research plan of the NSRP appropriate for the realization of the objectives?

Is it suitable and realistic for the next decade?

Chapter 2 Reviews and Proposals

Here is a summary of the comments and arguments given by the reviewers. This is followed by proposals which will be important in advancing the NSRP research.

2.1 Summary of reviews

[1] Development of research system and environment

- (1) **Are the objectives of the Numerical Simulation Research Project (NSRP), which was introduced in 2010, appropriate?**

Objectives are strategically given ranging from the elucidation of physics mechanisms inherent in fusion plasma, through the integration of acquired elements, to the development of a Numerical Test Reactor. The chosen objectives are adequate for a Project that attempts to clarify core plasma physics and integrate models. These objectives also have to be achieved in order that LHD data is reflected in the design of a helical DEMO reactor, therefore steady progress is desired. **The NSRP objectives are highly commendable.**

It is desired that the Project will tighten a cooperative ties between the experiment and the engineering counterparts. It is also desired that the Project will set more concrete milestones and specific targets en route toward Numerical Test Reactor (NTR).

- (2) **Is the research system for promoting the NSRP suitable for its objectives?
Does it function appropriately?**

The provisions of task-force groups and the steering committee coordinating their activity are appropriate. The task-oriented system has increased the freedom and mobility of researchers, and therefore has vitalized the Project itself. **The research system fits in well with efforts for the objectives and is working appropriately. It is highly commendable.**

It is desired that the Project will revise the system so that its members could work with a view of concrete goals.

- (3) **In the NSRP, is the environment on the “Plasma Simulator” system and its related researches appropriate?**

The Plasma Simulator, the backbone machine of the NSRP Project, has been regularly upgraded as required for achieving the Project's objectives, and it now runs on one of the most advanced computing systems in Japan. The conditions surrounding the Simulator have been improved and organized adequately. This is an extremely valuable collaboration resource, and many researchers from various universities across Japan have been using the Plasma Simulator to reach important results. **The efforts on the research infrastructure are extremely highly commendable.**

It is desired that the Project will regularly revise the updating plan to upgrade the Simulator with further advanced systems, pulling up to the ever-improving large-scale computing technology. It is recommended that the Project will also make an effective use of any other computational resources available in Japan.

[2] Research achievements

Does the NSRP produce high-level achievements in accordance with international standards for the following research areas, by promoting theory and computer simulation researches utilizing the Plasma Simulator?

(1) **Construction of Numerical Test Reactor for a helical fusion system (including contribution to the development of high-performance LHD plasma, to the design of a helical demo reactor, and to the sophistication of computational science)**

Utilizing effectively the advanced computing system, the NSRP Project has not only produced various new codes, but has also achieved high-level parallelization among major simulation codes, which are contributing to the sophistication of computational techniques. The work has also helped those studying LHD data, which is eventually assisting the understanding of LHD plasmas and the increase in the device's capability. **Those products related to the construction of a Numerical Test Reactor are highly commended.**

The Project should work harder on the development of integrated models aimed at the construction of a NTR, which will consequently lead to a helical reactor of the future. A strategic perspective has to be given to such efforts.

(2) **Physics mechanisms of fusion plasmas and their theoretical systemization**

The Project has advanced large-scale simulation up to the level that may pave a way to comprehend fusion plasma physics, and its products deserve international recognition. **The efforts for understanding of physics mechanisms in fusion plasmas and theoretical**

systemization are highly commended.

It is desired that the Project will ensure that the theoretical systematization will go ahead in a manner to organically combine individual elements studies with each other and to be able to give a systematic description on new discoveries.

[3] Promotion of collaboration regarding the NSRP

(1) Does the NSRP promote collaboration researches as the center of excellence, by integrating the high capabilities of the universities and institutes?

Various joint research programs are ongoing at NIFS, and the Plasma Simulator Symposium, which the Project annually holds, hosts many participants each year. By bringing together excellent research abilities from universities, the Project is appropriately carrying out joint programs. **Its performance as a COE is extremely highly commended.**

It is desired that the Project will develop advanced computer programs and improve computational skills in accordance to the ever-improving technologies of supercomputers. It is also desired that, as well as better infrastructure, the Project will keep human resources developments in the scope of its work.

(2) Is the Plasma Simulator effectively utilized for collaboration research?

Through various programs offered by the Project, a number of researchers both from NIFS and from other institutions are able to share the Plasma Simulator effectively, **which is extremely highly commended.**

(3) Does the NSRP function as a research hub for the dissemination of academic information to other fields, by promoting the NINS (National Institutes of National Sciences) interdisciplinary cooperation research and so on?

The work for promoting the NINS interdisciplinary cooperation scheme and disseminating academic information to other fields is highly commended. It is desired that the dissemination will be expanded.

(4) Does the NSRP contribute to the development of research in the universities?

By offering collaboration programs to many universities, the Project has been carrying out distinctive research with them by bringing out a high level of academic results. Among those, are newly developed numerical simulation codes. Undoubtedly, all these efforts have greatly helped the advancement of research in universities. **The Project's contribution is highly commended.**

[4] Promotion of international cooperation and collaborations

(1) Does the NSRP play a role as an international COE through international collaboration research?

NIFS has been serving as a host institute for the Japan-US cooperation program of the Joint Institute for Fusion Theory, from which many university researchers are benefitting very much. NIFS has been also playing a significant role in other projects based on bilateral agreements like Japan-Europe, Japan-China and Japan-South Korea. In such frameworks, the NSRP Project is sufficiently assuming the responsibility as an international COE. **The work is highly commended.**

It is desired that the NSRP will continue its commitment for the further advancement of its fusion research as an international COE.

(2) Does the NSRP promote cooperation with and contribution to ITER and BA activities?

NIFS does not only let the head of its Rokkasho Research Center serve concurrently as a leader of the BA-related project of IFERC, but also has been greatly contributing to the JT-60SA joint activities. This shows that the institute has helped to improve the provisions for BA-related joint activities. As to the ITER Project, many of NIFS's members are taking part in the ITPA activities, and the three-dimension simulation codes developed at NIFS are used at ITER. Those suggest NSRP's active participation and contribution to ITER and BA. **In terms of commitment to ITER and BA, the work is highly commended.**

[5] Human resources development

Does the NSRP contribute to the human resources development of the international scientific workforce required for long-term fusion studies through simulation research?

The Project is training young researchers and students through the research programs it offers. The Sokendai's Asian Winter School, an annual education program organized by the Project that attracts young researchers in and out of Japan, helps fostering international competency of participants. The Project also assists science education for high school students. **Therefore, its commitment for human resources development is highly commendable.**

It is desired that the Project will continue its educational commitment to the future of simulation research and computational science.

[6] Future plans

Is the research plan of the NSRP appropriate for the realization of the objectives?

Is it suitable and realistic for the next decade?

The plan shows that the Project intends to advance simulation science based on the data obtained from LHD and other large-scale machines. It also suggests that the Project will utilize the science back to the improvement of LHD performances, and to eventually design a Numerical Test Reactor. The Project is going to study individual physics elements first, and then integrate these findings to create a NTR. **The plan is highly commended.**

It is desired that the Project will set more concrete goals and provide a clear roadmap toward the NTR construction. Computational provisions need to be reinforced for the new plan to be implemented.

2.2 Proposals

Here is a summary of recommendations given by the panel to the Project for its future operation.

- (1) For the success of the objectives – the elucidation of physics of fusion plasma confinement, the systematization of found mechanisms and the construction of NTR, the NSRP Project is extremely important. It is desired that the Project will make progress.
- (2) The NSRP teams must work in a close relationship with the experimental teams as well as the engineering teams. It is desired that the Project will make its research plan more concrete and explicit by creating a roadmap to NTR.

- (3) It is desired that the Project will enrich research infrastructure and sophisticate computational techniques by increasing capabilities of the Plasma Simulator and other computing resources.

- (4) It is desired that the NSRP Project will continuously nurture researchers that can bear simulation research and computational science of the future. It is also desired the Project will keep its active commitment to the ITER Project and BA activities.

Chapter 3 In closing

Before the second six-year term began in 2010, NIFS got itself ready. Setting up research projects in three fields of LHD, numerical simulation and fusion engineering, the institute set up a new plan to run on the three wheels, while integrating products from the all three projects, in the direction to the realization of fusion reactors. In this end, all the research members were placed into one large department and allowed to participate in any of those projects. The divisional barrier-free structure is strengthening linkages among the three projects, and therefore NIFS will be likely to become flexible in responding to scientific requirements.

NIFS's administrative council decided to have one of the three projects, the Numerical Simulation Research Project, evaluated this year, following the LHD Project review last year. Non-NIFS administrative council members formed a Review panel with ten experts appointed from other institutions in Japan as well as abroad. On October 4, 2012, the panel held its first meeting and determined a process in detail. The following is an agreed list of evaluation points:

[1] Development of research system and environment

- (1) Are the objectives of the Numerical Simulation Research Project (NSRP), which was introduced in 2010, appropriate?
- (2) Is the research system for promoting the NSRP suitable for its objectives?
Does it function appropriately?
- (3) In the NSRP, is the environment on the "Plasma Simulator" system and its related researches appropriate?

[2] Research achievements

Does the NSRP produce high-level achievements in accordance with international standards for the following research areas, by promoting theory and computer simulation researches utilizing the Plasma Simulator?

- (1) Construction of Numerical Test Reactor for a helical fusion system (including contribution to the development of high-performance LHD plasma, to the design of a helical demo reactor, and to the sophistication of computational science)
- (2) Physics mechanisms of fusion plasmas and their theoretical systemization

[3] Promotion of collaboration regarding to the NSRP

- (1) Does the NSRP promote collaboration researches as the center of excellence, by integrating the high capabilities of the universities and institutes?

- (2) Is the Plasma Simulator effectively utilized for collaboration research?
- (3) Does the NSRP function as a research hub for the dissemination of academic information to other fields, by promoting the NINS (National Institutes of National Sciences) interdisciplinary cooperation research and so on?
- (4) Does the NSRP contribute to the development of research in the universities?

[4] Promotion of international cooperation and collaborations

- (1) Does the NSRP play a role as an international COE through international collaboration research?
- (2) Does the NSRP promote cooperation with and contribution to ITER and BA activities?

[5] Human resources development

Does the NSRP contribute to the human resources development of the international scientific workforce required for long-term fusion studies through simulation research?

[6] Future plans

- Is the research plan of the NSRP appropriate for the realization of the objectives ?
- Is it suitable and realistic for the next decade?

At their second meeting held on December 2, 2012, the panel was provided by the institute with detail information on the NSRP activities along with the items above. On January 11, the reviewers gathered in subdivided groups and moved forward the evaluation process. After all the subgroups completed their proposals, the panel finalized its work in a report at their third meeting held on January 11, 2012.

Here is a summary of evaluation results in response to each question:

[1] Development of research system and environment

- (1) Are the objectives of the Numerical Simulation Research Project (NSRP), which was introduced in 2010, appropriate?**

The NSRP Project, which is aimed to clarify a complete picture of physics mechanisms in fusion plasma, is given objectives that are set strategically: the elucidation of physics elements, the systematization of obtained mechanisms, and the construction of a Numerical Test Reactor.

The objective setting is appropriate. The given tasks are also important in a bid to utilize LHD products on NTR designing. It is desired that the Project will make steady progress. **The NSRP's objective setting is highly commended.**

- (2) **Is the research system for promoting the NSRP suitable for its objectives?
Does it function appropriately?**

It is appropriate that the Project is provided with taskforces (the Task Groups) and a coordinator (the Steering Group). The system is task-oriented, so it has been raising the freedom and mobility of researchers, and thus vitalizing the Project itself. **The research system works properly and fits well with the Project's objectives, which is highly commended.**

- (3) **In the NSRP, is the environment on the "Plasma Simulator" system and its related researches appropriate?**

The Project's backbone device of the Plasma Simulator has been regularly upgraded as required for achieving the objectives, and now employs one of the most advanced super computing systems in Japan. Provisions and conditions for the simulator have become improved, and the Simulator is adequately in operation. This collaboration resource is so valuable that many co-researchers are coming from across Japan to use the Plasma Simulator to obtain productive results. **The efforts on the Plasma Simulator and relevant requirements are extremely highly commended.**

[2] Research achievements

Does the NSRP produce high-level achievements in accordance with international standards for the following research areas, by promoting theory and computer simulation researches utilizing the Plasma Simulator?

- (1) **Construction of Numerical Test Reactor for a helical fusion system (including contribution to the development of high-performance LHD plasma, to the design of a helical demo reactor, and to the sophistication of computational science)**

The Project has not only achieved a successful parallelization among major computing codes at advanced levels, but also produced internationally-competitive scientific results based on the

superior computational performances. It has also helped analyze LHD experiment data, which is a considerable contribution to the understanding and upgrading LHD plasmas. Meanwhile, the developed codes are bringing computation scientists to a further sophisticated area. **The results related to the NTR construction are highly commendable.**

(2) Physics mechanisms of fusion plasmas and their theoretical systemization

The Project has advanced large-scale simulation to the levels that may lead to the elucidation of the complex fusion plasma physics, and these outcomes deserve international recognition. **The effort is highly commended.**

[3] Promotion of collaboration regarding the NSRP

(1) Does the NSRP promote collaboration researches as the center of excellence, by integrating the high capabilities of the universities and institutes?

A number of collaborative programs are ongoing mostly at NIFS. The Project annually holds the Plasma Simulator Symposium, in which many researchers participate to exchange views. Besides, bringing together excellent research abilities from universities, the Project is carrying out joint research, which is an adequate performance as a COE. **The work is extremely highly commended.**

(2) Is the Plasma Simulator effectively utilized for collaboration research?

The Plasma Simulator, expected to be a users facility, has been effectively used by a number of researchers in and out of NIFS through collaboration programs offered by NIFS. **The effective sharing of the resource is extremely highly commended.**

(3) Does the NSRP function as a research hub for the dissemination of academic information to other fields, by promoting the NINS (National Institutes of National Sciences) interdisciplinary cooperation research and so on?

The work for the promotion of the NINS interdisciplinary scheme and the dissemination of academic information to other fields is highly commended.

(4) Does the NSRP contribute to the development of research in the universities?

Offering collaboration programs to many universities, the Project has been carrying out distinctive research with them by bringing out a high level of academic results. Among them are newly developed numerical simulation codes. All these efforts have greatly helped the advancement of research in universities. **The Project's contribution is highly commended.**

[4] Promotion of international cooperation and collaborations

(1) Does the NSRP play a role as an international COE through international collaboration research?

NIFS has been serving as a host institute of the Japan-US cooperation of JIFT, which is very advantageous to many universities. NIFS is also playing an important role in some other multinational frameworks of Japan with Europe, China and South Korea. **The commitment as an international COE is sufficient and highly commended.**

(2) Does the NSRP promote cooperation with and contribution to ITER and BA activities?

As NIFS approves the head of its Rokkasho Research Center to concurrently serve as leader of the IFERC Project, and as NIFS has been involved in the JT-60SA joint research programs, it has greatly helped BA in terms of the improvement in the provisions for collaborations. As to the ITER Project, there is an active commitment. Many of the members have taken part in the ITPA activities, and the three-dimensional simulation codes developed at NIFS are used for ITER researches. Therefore, the Projects is actively involved and helping both ITER and BA projects. **Its cooperation and commitment to ITER and BA are highly commended.**

[5] Human resources development

Does the NSRP contribute to the human resources development of the international scientific workforce required for long-term fusion studies through simulation research?

Though its programs, the Project is fostering young researchers and students. One of its educational program, "The Sokendai's Asian Winter School" helps reinforce international competency of young participants. The Project also supports science education for high school

students in a considerable way. **The work related to human resources development is highly commended.**

[6] Future plans

Is the research plan of the NSRP appropriate for the realization of the objectives?

Is it suitable and realistic for the next decade?

The plan shows that the NSRP Project intends to develop simulation science based on the experimental data obtained from LHD and other large machines. At the same time, the Project also intends to utilize the science to reinforce LHD performance in a manner leading to the construction of a Numerical Test Reactor. The plan suggests that the Project will examine specific plasma physics, combine elucidated elements and create an integrated multiple model of NTR. **The plan is highly commended.**

Here is a summary of the reviewers' comments on the future of the NSRP Project.

- (1) The NSRP Project is extremely significant for achieving the three-step objectives: to clarify physics elements constituting fusion plasma confinement, to integrate the mechanisms individually elucidated and to construct a Numerical Test Reactor. The Project's progress is desired.
- (2) The NSRP teams should work in a close relationship with the experimental teams and the engineering teams. Concrete approach, including a clear roadmap toward NTR, is desired.
- (3) It is desired that including the enhancement in the performance of the Plasma Simulator and other resources, the Project will enrich research infrastructure and sophisticate computing techniques.
- (4) It is desired that the Project will continue its commitment to the future of simulation research and computational science in terms of human resource development. It is also desired that the Project will keep its active contribution to the ITER and BA activities.

The reviewers highly commend the Project's three-step strategy of physics elucidation,

theoretical systematization and the NTR construction. The Project's progress should be essential for an earlier realization of fusion DEMO reactors. What is desired now is that the Project will make its objectives more concrete and roadmap more explicit. With a rather clear view, it is hoped that the Project will step up its efforts.

Result of NSRP Evaluation 2012

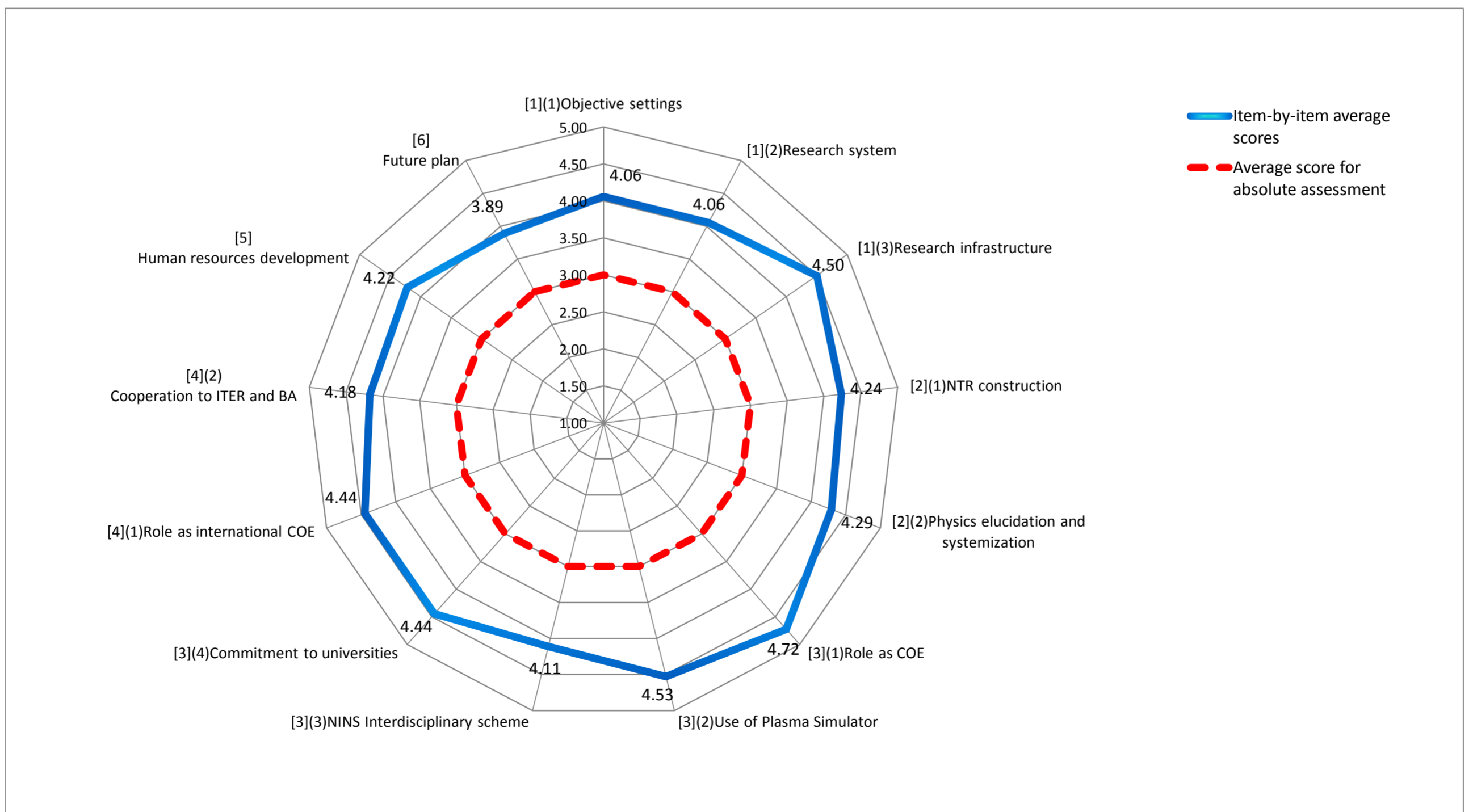
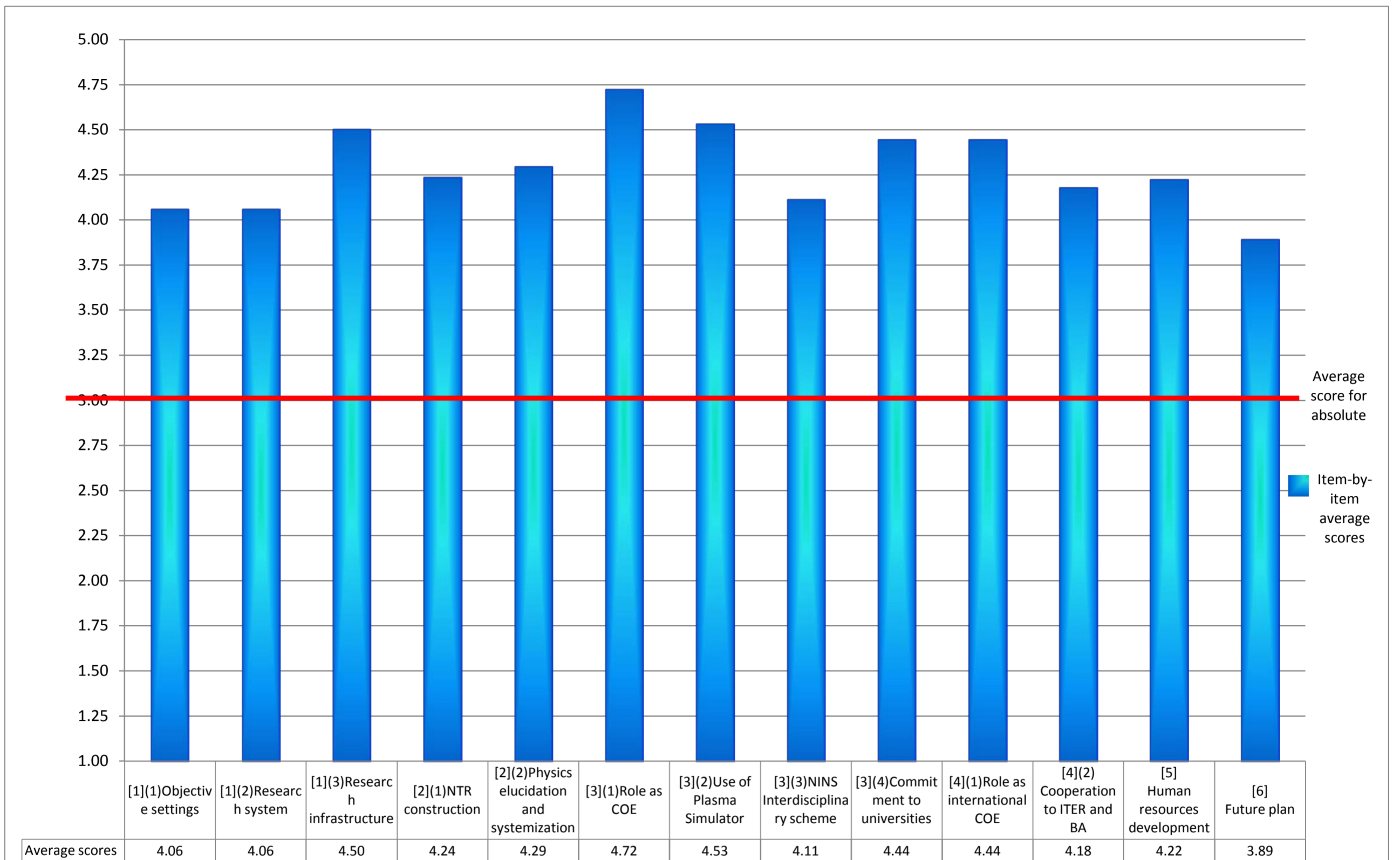
Items	Number of persons												
	1Objective settings	[1](2)Research system	[1](3)Research infrastructure	[2](1)NTR construction	2Physics elucidation and systemization	[3](1)Role as COE	[3](2)Use of Plasma Simulator	3NINS Interdisciplinary scheme	[3](4)Commitment to universities	[4](1)Role as international COE	[4](2)Cooperation to ITER and BA	[5]Human resources development	[6]Future plan
S	4	3	10	7	7	13	9	7	8	9	3	5	2
A	12	13	7	7	8	5	8	6	10	8	14	12	12
B	1	2	1	3	2	0	0	5	0	1	0	1	4
C	1	0	0	0	0	0	0	0	0	0	0	0	0
Average scores	4.06	4.06	4.50	4.24	4.29	4.72	4.53	4.11	4.44	4.44	4.18	4.22	3.89

Evaluation scoring		
S	Extremely highly commendable	5
A	Highly commendable	4
B	Commendable	3
C	Adequate	2
D	Inadequate	1

※ This table contains all the scores given by both Japanese and foreign reviewers.
Total numbers vary by item because some are left blank.

Items	Evaluation points
[1]	(Development of research system and environment)
1	Are the objectives of the Numerical Simulation Research Project (NSRP), which was introduced in 2010, appropriate?
[1](2)	Is the research system for promoting the NSRP suitable for its objectives? Does it function appropriately?
[1](3)	In the NSRP, is the environment on the "Plasma Simulator" system and its related researches appropriate?
[2]	(Research achievements) Does the NSRP produce high-level achievements in accordance with international standards for the following research areas, by promoting theory and computer simulation researches utilizing the Plasma Simulator?
[2](1)	Construction of Numerical Test Reactor for a helical fusion system (including contribution to the development of high-performance LHD plasma, to the design of a helical demo reactor, and to the sophistication of computational science)
2	Physics mechanisms of fusion plasmas and their theoretical systemization
[3]	(Promotion of collaboration regarding the NSRP)
[3](1)	Does the NSRP promote collaboration researches as the center of excellence, by integrating the high capabilities of the universities and institutes?
[3](2)	Is the Plasma Simulator effectively utilized for collaboration research?
3	Does the NSRP function as a research hub for the dissemination of academic information to other fields, by promoting the NINS (National Institutes of National Sciences) interdisciplinary cooperation research and so on?
[3](4)	Does the NSRP contribute to the development of research in the universities?
[4]	(Promotion of international cooperation and collaborations)
[4](1)	Does the NSRP play a role as an international COE through international collaboration research?
[4](2)	Does the NSRP promote cooperation with and contribution to ITER and BA activities?
[5]	(Human resources development) Does the NSRP contribute to the human resources development of the international scientific workforce required for long-term fusion studies through simulation research?
[6]	(Future plans) Is the research plan of the NSRP appropriate for the realization of the objectives ? Is it suitable and realistic for the next decade?

Item-by-item average scores





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