

“Field for Knowledge Integration and Innovation”

Organization and Evolution

Since Fiscal Year 2016

- Generating a new system for industry-academia collaborative research in the Agriculture, Forestry, Fisheries and Food sectors -

April 2016

The Planning Committee for Developing
“Field for Knowledge Integration and Innovation”

The Agriculture, Forestry and Fisheries Research Council Secretariat

Ministry of Agriculture, Forestry and Fisheries of JAPAN
(MAFF)

Japanese advanced technology has long been assuring food safety, security and *'oishisa'* (integration of palatability, taste and artistic delicacy) in forestry and fisheries fields contributing to realize affluent society.

Today, there is emerging demands of a new system generation for innovative research results leading to prompt new commercial product launch and business realization through a new collaboration between the field of agriculture, forestry, fisheries and food and the other field.

The Planning Committee for developing "Field for Knowledge Integration and Innovation" (FKII), chaired by Ken-Ichiro SENOH, President of the Industry-Academic Collaboration Initiative, NPO, was launched by inviting experts from variety of industry segments. The committee initiated discussion on a basic concept of FKII in May 2015 and made an interim report in September 2015. At the symposium and exhibition named "Agribusiness Creation Fair", the project progress has been publicized.

In December 2015, the preliminary "Council of Industry-Academia-Government Collaboration" (Council) for FKII was launched to identify its effective functionality and to prepare the full scale operation from FY2016. Meanwhile, the seminars, workshops and poster sessions have been conducted to introduce and demonstrate some of the innovative seeds organized by the preliminary Council.

This brochure introduces the outline of FKII showing the expectations from its full scale operation.

1 . The current status of the Industry-Academia collaborative research in the agriculture, forestry, fisheries and food sectors

- Although industry-academia collaborative programs in the agriculture, forestry, fisheries and food sector have achieved measurable progresses, the number of those that lead to product launch and commercialization has not been sufficient. Industry-academia collaborative research activities crossing over the different fields have a potential for further stimulation in the agriculture, forestry, fisheries and food sector.
- Some countries have gained industrial competitiveness by establishing the innovative production system through collaborative research and development (R&D) between the agriculture, forestry, fisheries, food sectors and the other sectors. Especially in the Netherlands, its export value in the agro-food industry is the second largest in the world, although its national land area is equivalent to the Kyushu Region in Japan.

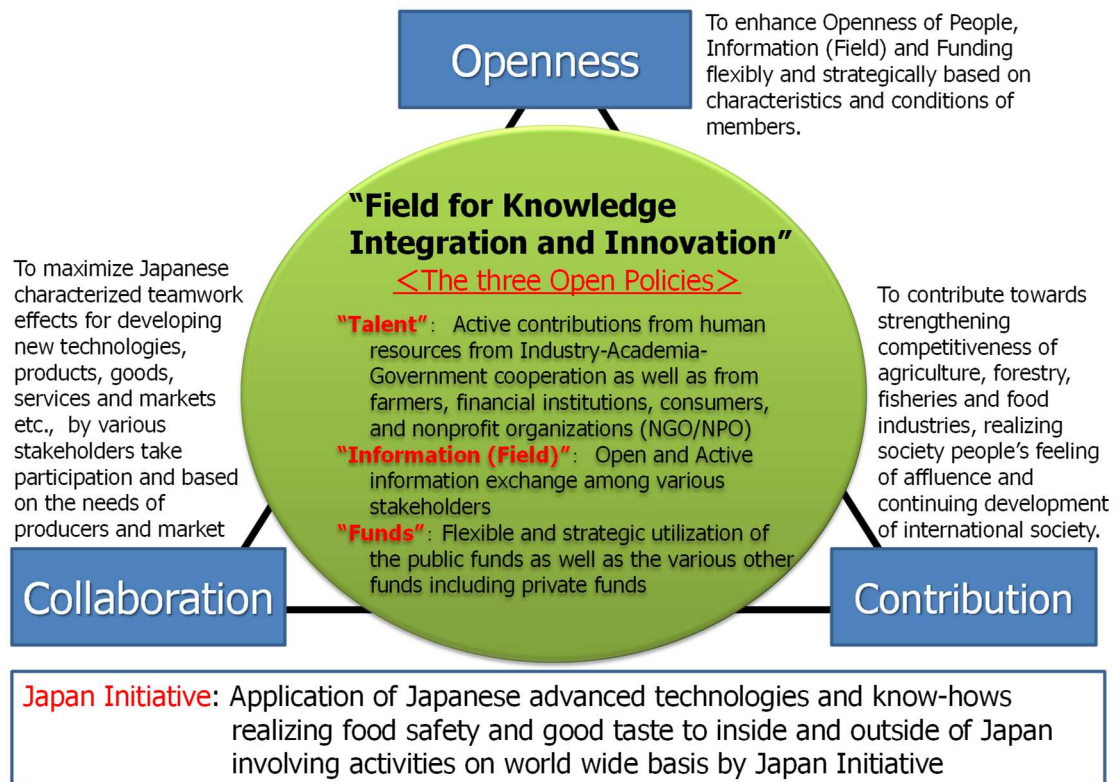
- In order to promote the growth in the agriculture, forestry, fisheries and food sectors as the contribution for realizing affluent society, there is a demand for new industry-academia collaborative research system in the agriculture, forestry, fisheries and food sectors to create innovative results by integrating knowledge, ideas and technologies crossing over the different fields. This new system is expected to lead those new innovative results to commercialization and industrialization.

2. Concept and Goal of FKII

In “Field for Knowledge Integration and Innovation” (FKII), “collaboration” should be promoted by sharing three resources such as “Talent”, “Information” and “Fund” openly among the variety of participants crossing over the agriculture, forestry, fisheries and food sectors and the other sectors. The FKII eventually aims at strengthening competitiveness of agriculture, forestry, fisheries and food industries realizing society where the people feel affluent and making “Contribution” towards for world’s affluence.

Basic concept of FKII

- To promote the open innovation in the agriculture, forestry, fisheries and food sectors, a new R&D system consisting of the three functions: “Openness”, “Collaboration” and “Contribution”, should be established by utilizing the existing R&D achievements and fully crossing over the current R&D framework. .
- For realizing such system, generation of a field such as FKII is initiated as a first step towards the creation of “Field” and “Opportunity”.

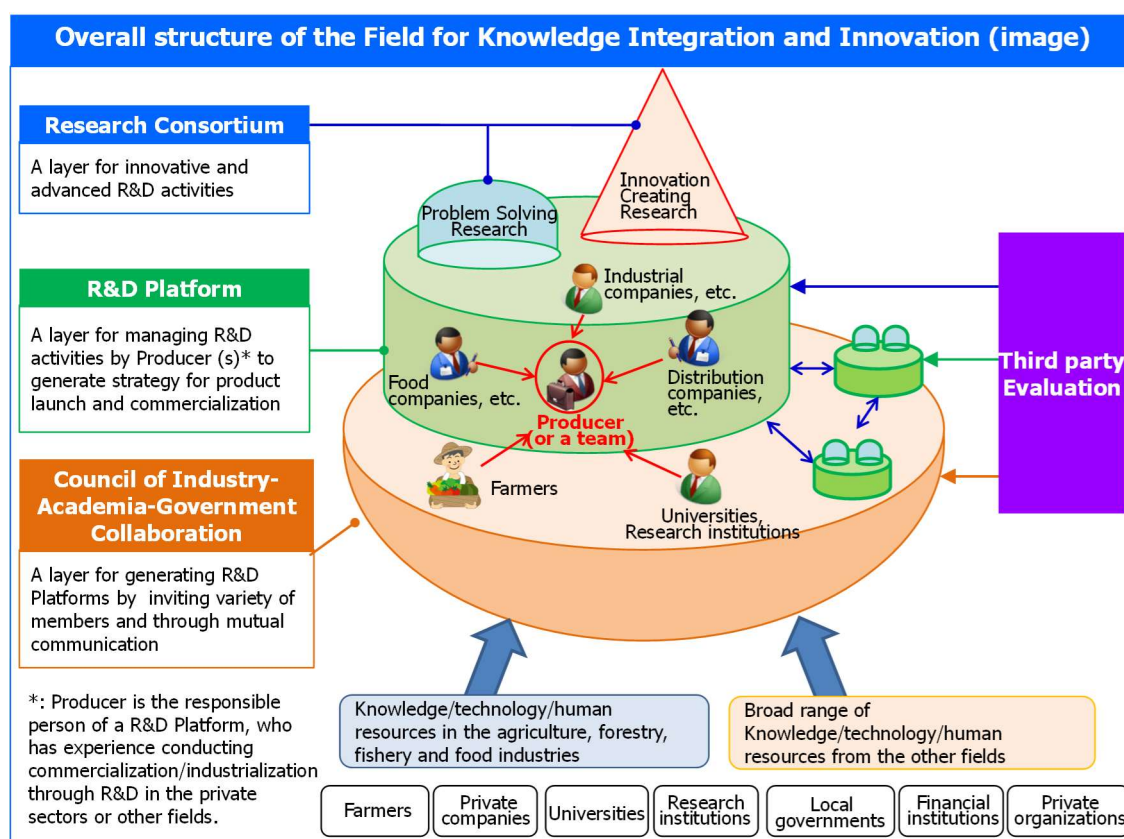


Participants of FKII and Their Roles

Farmers, private companies, universities, research institutions, financial institutions, local governments, non-governmental/non-profit organizations and consumers are potential participants. All the participants are expected to share information on their own challenges, technologies and ideas with the other participants. The fruits of the Field are expected to be returned to the each of activities and businesses of participants.

3. Identification of the basic functions of the Three-Layered-Structure in FKII

The interim report recommends a Three-Layered-Structure in FKII consisting of “Council of Industry-Academia-Government Collaboration” (Council), “R&D Platform” (Platform) and “Research Consortium” (Consortium).

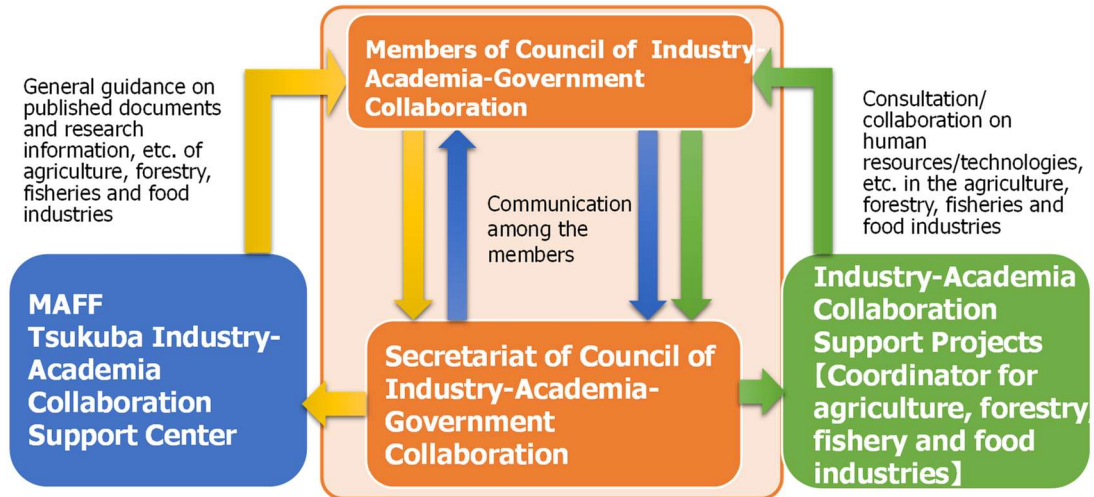


[Council of Industry-Academia-Government Collaboration]

- The Council is an organization participated by a wide range of organizations and individuals from the agriculture, forestry, fisheries, food sectors and other sectors. It promotes the formation of new R&D groups, Platforms to drive innovations in the agriculture, forestry, fisheries and food sectors, through interactions among the participants and exchanges of a variety of information on the production through to the consumption.

Scheme for supporting the Council members

- "Field for Knowledge Integration and Innovation" needs to establish proper supporting system for assumed various demands and inquiries from various members and handling system for research information would.
- To correspond to those demands and inquiries from the members, it is essential to prepare expertise of both on "agriculture, forestry, fisheries and food sectors" and "other sectors" as well as a broad network. Presently, it is hard to find organizations or personnel that satisfy all the prerequisites. For the starting up the Field, it is essential to organize the cooperative efforts of related organizations for the member supports.



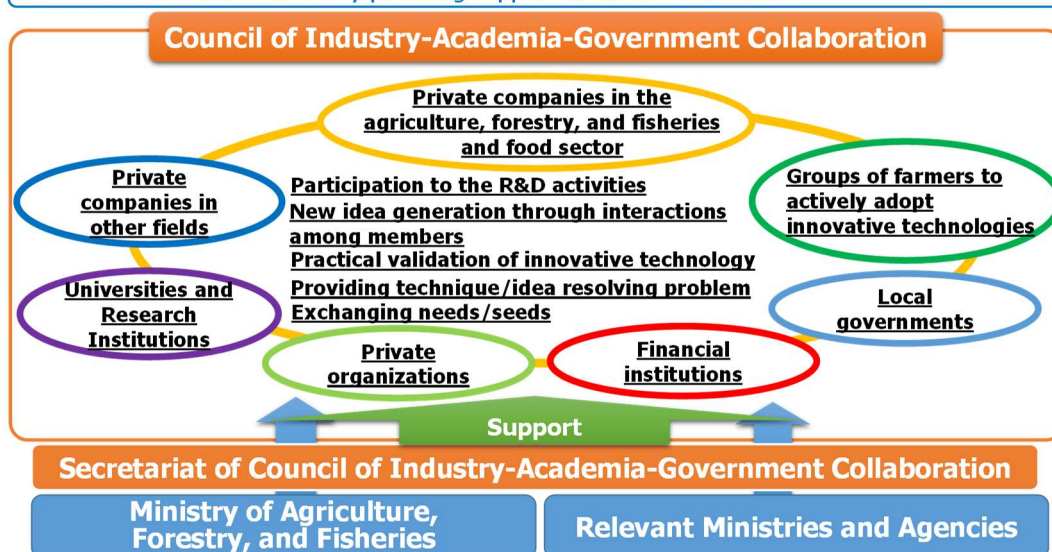
- Related organizations will organize cooperation system among the staffs in charge, to enable proper handling of inquiries from the members, etc. Holding regular meetings to share information and achieve close coordination are also in consideration.

<p><Role-Expertise></p> <ul style="list-style-type: none"> ○ Providing documents/research information, etc. ○ Providing published information on agriculture, forestry, fishery and food industries ○ Providing research results of projects on agriculture, forestry, fisheries and food sector conducted by MAFF 	<p><Role- Expertise ></p> <ul style="list-style-type: none"> ○ Grasping demands/needs of Council members and handling wide range of inquiries /consultation from the other fields ○ Respond to inquiries from members and non-members in detail and accumulate information on the members' interest or responding results functioning as the linchpin of related organization 	<p><Role- Expertise ></p> <ul style="list-style-type: none"> ○ Coordinating the efforts mainly in the agriculture, forestry, fisheries and food sectors ○ Accumulation of expert knowledge/knowhow related to the technologies in the agriculture, forestry, fisheries and food sectors, in connection with the activities in the production fields
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- Since the foundation of the preliminary Council in December 2015, the number of the participants reached nearly 700 by March 2016 and being expected to increase further in the number (1445 in December 2016). To maintain the standard of the benefits for the participants and to attract new participants, the Council services will be improved continuously. The Council endeavors to make FKII active and attractive by supporting the participants' collaborative activities and by inviting potential participants from different sectors and businesses.
- The Council monitors ongoing activities of the participants, Platforms and Consortiums and conducts effective public relations for the activation of FKII.
- The Council continues to hold events such as seminars and workshops throughout the country to integrate and utilize "knowledge". The participants of Council are expected to take part on the understanding of the following concepts;
The Council is designed to promote activities of
 - 1) Convenience Store Type: where the members exchange clear views on problems they face and solutions/ideas
 - 2) Cosmetics Counter Type: where a member with a problem consults with the other members for solution/ideas
 - 3) Counselling Type: where the members interact to build a business model and plan a R&D project although problems and/or potential solutions are not identified yet.

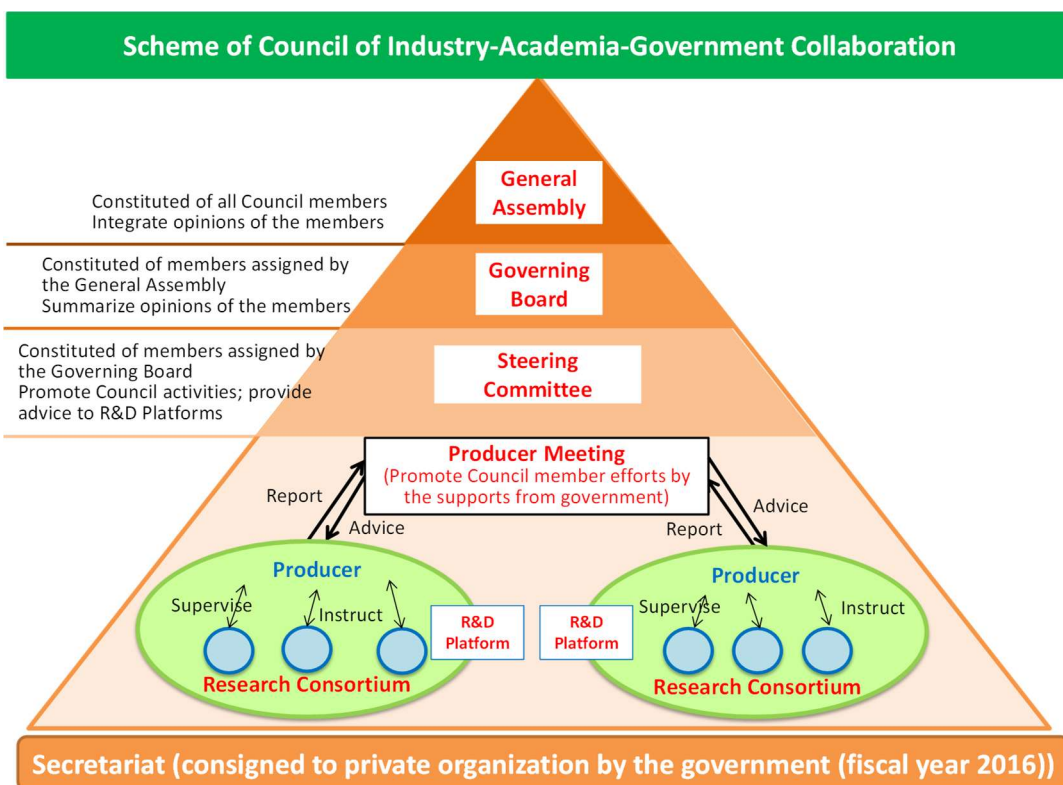
Member activities in Council of Industry-Academia-Government Collaboration

- The Council of Industry-Academia-Government Collaboration will make efforts to generate R&D Platforms through active communication among affiliations from the agriculture, forestry, fisheries and food sectors and various fields such as private companies/organizations, farmers, universities, research institutions, financial institutions, and local governments, etc.
- It is important to promote whole active interactions among members according to each member's attributes and characteristics by providing supports from the Secretariat.



- The Council holds General Assembly to collect and summarize the opinions from the members and organize Governing Board consisting of directors elected at the general assembly. Governing Board organizes Steering Committee consisting of the members appointed by Governing Board to practically support activities of Council.
- Steering Committee holds Producer* Meeting by inviting producers from Platforms to monitor the activities in each Platform and provide appropriate suggestions, then establishes appropriate governance of Council.

* The role of "Producer" is described in Section 4.



[R&D Platform]

- Council members who share the awareness on similar problems and challenges in a specified R&D fields forms a Platform. They develop a new R&D strategy over the limit of existing R&D activities.
- In R&D Platform, a Producer (Producers) leads the formation of Consortium under cooperation agreement, a R&D strategy and an intellectual property strategy. He or she (they) takes a major role for effective and efficient R&D activities leading to the product launch and commercialization in Consortium.

Platform members are supposed to find a qualified Producer in accordance with the

description in Section 4. To get started, Council supports the members through providing opportunities to be introduced and interact with nominated producer candidates.

- In the case of application development by taking advantages of basic research through value chain to commercialization, it is recommended to collaborate with public research institutions such as National Research and Development Agency which have experiences in basic research and are able to cooperate with other parties in a neutral standing point.
- In preparation for setting up a new Platform, it is required to submit research target, plan, members and a Producer (or Producers) in charge of the Platform management to Council.

[Research Consortium]

- In a Research Consortium, group members bring their expertise and ideas for conducting an innovative R&D based on the R&D strategy of Platform.
- The Consortium carries out an R&D project strategically and widely utilizing appropriate private and/or public R&D funds according to contents and stages of the project. With regard to R&D funding arrangement, Council provides related information such as available funding programs. The FKII is where supportive actions are provided to the members who take subjective actions by investing their own resources in the first place for conducting innovative research.
- It should be noted that the Research Consortium is responsible for securing total fund on its own by getting the funding provider's approval.



Poster sessions



Workshops

4. Roles and skills required for Producer (or Producers) of FKII

Each R&D platform is supposed to assign a Producer (or Producers) as the responsible person for the various activities in Platform starting from establishment of research strategy up to product launch and commercialization. Roles and skills required for the Producer(s) are summarized as follows.

For the projects starting from the fiscal year 2016, Council supports the assignment of Producer(s) capable of executing the following role by their talents. In parallel, Council also supports person(s) who will be able to contribute to FKII if they do not satisfy the requirements by considering anticipated difficulties to secure the experienced person(s).

Role: A Producer(s) is responsible for scouting innovative technologies and ideas, matching of potential participant, coordination of interests and rights including intellectual property, development of IP and R&D strategies in accordance with the business model, fund-raising for the R&D Consortium and prompt release of the results.

Skills: - Human network and track record of commercialization

Taking initiatives for a new product launch and commercialization by utilizing a wide range of human network both inside and outside of Japan with researchers in private companies, academics and research institutions through industry-academia collaboration.

- Understanding and motivation for the agriculture, forestry, fisheries and food industries

Demonstrating the high level of interest in the current situation and issues of the agriculture, forestry, fisheries and food sectors, and motivation for solving the issues and overcoming the challenges as well as possessing ability of project management with appropriate identification of insufficient elements for the progress such as technologies, funds and ideas.

- Knowledge of the market, technology, and intellectual property and business model development capability

Knowledge of designing desirable industry structure from both of the short-term and long-term view points, business model development and R&D project implementation that leads to a new value chain generation through proper valuation and analysis of the markets, technologies and intellectual properties based on abounding experiences.

- **Valuation of R&D activities and management capability**
 Capability to coordinate Platform and Consortium properly by monitoring progresses for product launch and commercialization and risk assessment. Capacity to create competent technologies continuously rather than ending up with sole result for sole theme.
- **Fairness, Neutrality and Regionally well-balanced Business development maintaining**
 Capability to cooperate fairly and neutrally with the members of Platform and Consortium with understanding complexity of the society regardless of the past habits and practices under the policy to prioritize new business model creation through an R&D.
 Capability to coordinate collaboration with participants from different sectors by providing opportunities for interaction and establishing mutual understanding.
 Capability to widely collaborate widely with the persons/parties concerned identifying nationwide and global business model without restricting into a specific region.

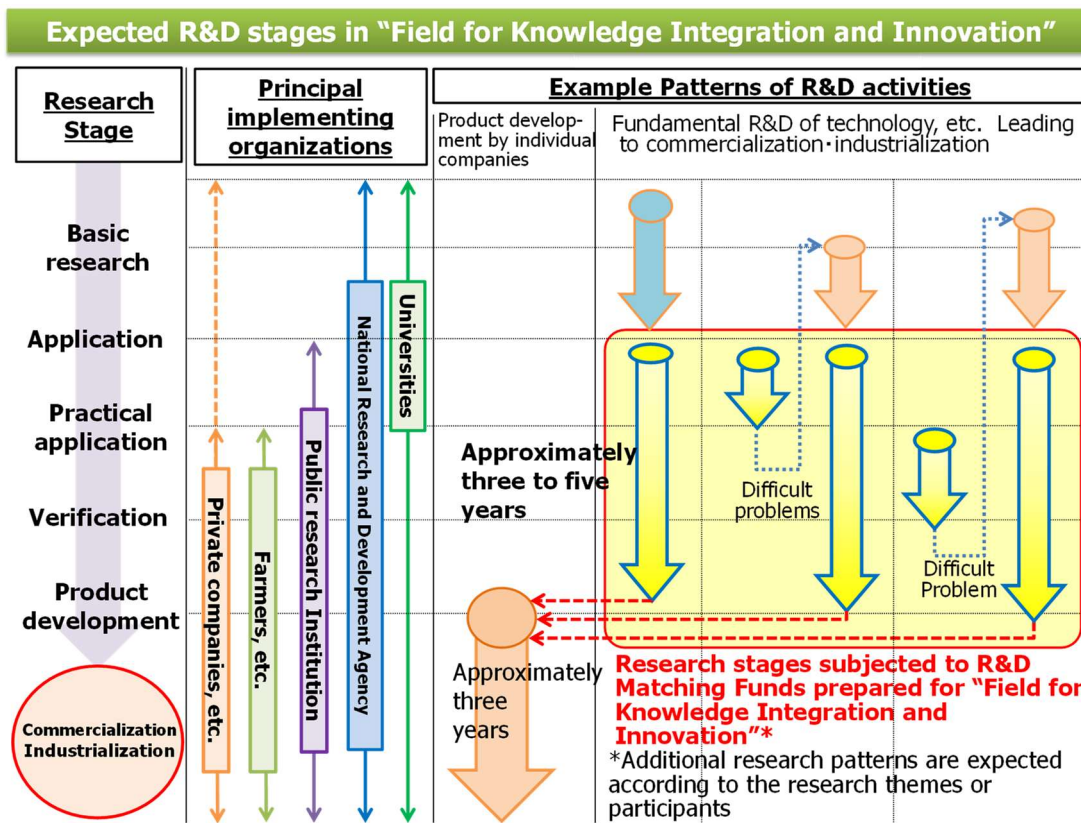
5. R&D levels and stages to be promoted in FKII

Main R&D stages in FKII

Learning from the patterns of the R&D practices, it is generally assumed that approximately 10 years or more are needed for a commercialization starting from basic research level and 5 years or more starting from practically applied technology seeds. Due to the constraints of funding and facilities, universities and public research institutions have played a main role to initiate basic research of the mid to long term project through to the application and the commercialization.

On the other hand, research activities conducting throughout basic, application and commercialization stages are limited in private companies. Those private companies have mainly focused on the stages close to commercialization of their products/services. The concept of FKII is to be a framework to realize continuous and speedy commercialization by getting variety of participants including private companies. It is appropriate for the FKII to take its position for intermediately connecting the technologies emerged from basic to applied R&D stages by universities and public research institutions and the commercialization stage by private companies. To start with, the projects supported by matching fund by MAFF are applied to those projects that the commercialization is expected within approximately 3-5

years from the view point of delivering commercialization results continuously while looking on medium/long-term business development generation.



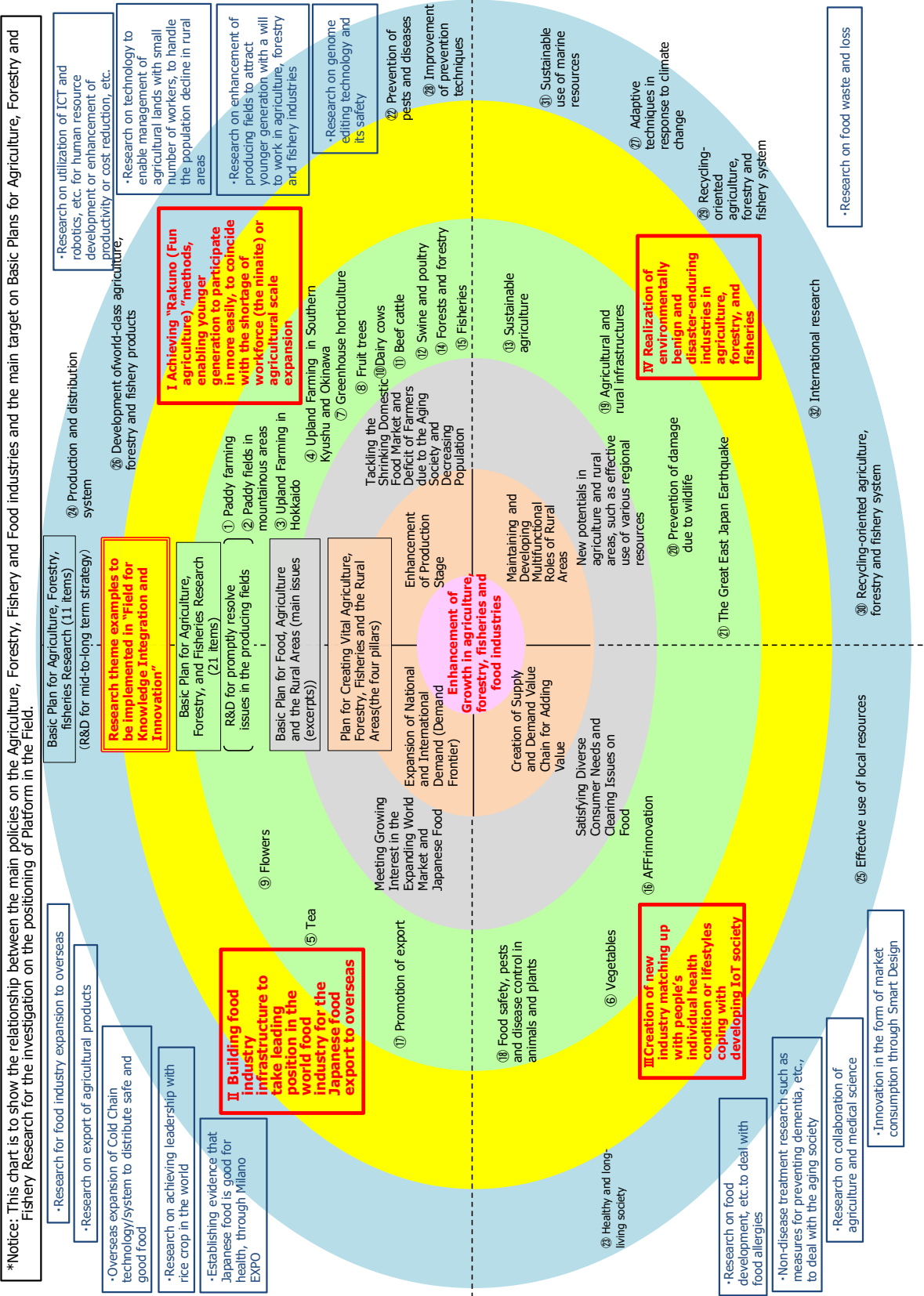
Investigation on the research fields to be promoted in FKII

In the interim report, all the theme described in the following two plans are reviewed and sorted out to identify the R&D theme for short, medium and long-term set up to be conducted in FKII as shown in diagram below.

Four policies described in the "Plan for Creating Vital Agriculture, Forestry, Fisheries and the Rural Areas" are "Enhancement of Production Stage", "Expansion of National and International Demand (Demand Frontier)", "Creation of Supply and Demand Value Chain for Adding Value" and "Maintaining and Developing Multifunctional Roles of Rural Areas".

Four policies described in "Basic Plan for Food, Agriculture and Rural Areas" are "Tackling the Shrinking Domestic Food Market and Deficit of Farmers due to the Aging Society and Decreasing Population", "Meeting Growing Interest in the Expanding World Market and Japanese Food", "Satisfying Diverse Consumer Needs and Clearing Issues on Food", "Maintenance and Exertion of the Multi-function of the Rural Areas".

Main policies on the Agriculture, Forestry, Fisheries and Food industries, and Main target of Basic Plans for Agriculture, Forestry and Fisheries Research



Planning Committee adopted the comments that R&D theme described as “World Food Industry Expansion and Growing Interests on Japanese Food” and “Variation of Consumer Needs and Requirement for Food” in the left side field of the diagram are not relatively active and need to be reinforced by introducing technologies and ideas from private companies and a variety of fields.

Accordingly, Planning Committee adopted the following six categories as the facing research fields and conducted the trial seminars/workshops.

Global development of Japanese food and food industry

Creating health promoting industry to realize a healthy, longevity society

Information-based industrialization of agriculture, forestry, fisheries and innovation in production system

Creating a new bio-based material industry

Creating next generation of fisheries and breeding industry

Realizing Japanese initiative in world seed industry

Since many members participated to the each trial seminars and workshops on the above mentioned 6 R&D categories, it is expected that new collaborative efforts between the agriculture, forestry, fisheries and food sectors and the other sectors will be generated and will lead to creation of new business potentiality in each categories. At the same time, FKII also supports the other R&D categories other than those six R&D categories so as to promote innovative R&Ds beyond the existing ideas in the agriculture, forestry, fisheries and food sectors.

6. Information Handling of Intellectual Properties

The activities of FKII should be carried out based on the sufficient understanding on IPs including acquisition of rights, confidential information, non-filing IP (R&D data etc.) by the members within Three-Layered-Structure so that new business models will be created effectively. The participants of Council, Platform and Consortium should, in principle, decide how to handle IPs and mutually understand the agreement prior to each meeting and project launch. The followings are expected general rules.

Council of Industry-Academia-Government Collaboration

Each member should investigate and discuss based on the non-confidential information disclosure

R&D Platform

Each member should investigate and discuss based on the non-confidential information disclosure and should conclude memorandum of interests or agreement for confidential information disclosure including IP related information accordingly.

Research Consortium

Information should be appropriately controlled by concluding non-disclosure agreement or equivalent contract. Prior to the project launch for research, the required policy to control mutual IP rights should be clearly defined.

It should be noted that, in principle, IP rights belongs to Consortium in accordance with the Bayh-Dole Act of Japan in case the R&D Consortium is funded by MAFF as the R&D Model Project of FKII (so called Matching Fund Project). Consortium has to report to MAFF regarding the policy for handling IPs discussed by the members for the first year of the R&D project. Consortium funded by MAFF also should conduct research promotion meeting and should manage the IPs with the assistance of experts (experienced personnel managing IP in private company, university TLOs and IP department or technology transfer of the member organization of participated organization).

In case Consortium is not funded by the national government and conducts R&D activities with its own responsibility and fund, above mentioned policy is not applied and Council will not disturb these activities.

The activities in FKII need to be conducted in accordance with "Guide for Agriculture IT Service Standard Protocol for Utilization" developed by the Cabinet Secretariat and "Guideline for Application of Agriculture ICT Intellectual Property" by the Food Industry Affairs Bureau of MAFF so that the information on agriculture will be handled properly.

7 . Applying the R&D achievements to the agriculture, forestry, fishery and food industries

In FKII, farmers and producers are encouraged to participate from the R&D stage for hitting the target that the effective and efficient R&Ds will be conducted leading to the effective and

efficient technology development resolving the problems in production and business innovation, in addition to the collaboration between the agriculture, forestry, fisheries and food sector and other sectors.

Consequently, it is important to realize following effects for the increase in income of agricultural producers; dramatically bringing forward the period from R&D to a new technology popularization as well as making contribution for business innovation and value addition of the products and foods by applying a new technology matching up with the practical problems in the production sites.

Therefore, the prompt dissemination and the awareness rising of the R&D achievements should be promoted in member community and through the local governments and national farmers associations widely.

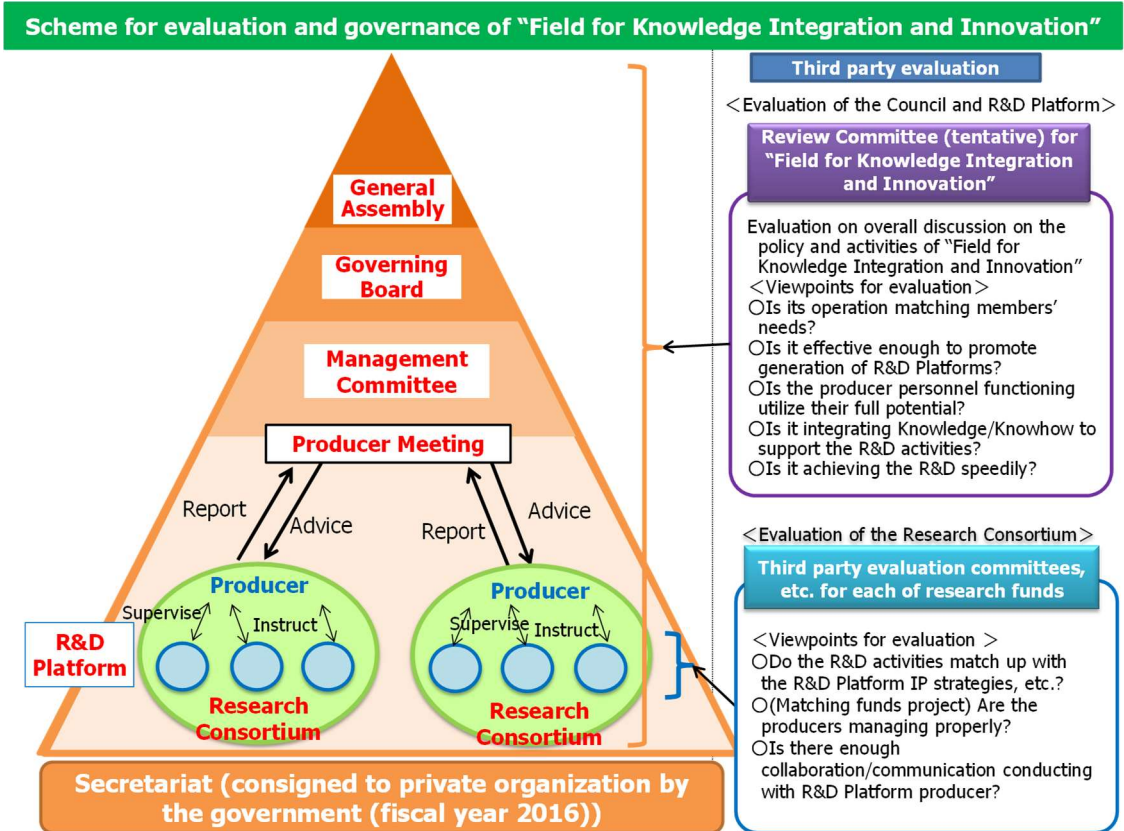
Additionally, a new business start-up generation by Platform member companies and agricultural producers and the other impacts are expected for leading R&D achievements to the commercialization by utilizing a new value chain established in R&D Platform.

8. Evolution of the programs in FKII

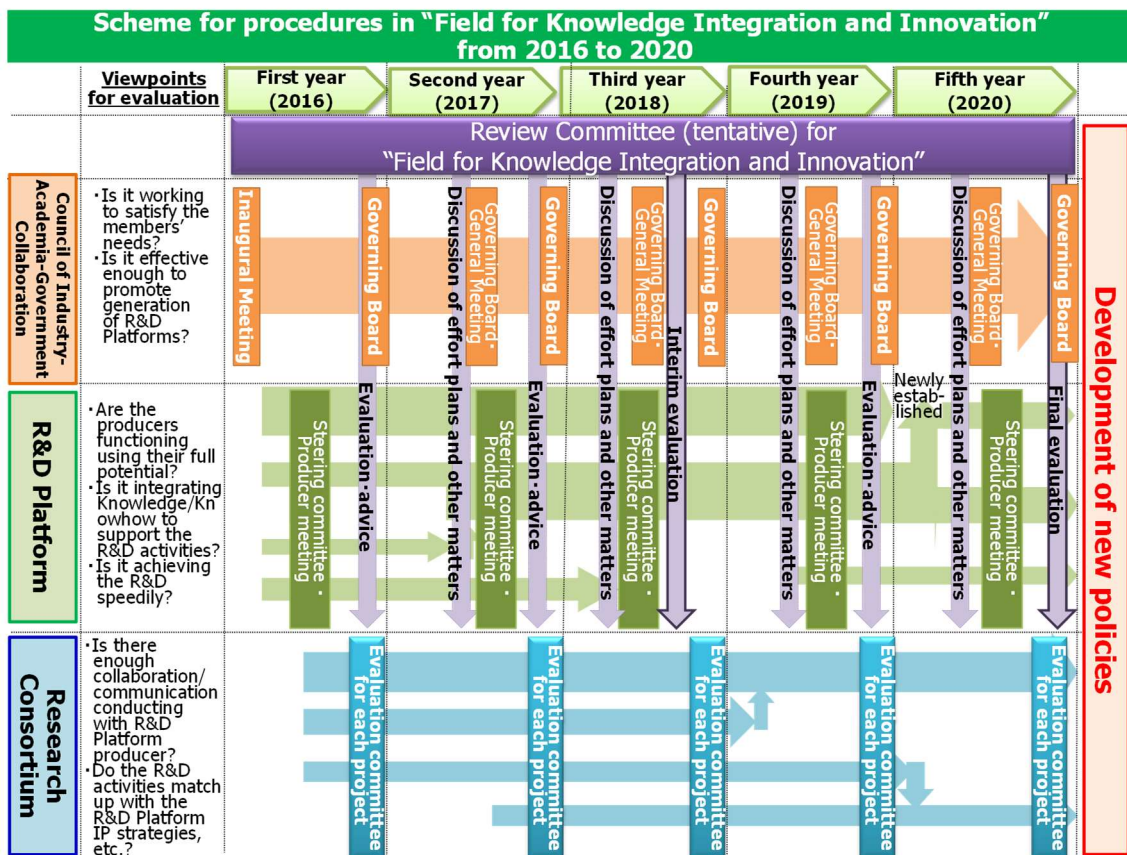
Promotion methods for the coming five years

FKII promotes R&D activities for prompt product launch and commercialization based on the strategic cooperation and the research results information sharing in the Three-Layered-Structure of Council, Platforms and Consortiums. It is expected to realize the speedy development progresses and to clarify the method to resolve the problems based on the knowledge in agriculture, forestry, fisheries and food sectors.

It is important for the total operation of Council to assure that those three layers are coordinated organically. For an effective and efficient promotion of Council activities, a system to understand the overall activities based on the respect to the autonomy of the members is essential. For this reason, the following system for management and evaluation of each layers of FKII is assumed to be applied.



The Review Committee for FKII (tentative), comprised of a third party members appointed by the government, reviews Council and action policies and activities of Platforms by considering the commencement time of Platforms and Consortiums as well as the continuity of the funded projects. For five-year project, the third and fifth year will be designated as year of the "interim evaluation" and "final evaluation", respectively. Those evaluations intend to clarify the achievements and meanings of the themes in reference to the initial target and to reflect those findings to develop a new policy from the viewpoints of the Three-Layered-Structure system organization, activities of the producer and degree of innovative R&D efforts for defying conventional wisdom.



9. Need for evolving FKII with a mid-to-long term perspective

Countries such as the Netherlands and Belgium, where competitiveness in the agriculture, forestry, fisheries and food industries have been strengthened, have achieved tremendous results by integrating "Knowledge" of various private sectors, universities, and research institutes, through mid-term and long-term efforts ranging from five to ten years to fifteen years. To catch up with these efforts in foreign countries, and to achieve better results to strengthen competitiveness in the agriculture, forestry, fisheries and food industries under the progressing globalization, it is essential not only to promote speedy R&Ds but to develop FKII and to train Producers and researchers who can actively contribute to FKII from the view point of mid-to-long term perspective of five, ten or fifteen years.

Based on this understanding, the term of first five years starting from 2016 is positioned as the first phase of FKII. It is also essential, for further evolution of FKII, to promote the policy of FKII by continuously evaluating and improving the operation based on the mid-to-long term perspective. Both the government promoting the policy of FKII and the members of

Council participating FKII need to share the above mentioned vision and make all possible efforts together continuously for evolving FKII successfully.

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