

Evaluation of Operating Results for
Institute of Physical and Chemical Research
Estimated at the End of the 3rd Mid to Long-Term Objective Period

August 2017

Minister of Education, Culture, Sports, Science and Technology

1. Items related to the evaluation		
Agency	Institute of Physical and Chemical Research (RIKEN)	
FY for evaluation	Estimated evaluation	the 3 rd mid to long-term objective period (including estimated performance in the final year)
	Mid to long-term objective period	FY 2013-FY2017

2. Items related to the assessor			
The Competent Minister	Minister of Education, Culture, Sports, Science and Technology		
Incorporated jurisdiction dept.	Research Promotion Bureau	Dept. and person in charge	Basic Research Promotion Division, Tetsuya Kishimoto
Evaluation and inspection dept.	Science and Technology Policy Bureau	Dept. and person in charge	Planning and Evaluation Division, Kenji Matsuoka

3. Items regarding implementation of the evaluation
<p>October 1, 2016: Became the designated National Research and Development Agency</p> <p>June 28, 2017: 8th Sub-Committee for RIKEN, National Research and Development Agency Council of MEXT (1st hearing from RIKEN)</p> <p>July 6, 2017 :9th Sub-Committee for RIKEN, National Research and Development Agency Council of MEXT (2nd hearing from RIKEN)</p> <p>July 25, 2017: 10th Sub-Committee for RIKEN, National Research and Development Agency Council of MEXT (hearing opinions)</p> <p>August 3, 2017: 10th National Research and Development Agency Council, MEXT (hearing opinions)</p>

4. Important items and others relating to the evaluation
<p>March 17, 2014 Amended 3rdmid to long-term objectives</p> <p>March 19, 2014 Changed 3rd medium-term plan</p> <p>March 3, 2015 Amended 3rd mid to long-term objectives</p> <p>March 31, 2015 Changed 3rd medium-term plan</p> <p>November 26, 2015 Amended 3rd mid to long-term objectives</p> <p>February 22, 2016 Changed 3rd medium-term plan</p> <p>March 1, 2016 Amended 3rd mid to long-term objectives</p> <p>March 31, 2016 Changed 3rd mid to long-term plan</p> <p>October 1, 2016 Became the designated National Research and Development Agency</p> <p>October 1, 2016 Amended 3rd mid to long-term objectives</p> <p>October 3, 2016 Changed 3rdmid to long-term plan</p> <p>March 23, 2017 Changed 3rdmid to long-term plan</p>

1. Overall evaluation	
Rating* (S, A, B, C, D)	A
Reasons for rating	As shown in the overall evaluation of the agency as a whole, more progress of performance than expected in the mid to long-term plan and the FY plan is recognized.

2. Evaluation of the whole agency	
<p>○In its activities of the 3rd mid to long-term objective period, RIKEN <u>created considerable research and development results that lead the world in each research field, and these are expected to be widely applied to industry,</u> including emergent physical science research, brain science research, photonics engineering research and accelerator science research, and therefore it is evaluated that the agency is proceeding with achievements toward maximizing the results.</p> <p>(Examples of considerable research and development results created during the 3rd mid to long-term objective period)</p> <ul style="list-style-type: none"> • Emergent matter science research: It is extremely highly evaluated that the agency discovered the world's first skyrmion room temperature operating substance, and developed skyrmion research toward the realization of ultra low power magnetic memory, such as generation in metastable state and development of control method and developed a highly efficient and tunable single photon source with superconducting quantum circuits ahead of the world, contributing greatly to the realization of the simulation of quantum chemical calculation. • Brain science research: It is extremely highly evaluated that memory operation, the first breakthrough achievement in the world, suggests the possibility of development of new therapeutic methods, such as for depression, Alzheimer's disease and memory disorder, and that the agency also developed a model mouse for the next generation type Alzheimer's disease as a world standard model mouse and so on. • Advanced photonics research: It is highly evaluated that the agency has contributed greatly to elucidation of an ultra-high-speed physical phenomena, such as movement of electrons which could not be observed up to now, using high power laser, the world's highest output isolated attosecond pulse that the agency developed by using an original method, and the agency also developed a new method to visualize the inside by reflection from the object using a fast neutron beam using an advanced neutron imaging method toward realization of nondestructive testing of infrastructure to mitigate any concern about aging. • Accelerator science research: It is highly evaluated that the agency achieved the mid-to-long term goal of triple beam intensity of heavy element about RI beams two years ahead of schedule and discovered 113th element from 2004 to 2012, for which it was decided to acquire the naming rights and use the element name "Nihonium," creating the rare opportunity of adding the element name and the element symbol from Japan to the periodic table of elements. Furthermore, the agency succeeded in the synthesis validation of element 116th as a preliminary experiment for synthesis of 119th element and following elements. • Synchrotron radiation science research: It can be evaluated that industrial use is carried out at a high ratio of 20% in SPring-8 and the impacted research results are available in society, including high-performance/high-quality fuel-efficient tires, actually developed with supercomputer K, and simultaneous and high power operation of multiple beam lines was achieved for the first time in the world, due to distribution of electron beam and development of independent control technology of X-ray laser. • Computational science and technology research: It can be evaluated that the operation time of "K" exceeded the targeted 8,000 hours every year, achieving an average occupancy rate of 97.9%, etc., thereby realizing extremely stable operation, contributing to the shared use of computing resources, and "K" acquired the world first place with Graph 500 and HPCG, which are indicators of practical performance, contributing to the development of computational science and technology. • Promotion of collaboration of drug discovery related research: It is highly evaluated that the agency has established the structure with enough support to reach the beginning of the world's first clinical trial in the retinal regenerative medicine technology project, and it also contributed to the world's first clinical trial in the artificial adjuvant vector cell project by building a support system. <p>○In addition, during the mid to long-term objective period, <u>Japan's Basic Science and Technology Plan was revised, and RIKEN Center for Advanced Intelligence Project was established amid increasing importance of research and development toward realizing Society 5.0,</u> whereby efforts for starting artificial intelligence research were made steadily. In the next mid to long-term objective period, further efforts for promotion of research and development activities with high national and social needs are expected in accordance with the current state and environment.</p> <p>○Regarding items related to management, such as streamlining business operations, it can be evaluated that steady efforts are underway generally as planned. Furthermore, <u>it can be evaluated that while collecting and analyzing national policies and research trends, the agency introduced a new mechanism to realize efficient allocation of research resources under the leadership of the president. The agency also formulated a science power development plan as management policy, for instance, beginning new work for creation of innovation and personnel system reform, putting emphasis on human resources development by introducing indefinite scope of employments and developing basic science and special researcher system.</u> Further enhancement and progress of these efforts are expected as a designated National Research and Development Agency criteria.</p> <p>○Note that <u>research problems related to the article on the STAP phenomenon occurred during this mid to long-term objective period, as pointed out as issues to improve in the Evaluation on Operating Performance, and that it was recognized that RIKEN carried out reform efforts to prevent the recurrence of research abnormality, while receiving the points and being evaluated by external experts, including receiving advice on resolving these issues.</u> It is important to take a serious view that trust in society has been greatly impaired due to a series of problems and it is imperative to continue implementing effective measures based on reform efforts for researching and developing activities in accordance with strict standards.</p>	

3. Issues to be solved and /or improved for each subject

○The research problems related to the article on the STAP phenomenon occurred during this mid to long-term objective period, as pointed out as issues to improve in the Evaluation on Operating Performance, and that it was recognized that RIKEN carried out reform efforts to prevent the recurrence of research abnormality, while receiving the points and being evaluated by external experts, including receiving advice on resolving these issues. It is important to take a serious view that trust in society has been greatly impaired due to a series of problems and it is imperative to continue implementing effective measures based on reform efforts for researching and developing activities in accordance with strict standards. (See page 161)

4. Other items

Main opinions of the council on research and development

- It is evaluated that, based on the Basic Science and Technology Plan revised during the ongoing mid to long-term objective period, the agency newly established RIKEN Center for Advanced Intelligence Project to realize Society 5.0 to start research on artificial intelligence, and set up an organization to collect and analyze national policy and research trends to respond to national policies and measures as well as social needs. Further enhancement and progress of these efforts are expected as a designated National Research and Development Agency.
- Given the fact that enough supply time and stability has been realized in terms of sharing the research base of accelerator facilities, synchrotron facilities and supercomputers, it can be estimated that RIKEN plays the role of providing an important research base supporting innovation through steady efforts of stakeholders concerned.
- With respect to industry-academia-government cooperation, the fact that research results are highly appreciated by companies, and the establishment of a collaboration center is realized greatly exceeding the target and income from intellectual property far exceeding expenses is obtained by utilizing intellectual property, which can be highly evaluated from the viewpoint of promoting social return of research achievements.
- It is highly evaluated that the management has been able to execute appropriate resource allocation in a tight budget under its governance.
- It can be assessed that the agency is making stepped-up efforts for human resources development by introducing indefinite employment facilities and endeavoring to develop the basic science special researcher system, which will also be an extremely important measure in the next mid to long-term objective period. Furthermore it can be evaluated that the agency is preparing a workable environment for researchers from overseas, and for female researchers and staff with family members ahead of other organizations, and it is hoped that the agency will continue to make positive efforts in that direction.
- It was regrettable that a STAP problem occurred at the Research Center for Regeneration and Development Science (currently RIKEN Center for Developmental Biology) at an early stage of the mid to long-term objective period. Currently the Center has overcome the situation, coming up with positive outcomes, but the evaluation is based on the entire period, including this such a confusion. It is necessary to consider how to respond as an institution, and to create an organizational system, based on the premise that research related abnormalities could occur.

Auditor's special comments

- It is admitted that the work is properly implemented in compliance with laws and regulations, and effective and efficient operation is being conducted in line with the mid to long-term plan and the FY plan.

- *1 S: Based on the National Research and Development Agency's aims, businesses, mid to long-term objectives and so on, as a result of comprehensive consideration based on some circumstances regarding the agency's business achievements, efforts and so on through its activities, especially the creation of considerable achievements, anticipated creation of special achievements in the future and so on toward "maximization of R&D achievements" under the conditions of appropriate, effective and efficient operations are recognized.
- A: Based on the National Research and Development Agency's aims, businesses, mid to long-term objectives and so on, as a result of comprehensive consideration based on some circumstances regarding the agency's business achievements, efforts and so on through its activities, the creation of considerable achievements, anticipated creation of achievements in the future and so on toward "maximization of R&D achievements" under the conditions of appropriate, effective and efficient operations are recognized.
- B: Based on the National Research and Development Agency's aims, business, mid to long-term objectives and so on, as a result of comprehensive consideration based on some circumstances regarding the agency's business achievement, efforts and so on through its activities, a certain degree of expectation for the creation of achievement and creation of achievement in the future toward "maximization of R&D achievements" were recognized, and steady business operations have been also recognized.
- C: Based on the National Research and Development Agency's aims, businesses, mid to long-term objectives and so on, as a result of comprehensive consideration based on some circumstances regarding the agency's business achievements, efforts and so on through its activities, the creation of achievements, further drastic efforts and improvements toward "maximization of R&D achievements" or "the appropriate, effective and efficient operations" are anticipated.
- D: Based on the National Research and Development Agency's aims, businesses, mid to long-term objectives and so on, as a result of comprehensive consideration based on some circumstances regarding the agency's business achievements, efforts and so on through its activities, special efforts and improvements including a fundamental drastic review, toward "maximization of R&D achievements" or "the appropriate, effective and efficient operations" are required.

Mid to long-term objectives (Mid to long-term plan)	FY Ratings					Mid to long-term objective period evaluation	No. of document each item	Remarks
	FY2013	FY2014	FY2015	FY2016	FY2017			
I. Items concerning the improvement of the service to the nation and the quality of the operations								
1. Promoting strategic/focused research development on a basis of national/social needs								
(1) Emergent matter science	S	S	S	S		S	I-1-(1)	
(2) Sustainable resource science	S	A	A	A		A	I-1-(2)	
(3) Brain science	S	S	S	A		S	I-1-(3)	
(4) Developmental biology	C	B	A	A		B	I-1-(4)	
(5) Life system research	A	S	S	A		A	I-1-(5)	
(6) Integration of life and medical sciences	S	A	A	A		A	I-1-(6)	
(7) Advanced photonics research	S	S	S	A		S	I-1-(7)	
(8) Information science and technology research	-	-	-	B		B	I-1-(8)	
2. The promotion of development and share-use study of the world's top level research base								
(1) Accelerator science research	A	A	S	A		S	I-2-(1)	
(2) Synchrotron radiation science research	A	A	A	A		A	I-2-(2)	
(3) Bio resource project	B	B	A	A		A	I-2-(3)	
(4) Life sciences technology platform research	A	A	A	A		A	I-2-(4)	

Mid to long-term objectives (Mid to long-term plan)	FY Ratings					Mid to long-term objective period evaluation	No. of document each item	Remarks
	FY2013	FY2014	FY2015	FY2016	FY2017			
II. Measures to be taken for achieving the objectives concerning the efficiency of the administration of the operations	A	B	B	B		B	II	
1. Efficiency of research resource allocation	A	B	A	B		A	II-1	
2. Efficiency of research resource								
(1) Promotion of information disclosure	A	B	B	B		B	II-2	
(2) Efforts for cost management	A	B	B	B		B		
(3) Improvement of the quality of staff	B	B	B	B		B		
(4) Energy-saving measures, facility utilization measures	A	B	B	B		B		
3. Regulation of salary levels	A	B	B	B		B	II-3	
4. Appropriateness of contract business	A	B	B	B		B	II-4	
5. Securing external funds	A	B	B	B		B	II-5	
6. Ensuring business safety	A	B	B	B		B	II-6	
III. Budget (Including personnel expenses)/ income and expenditure plan, and funding plan	A	B	B	B		B	III	
IV. Limit amount of short-term borrowing	-	-	-	-		-	IV	
V. If the agency has any unnecessary property or any property that is expected to be unnecessary property, a plan for disposal of such property	A	B	B	B		B	V	
VI. If the agency intends to transfer or provide as collateral any important property other than the	C	B	B	B		B	VI	

(5) Computational science and technology research	A	B	A	A		A	I-2-(5)	
3. Promotion of tip fusion research by establishing a system for exhibiting the comprehensive strength of RIKEN								
(1) Creative research proposal system	A	A	B	B		B	I-3-(1)	
(2) The creation of a system to appoint a researcher as the core	A	B	B	B		B	I-3-(2)	
4. Infrastructure construction and the promotion of industry-academia-government collaboration to create the results with the impact leading to innovation								
(1) Interdisciplinary cooperation with industry	A	B	A	A		A	I-4-(1)	
(2) Cross-promotion cooperation ①Promotion of cooperation on biomass engineering	A	A	A	A		A	I-4-(2)-①	
(2) Cross-promotion cooperation ②Promotion of cooperation on drug discovery related research	A	A	S	A		S	I-4-(2)-②	
(3) Promotion of effective intellectual property strategy leading to practical use	A	B	A	A		A	I-4-(3)	
5. Development of research environment, nurturing and producing excellent researchers and so on								
(1) Development of vibrant open research environment	B	B	B	B		B	I-5-(1)	
(2) Development of human resources with internationally superior ability (Entitled, "Development of excellent researchers, etc." until September 2016)	B	B	B	B		B	I-5-(2)	
(3) Increase understanding R&D activities and announcing easy-to-understand R&D achievements								
①Papers and the results announced at the symposium and so on	A	B	A	A		A	I-5-(3)	
②Understanding the promotion of RD activities	B	B	B	B		B	I-5-(3)	
(4) Coordination and cooperation with research institutes at home and abroad	A	B	B	B		B	I-5-(4)	
(5) Strengthening the strong support function for R&D from an administrative and	B	B	B	B		B	I-5-(5)	

property provided for in the preceding item, a plan therefor								
VII. Purpose of using accumulated profit	-	-	B	B		B	VII	
VIII. Other matters concerning the administration of the operations specified by ordinance of the competent ministry								
1. Plans for equipment and facilities	A	B	B	B		B	VIII-1	
2. Plans for personnel	B	B	B	B		B	VIII-2	
3. Debt burden over the mid to long-term objective period	-	-	-	-		-	VIII-3	
4. Use of a reserve fund	A	B	-	-		B	VIII-4	

technical perspective								
6. Promotion towards the appropriate business operations efforts								
(1) Responding to national policies, and social needs	A	B	B	B		B	I-6-(1)	
(2) Legal compliance, maintain ethics	C	B	B	B		B	I-6-(2)	
(3) Implementation and reflection of appropriate research evaluation, and so on	B	B	B	B		B	I-6-(3)	
(4) Promoting information disclosure	A	B	B	B		B	I-6-(4)	
(5) Efforts for auditor enhancement	-	B	B	B		B	I-6-(5)	

* For items that are set to “high” level of importance, a “circle” shall be marked next to each comment.

For items that are set to “high” level of difficulty, each comment shall be underlined.

* Evaluations up to FY 2013 were made based on “the basic guideline regarding business results evaluation for Incorporated Administrative Agency under MEXT’s jurisdiction” (The Evaluation Committee for Incorporated Administrative Agency under MEXT’s jurisdiction on March 22, 2002).

Also, the evaluations after FY2014 are made based on “criteria relating to the evaluation for Incorporative Administrative Agency under MEXT’s jurisdiction” (decided by the Minister of MEXT in June 30, 2015). The details are as follows

Ratings up to FY2013	Ratings after FY2014
<p>S: Outstanding achievements are fulfilled. (Without providing a cross-cutting objective standard for the agency in advance, S is rated according to the characteristics of the agency's business operations.)</p> <p>A: Achievements are in line with the medium-term plan, or beyond, or are steadily being implemented toward a medium-term objective, or beyond (achievement rate for a medium-term plan should be over 100% in a given FY.).</p> <p>B: In some ways the plan is not being implemented in line with medium-term plan, however, a medium-term objective may be achieved by means of ideas and efforts (achievement rate for the medium-term plan should be 70% to 100%).</p> <p>C: The implementation of the plan is behind the medium-term objective, therefore, improvement of business is necessary in order to realize the achievement of the medium-term objective (achievement rate for the medium-term plan in a given FY is less than 70%).</p> <p>F: The Evaluation Committee needs to warn an agency concerning the improvement of its business management and others (Without providing an objective standard in advance, F is rated as a result of judgement that a warning concerning business improvement is necessary.)</p>	<p>【Administrative and projects related to research and development (I)】</p> <p>S: Based on the National Research and Development Agency’s aims, businesses, mid to long-term objectives and so on, and as a result of comprehensive consideration based on some circumstances regarding the agency’s business achievements, efforts and so on through its activities, especially the creation of considerable achievements, anticipated creation of special achievements in the future and so on toward “maximization of R&D achievements” under the conditions of appropriate, effective, and efficient operations are recognized.</p> <p>A: Based on the National Research and Development Agency’s aims, businesses, mid to long-term objectives and so on, and as a result of comprehensive consideration based on some circumstances regarding the agency’s business achievements, efforts and so on through its activities, the creation of considerable achievements, anticipated creation of achievements in the future and so on toward “maximization of R&D achievements” under the conditions of appropriate, effective, and efficient operations are recognized.</p> <p>B: Based on the National Research and Development Agency’s aims, businesses, mid to long-term objectives and so on, and as a result of comprehensive consideration based on some circumstances regarding the agency’s business achievement, efforts and so on through its activities, a certain degree of expectation for the creation of achievement and creation of achievement in the future toward “maximization of R&D achievements” were recognized, and steady business operations have been also recognized.</p> <p>C: Based on the National Research and Development Agency’s aims, businesses, mid to long-term objectives and so on, and as a result of comprehensive consideration based on some circumstances regarding the agency’s business achievements, efforts and so on through its activities, the creation of achievements, further drastic efforts and improvements toward “maximization of R&D achievements” or the “appropriate, effective, and efficient operations” are anticipated.</p> <p>D: Based on the National Research and Development Agency's aims, businesses, mid to long-term objectives and so on, and as a result of comprehensive consideration based on some circumstances regarding the agency's business achievements, efforts through its activities, special efforts and improvements including a fundamental drastic review, toward “maximization of R&D achievements” or the “appropriate, effective, and efficient operations” are required.</p> <p>【Other than administrative work and projects regarding research and development (After II)】</p> <p>S: Through the activities of a corporation, remarkable performance exceeding the intended objectives is recognized</p>

	<p>quantitatively and qualitatively in the medium-term plan (in terms of quantitative indicators, 120% or more vis-à-vis planned medium-term value (or planned FY value), and remarkable performance is also recognized qualitatively)</p> <p>A: Through the activities of a corporation, remarkable performance exceeding the intended objectives is recognized in the medium-term plan (in terms of quantitative indicators, 120% or more vis-à-vis planned medium-term value (or planned FY value)).</p> <p>B: Performance exceeding the intended objectives is recognized in the medium-term plan (in terms of quantitative indicators, 100% or more but less than 120% vis-à-vis planned medium-term value (or planned FY value)).</p> <p>C: Performance falls below the intended objectives in the medium-term plan, requiring improved performance (in terms of quantitative indicators, 80% or more but less than 100% vis-à-vis planned medium-term value (or planned FY value)).</p> <p>D: Performance falls below the intended objectives in the medium-term plan, requiring drastic improvement of business including its abolition (in terms of quantitative indicators, less than 80% vis-à-vis planned medium-term values (or planned FY value), or it is recognized that the competent Minister is required to ask for improving business operations or taking other necessary measures).</p>
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