



Collaborative Development Project for Precision and Digital Agriculture to Strengthen the Innovation Ecosystem and the Sustainability of Brazilian Agrifood Chains

April, 2024

+ General Coordination of Technical Cooperation and Partnerships with
Developed Countries – CGTP cgeb@abc.gov.br – Phone: 061 2030 6885

Legal base:

Basic Technical Cooperation Agreement between the Government of the Federative Republic of Brazil and the Government of Japan / Signed on September 22, 1970 and Promulgated by Decree No. 69.008, of August 4, 1971.

SECTION 1:

PROJECT IDENTIFICATION

1.1 Project title

Collaborative Development Project for Precision and Digital Agriculture to Strengthen the Innovation Ecosystem and the Sustainability of Brazilian Agrifood Chains

1.2 Expected duration

36 months

1.3 External source

Japan

1.4 Foreign cooperation agency

Japan International Cooperation Agency (JICA)

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1.5 Brazil's proposing executing institution

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1.6 Governmental entity coordinating Brazil-External Source bilateral cooperation

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1.7 Summarized estimated budget (Cost is estimated and adjustments will be made as the project progresses)

Total Estimated budget: US\$10,611,371.03
Financial contribution from the external source (US\$): 5,023,450.26.
Brazilian non-financial counterpart (US\$): 4,328,701.49
Fundraising: US\$1,259,219.28

Such compensation does not imply extraordinary use of budgetary resources, only being limited to the compilation of resources already foreseen to be executed in the institutions within the scope of the implementation of their current policies.

1.8 Place, date and signature of holders

The signature of this document represents the agreement of the executing and co-executing institutions in Brazil with their designation, by the Government of the Federative Republic of Brazil, for the execution of the cooperation project negotiated between the partner governments. The document contains and organizes mechanisms and arrangements to carry out what is foreseen in the Supplementary Agreement between Brazil and Japan and should serve as a basis for strategic decisions regarding technical, managerial and coordination aspects of the project, jointly with the institution implementer designated by the government of the external source partner.

Collaborative Development Project for Precision and Digital Agriculture to Strengthen the Innovation Ecosystem and Sustainability of Brazilian *Agro*

Ministry of Agriculture
and Livestock
Secretariat of
Innovation, Sustainable
Development, Irrigation
and Cooperativism -
SDI/MAPA

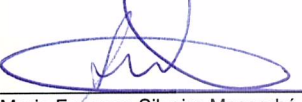


Renata Bueno Miranda
Secretary

Brasília, 26/04/24

Place and date

Brazilian Agricultural
Research Corporation-
Embrapa

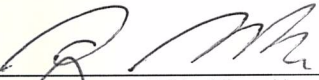


Silvia Maria Fonseca Silveira Massruhá
President

Brasília, 22/05/24

Place and date

Japan International
Cooperation Agency-
JICA



Akihiro Miyazaki
Chief Representative
JICA Brazil Office

Brasília, 02/05/2024

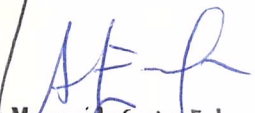
Place and date

Brazilian Cooperation
Agency-
ABC Ministry of
Foreign
Affairs



Ambassador Ruy Pereira
Director

Place and date



Ana Margarida Castro Euler
Diretora - Executiva
Embrapa

BSB - DF, 06/05/24

SECTION 2: JUSTIFICATION

The justification is initially presented in item 2.1 with the diagnosis of the current situation of the sector, followed by the problems focused on by the project and its relevance in item 2.2.

2.1 Situation diagnosis

In three decades, Brazil was able to create a sustainable and competitive model of tropical agriculture unparalleled in the world. Brazilian agriculture today is very different from that of the 1970s. Today's Brazil has a science-driven agriculture. This transition from an importing country to one of the largest agricultural producers in the world took place through research led, in large part, by Embrapa, created in 1973. It managed to promote the adaptation and tropicalization of crops, but it is essential to remember that it also had crucial support, which was International Cooperation, in which Japanese Cooperation made a relevant contribution in this process.

After 5 decades, the world faces new challenges that go beyond the issue of food production, but also involve issues related to sustainability, food safety, health and traceability with the integration of the different links in the production chains, bringing qualified information for greater transparency in relationships of exchanges.

As widely reported in the media, FAO projections indicate a significant increase in world demand for food until 2050 due to population growth, especially in poor countries.

The biggest challenge for Brazilian agriculture, therefore, seems to be not just producing more food, but the challenge of producing it in a sustainable way and attentive to issues of climate change, water use and the balance of carbon stock. This raises the exceptional level of effort and coordination power that will be required to overcome this challenge. In this sense, it becomes strategic that the sectors involved are encouraged to act actively and in line with global priorities,

with the SDGs (Sustainable Development Goal)¹ and with concepts of ESG (Environmental, Social and Corporate Governance)² in full development whose standardization is being integrated by the International Financial Reporting Standards Foundation (IFRS)³ illustrated in Figure 1.

In the context of producing more and in a sustainable way, Brazil has made efforts and commitment in several initiatives to develop mitigating technologies with high potential that are already underway, such as: No-tillage System (DPS), Biological Inputs, Integration Crop Livestock Forest (ILPF), Agroforestry Production System (SAF), Planted Forests, Animal Waste Treatment and Recovery of Degraded Pastures. It is worth mentioning that the aforementioned initiatives are included in the Sectorial Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low Carbon Economy in Agriculture - ABC Plan, rational use of water, animal welfare, maintenance of biodiversity. However, it is in the area of Precision and Digital Agriculture that this agreement has the greatest expectation of contribution.

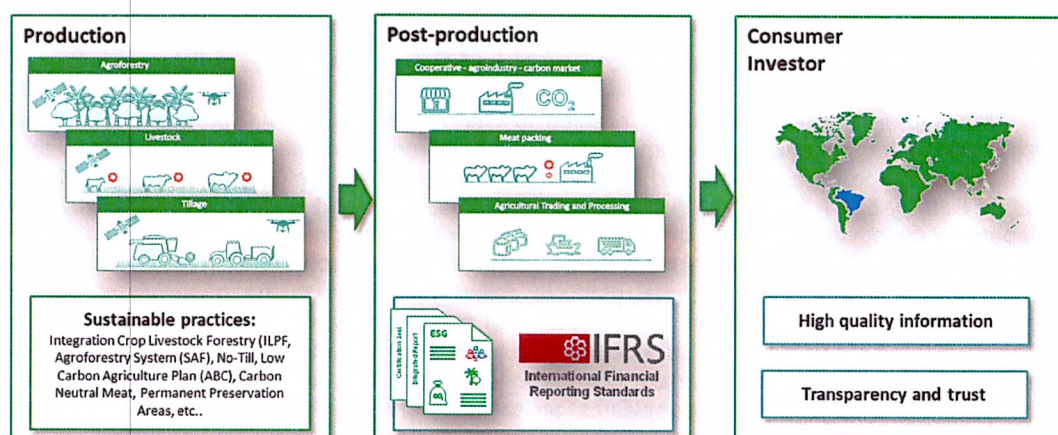


Figure 1. Challenge of producing more with sustainability and need for quality indicators.

Precision and digital agriculture is the agriculture connected to the age of digital transformation that aims to promote increased productivity, reduced costs and increased efficiency through tools, devices, systems, applications, data, IoT (Internet of Things), big data, machine learning, digital twins, among other trends in the area of Information and Communication Technology (ICT) applied to Agrifood Chains (*Agro*) (Figure 2). Increasing and/or bringing efficiency to areas already occupied or even degraded through technologies is an important opportunity to contribute to the global effort towards sustainability.

To this end, it is essential to promote an environment of innovation conducive to the insertion of producers in the era of digital agriculture, as well as to reduce bureaucracy processes that hinder the adoption of new technologies in agriculture.

In addition, as a strategic axis, it is perceived that the use of platforms for the organization and promotion of agricultural services linking all components of the chain, marketplaces, generation and availability of information and data, open or not for RDI (Research, Development and Innovation) and business generation is of paramount importance for Brazil.

In turn, Japan is notably one of the world references in the field of digital and precision technologies for the most diverse sectors of the economy.

¹ United Nations Brazil. Sustainable Development Goal <https://brasil.un.org/pt-br/sdgs> (Consultation held on Dec 13, 2021)

² World Economic Forum. Strategic Intelligence: Global Issue ESG. <https://intelligence.weforum.org/topics/a1G680000004E11EAM>

³ IFRS Foundation <https://www.ifrs.org/groups/international-sustainability-standards-board/>

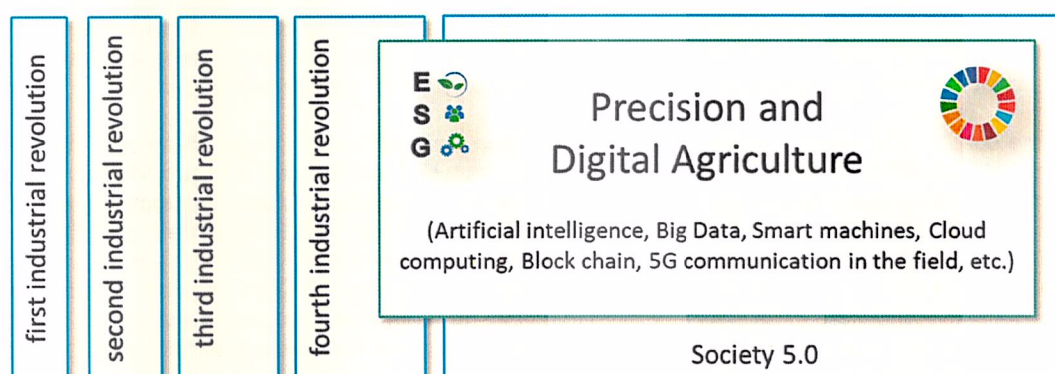


Figure 2. Databased agriculture in the context of the Fourth Industrial Revolution.

In 2015 Japan, like other countries, reacted to Germany's Industry 4.0 program. Concerned about externalities, the Japanese government proposed to intensify the convergence of digital technologies in a more comprehensive way and expanding for systemic well-being to the whole society, which it called Society 5.0. It was up to the National Agriculture and Food Research Organization (NARO), a Japanese agricultural research organization, to develop the program for the agricultural sector, which was proposed by the Agricultural Information Technology Research Center (NARO/RCAIT) in October 2018, with a proposal for a digital platform called WAGRI, with the objective of collaboratively integrating data and information from agricultural stakeholders in that country and the purpose of Society 5.0 in tune with the SDGs. According to McKinsey⁴, the intrinsic concepts of ESG have been embedded in the culture of Japanese corporations for centuries, while the world is seeking to embed them in their companies. ESG ecosystems⁵ are taking hold and universal metrics are being developed.

In Brazil, some segments of *Agro*, together with the others, already participate with processes of elaboration of integrated sustainability reports⁶ to their shareholders and customers. The implementation of technologies and certifications has been a huge challenge but won thanks to pioneering companies. Unlike fiscal data, agricultural production data is not yet available for auditing. The next challenge is the availability of data and metrics that allow independent auditing. We believe that Precision Agriculture (PA) and Digital Agriculture (DA) can provide robust digital data remotely and companies in theory will be able to provide data to auditors from anywhere in the world delivering transparency to Brazilian *Agro*.

In this sense, a new moment of international cooperation between Brazil and Japan is envisaged, again in agriculture and aiming at a second revolution in Brazilian *Agro* in contribution to the stability of global food security, through a robust cooperation work in the area of sustainable and digital agriculture.

2.2 Problem(s)

Projections of population growth and increased demand for food have created certain euphoria in the productive sector of agriculture for increased production, as well as in its innovation ecosystem. At the same time, the exceptional dynamism generated by the fourth industrial revolution boosted a number of initiatives in the market, with emphasis on the *Agro* value chains.

If, on the one hand, there is economic optimism on the Brazilian side and the expectation of meeting the global demand for agricultural products, on the other hand, there is strong pressure on companies that participate or relate to *Agro* to promote sustainable practices that mitigate the main

⁴ Charting a path from the shuchu kiyaku to ESG for Japanese companies.
<https://www.mckinsey.com/business-functions/sustainability/our-insights/charting-a-path-from-the-shuchu-kiyaku-to-esg-for-japanese-companies>

⁵ World Economic Forum. ESG Ecosystem Map.

⁶ Value Reporting Foundation <https://www.integratedreporting.org/>

global risks perceived by world leadership⁷. Metrics are essential to assess the level of fulfillment of this demand.

In 2021, PWC warned of the importance of the ESG agenda in agribusiness in Brazil based on the 2021 annual global CEO survey⁸.

As mentioned and illustrated in Figure 1, Brazil has played its role in the sustainability of *Agro* and the effort must reflect the use of metrics. In the case of financial reports, the metric is well defined and financial documents present standardizations. However, when dealing with sustainability in *Agro*, conferences and audits often depend on incursions of verification in the field. If there is no sustainability metric in economic sectors in general, for the agricultural sector it is even further away.

Crop maps, input application maps and field operations maps used in precision agriculture are digital and recorded by machines that can be compared to field inspectors' records and remote sensing images (satellite and drones). These maps are fingerprints of the edaphoclimatic interaction of the crop, therefore they are unique and fraud-free. As long as they are processed, they can prove the use of good practices.

The soybean chains are part of the export and production agenda of the most important *Agro* in the country, along with corn and other inputs, which feeds the second most important agenda, which is meat. In the case of livestock, specifically the beef cattle chain, there is a signal from the market that there will be a need to prove the integrated report through audits. Sisbov (Brazilian System for the Individual Identification of Cattle and Buffaloes)⁹ and Agri Trace (Integrated Traceability System of CNA/SENAR)¹⁰ are efforts in this direction. But the process of identification by earrings and radio frequency identification devices (RFID) has not been free of fraud, which favors accusations of greenwashing, weakening the sector. It is essential that the country adds technological advances and develops new technologies such as animal identification by biometrics so that this sector can safely move forward on the precision and digital agriculture agenda.

It is thus clear that the promotion of precision and digital agriculture is a strategic element for overcoming the current and future challenges of global agriculture. It is necessary to extend the use of precision agriculture and reduce barriers that prevent wider dissemination ranging from the need for more projects of this nature, to infrastructure issues such as rural connectivity. In this regard, the federal government, through the Ministry of Agriculture, Livestock and Supply, has been working closely with the Ministry of Communications to promote Rural Connectivity in the country and there will be new business and investment opportunities that will arise. Concrete examples are the completion of the 5G Auction, which, in addition to providing high-tech connectivity to large centers, offset the expansion of the 4G network in rural areas and federal highways, which are strategic for the flow of agricultural production.

It is understood that connectivity will contribute to an effort to support small and medium-scaled farmers, accelerating actions for the dissemination and transfer of technologies to the neediest rural populations. There is an ongoing government effort for Technical Assistance and Rural Extension (ATER) to be incorporated into the era of the fourth industrial revolution (MAPA, 2021). The challenge of digital agriculture in the country is not just about technologies at the frontier of knowledge.

On the other hand, there is an understanding that the data generated in digital transactions and operations in *Agro* will be the greatest input for the future. Therefore, promoting not only the application of new technologies, devices and modern equipment, but also the management of data and information generated in the field are fundamental elements for decision making. A concrete example of this are robust data platforms already in use in the country, such as ZARC (Agricultural Zoning of Climate Risk), CAR (Rural Environment Registry), Pronasolos (Brazil's National Soil Survey and Interpretation Program), agroclimatic data from INMET (National Institute of Meteorology), which in addition to all climate predictability, contribute to the mitigation of climate risks using a parametric insurance model based on meteorological indices. Another example is the

⁷ Global Risks Report 2022 <https://www.weforum.org/reports/global-risks-report-2022>

⁸ PWC. https://www.pwc.com.br/pt/estudos/setores-atividades/agribusiness/2021/ESG_AGRO_21_A.pdf, consultation held in Feb. 2022.

⁹ Sisbov <https://www.gov.br/agricultura/pt-br/assuntos/sanidade-animal-e-vegetal/saude-animal/rastreabilidade-animal/sisbov>

¹⁰ Agri Trace <http://ranimal.cnabrazil.org.br/>

aforementioned Sisbov and Agri Trace. It is also worth mentioning projects such as the *Agro* API, a means of support with Embrapa software libraries, the MAPA Agricultural Observatory, among other initiatives that constitute an important tool for the development of systems within the scope of DA.

The Japanese collaboration in Brazil is part of the history of the development of contemporary Brazilian *Agro*, whose support dates back to the 70s, when the country was dependent on food imports, helped to create a turning point in the country's development process.

Today Brazil is facing a new problem. The country is challenged to deliver thriving, sustainable and transparent agriculture to the world, in a scenario of unprecedented and globally connected digital transformation. Brazil urgently needs to incorporate Society 5.0 into its *Agro*.

Thus, a fundamental problem in this project is to present elements that contribute so that Brazil can prepare to continue being a major food provider for the world, as it has been in recent decades, but now also inserting in this process the new digital technologies, precision and attentive to environmental and climate issues adherent to the principles of ESG and *Sustainable Smart Agriculture*.

In a more detailed look, there are five macro problems to which the project can seek solutions:

- Greater transparency in exchange relationships in the various agricultural production chains in order to expand the ability to traceability, bringing greater confidence to actors from all links in the production chains, from producer to final consumer. With this, will also minimize practices such as greenwashing that increases uncertainties and ambiguities, volatilizes information, undermines consumer confidence and makes simple reports insufficient to prove the environmental contribution of Brazilian *Agro*. Moreover, the absence of auditable quality data and mechanisms that could allow the delivery of transparency to the processes carried out is one of the main problems. These absences of evidence prevent the aggregation of higher values to your products.
- The implementation of Precision Agriculture is still complex, making it more difficult to advance. One of the main reasons for complexity is the incompatibility between systems, processes, and files, which challenges fuller interoperability. In livestock, animal identification technology still needs to be adjusted to the Brazilian reality and requires significant advances for a scale adoption.
- There are more than 1,500 *Agro* Startups in the country and a reasonable amount of data. The integration of stored data with those that will still be generated and the promotion of synergy between the initiatives bring revolutionary potential. Promote greater coordination of initiatives is a problem that, if overcome, will contribute to the achievement of the great innovation challenges.
- The limited capacity to generate, store and integrate data in Brazilian agriculture becomes an element that prevents the virtuous expansion of innovation. Seek elements that contribute to expanding this capacity based on existing platforms in Brazil and Japan.
- Finally, it is known that Brazil has relevant examples of sustainable production systems in several biomes, such as the Agroforestry System (SAF) in the Amazon. However, the use of environmentally inappropriate techniques by a portion of small producers is a problem that increases with the expansion of the population, increasing poverty and deforestation in regions such as the Amazon. The economic appeal of SAF and the dissemination of its potential to other farmers still seems to be insufficient, preventing a wider dissemination of its use.

2.3 Beneficiaries

The project is characterized by the holistic approach of Brazilian agriculture with a reflection on the world market, bringing as beneficiaries the agents of the Brazilian *Agro* production system, worldwide and its stakeholders.

More specifically, the following beneficiaries have been identified:

Beneficiary Regions and Cultures:

The theme addressed in this project is transversal to all agricultural and livestock, crops of commercial interest and which also have a stake in the sustainability of the Brazilian *Agro* chains, with an impact on the global world. Although these cultures have specific peculiar characteristics, each one in its segments of value chains, with its infrastructures and regional personalities, they are present in the five Brazilian regions. Therefore, **there is no limitation of the region where it could be applied**. Thus, several crops will benefit from the expansion of generation and adoption of digital and precision technologies, but for the purposes of the project the following chains will be worked on: grains, livestock and agroforestry systems.

Entrepreneurs and technology-based companies will also benefit from the project, as they are key players in the agricultural innovation ecosystem. In this logic, the very use of support platforms will be encouraged as an organizing element not only of data, but also of this large ecosystem of companies and information that make up Brazilian *Agro*. In this scenario, it is envisaged to promote the approximation and exchange of experiences between the Brazilian and Japanese ecosystems.

2.4 Insertion in national development priorities

The project is in line with the Brazilian government's strategies to —promote the conservation and sustainable use of natural resources, focusing on environmental quality as one of the fundamental aspects of people's quality of life, reconciling environmental preservation with economic and social development, which reveals the following challenges¹¹:

- *Improve urban environmental quality.*
- *Implement policies, actions and measures to face climate change and its effects, promoting a resilient and low-carbon economy.*
- *Ensuring the preservation of biodiversity, the reduction of illegal deforestation, the recovery of native vegetation and the sustainable use of national biomes.*
- *Promote sustainable business opportunities in the environment."*

Brazil has one of the most modern preservation and land use legal frameworks¹². There is still a need for a great effort for its full implementation. Perhaps the first step is to ensure the legal security of properties; however, for those who are regulated, proof of sustainable practices can significantly add value to their products.

Regarding the agenda of digital transformation of agriculture in the country, important legal instruments were fundamental and provide a legal and strategic framework for the project, which is in line with the Federal strategy¹³.

Chapter 1.3.2 clearly shows the alignment of this proposal with the EFD 2020-2031, as can be seen:

"expand mechanisms to encourage joint actions between public and private institutions, in order to generate a more symbiotic innovation ecosystem and a more entrepreneurial and dynamic business environment; - encourage the development of industry 4.0, in order to compete in the national and international scenario, with the development of high added value products and the provision of high quality services; - encourage the performance of large companies as anchors in open innovation for the development of innovative startups and MSMEs; - intensify the transformation of agribusiness, through the development and incorporation of new biological, digital and innovation-bearing technologies, allowing the vertical growth of agriculture, with economic, social and environmental sustainability; - position Brazilian agribusiness as a reference in promoting health and quality of life for world society, through efficient production and effective delivery of products, services, processes and their derivatives, based on sustainability, bio economy, digital agriculture, open

¹¹ Brasil, 2020. A Estratégia Federal de Desenvolvimento para o Brasil no período de 2020 a 2031 (EFD 2020-2031). <https://www.gov.br/economia/pt-br/assuntos/gestao/estrategia-federal-de-desenvolvimento>.

¹² Law 12,651, of May 25, 2012, also known as the new "Forest Code", establishes general rules on the Protection of Native Vegetation, including Permanent Preservation Areas, Legal Reserves and Restricted Use; forest exploitation, the supply of forest raw materials, control of the origin of forest products, control and prevention of forest fires, and the provision of economic and financial instruments to achieve its objectives (<https://www.embrapa.br/codigo-florestal/entenda-o-codigo-florestal>).

¹³ Federal Development Strategy for Brazil for the period from 2020 to 2031 (EFD 2020-2031) is established by Decree N°. 10,531, of October 26, 2020

innovation and contemporary food systems; - to introduce the dimension of innovation, together with the private sector and international partners, in all government action, as a fundamental challenge for the country's future".

In addition, it is also worth mentioning the *Agro* 4.0 Chamber and the national plan for IoT¹⁴, the Plan aims to implement and develop the Internet of Things in the country and, based on free competition and free circulation of data, observing the information security and personal data protection guidelines. To this end, MAPA, together with the MCTI, will sign a Technical Cooperation Agreement (ACT) for its implementation and whose existence of the desired platform will be essential to provide coordination and visibility to ongoing actions.

In addition to this important guideline, the laws passed in recent years include the legal framework for Startups and the legal framework for stimulating scientific development, research, scientific and technological training and innovation¹⁵.

On October 20, 2022, the Brazilian Senate unanimously approved, with ten (10) votes, the Act 149/2019 establishing the National Incentive Policy for Precision Agriculture and Livestock to increase efficiency in the application of resources and inputs of production, in order to reduce waste, reduce production costs, increase productivity and profitability, as well as ensure environmental, social and economic sustainability. The project was presented by Senator Guaracy Silveira.

2.5 Expected situation at the end of the project

At the end of the project, Brazil is expected to have important elements to accelerate the digital transformation of Brazilian agriculture, based on digital technologies, precision and adherent to environmental, climate and carbon issues in a concept of *Sustainable Smart Agriculture*.

These are expected situations for the four —**Outputs**||:

- i. **Innovation ecosystem:** An environment for exchange human resources, technologies and information to co-create sustainability is established for innovation ecosystem by precision and digital agriculture. It is expected that the *Agro*'s innovation potential will increase and that continuous technological solutions will be made available through a model of business model constructions that promote the sending of data to the platform and keep it always current.
 - a. Digital transformation strategy (including dissemination plan) for each area (Crops, Livestock, Agroforestry) through the collaboration Brazil and Japan is prepared synergistically with the *Agro* 4.0 and other organizations representing society in precision and digital agriculture.
 - b. Scope definition for each area (Crops, Livestock, Agroforestry) is prepared for On-farm experimentation to benefit medium and small-scale agricultural producers.
 - c. Technology mapping and roadmap (Crops, Livestock and Agroforestry) for On-farm Experimentation are prepared in accordance with the legislation in Brazil
- ii. **Data platform:** The agricultural digital platform is improved by means of promoting the innovation ecosystem. A new platform is expected to be built as a result of a joint work between Brazil with AgroAPI and Japan's technologies, powered and intensively used by Agritechs.
 - a. Design of the digital platform architecture for each scope (Crops, Livestock and Agroforestry) is prepared to enhance the function of existing platforms
 - b. Design of raw data and data base management for each scope is prepared.

¹⁴ Plano Nacional de Internet das Coisas, instituído pelo Decreto nº 9.854, de 25 de junho de 2019

¹⁵ Legal Framework for CTI: LAW Nº 13,243, of January 11, 2016, which provides for incentives for scientific development, research, scientific and technological training and innovation and amends Law Nº 10,973, of December 2, 2004, to Law Nº 6,815, of August 19, 1980, Law Nº 8,666, of June 21, 1993, Law Nº 12,462, of August 4, 2011, Law Nº 8,745, of December 9, 1993, Law Nº 8,958, of December 20, 1994, Law Nº 8,010, of March 29, 1990, Law Nº 8,032, of April 12, 1990, and Law Nº 12,772, of December 28, 2012, pursuant to the Amendment Constitution Nº 85, of February 26, 2015.

- c. Capacity of at least 20 business managers, Agri-FoodTechs, researchers, etc. participating in digital platform improvement is enhanced to enrich capability of digital platform
- iii. **On-Farm Experimentation:** On-farm Experimentation of the areas (Crop, Livestock and Agroforestry) of a particular technology is carried out to confirm the usability of precision and digital agriculture data.
 - a. Technical notes/documents from the result of On-farm Experimentation on digital support system for certification are submitted to MAPA and Embrapa, including setting and measuring ESG sustainability Indicators for audit in each area (Crop, Livestock, Agroforestry)
 - b. Publication materials from the results of On-farm Experimentation are prepared and distributed.
 - c. Capacity of at least XX **members from each On-farm Experimentation team (business managers, Agri-Food Techs, researchers, etc.) is enhanced.
- iv. **Transfer and dissemination:** General knowledge of the project is transferred to agricultural innovation ecosystem. The dissemination strategy used by the project is expected to be a more mature way of transferring technologies and knowledge to enable *Agro* in the new digital scenario.
 - a. Knowledge of sustainable agricultural systems based on precision and digital agriculture is transferred to 200 business managers, researchers, and disseminators through project events.
 - b. Knowledge of API 10 and agricultural data platform functions and/or implementation is transferred to 300 students and Agri-Food Tech through project events.
 - c. Knowledge of the precision and digital agriculture is transferred to 600 professionals and students through project events.
 - d. Feedback from participants in the project events are obtained.

2.6 Project Implementing Strategy

Due to the breadth of the potential scope of the proposal, to focus on fundamental points of the construction of the exchange and that result in the beginning of a new level of exchange on digital platforms, the concept of MVP (*Minimum Viable Product*) is used. There are three implementation focuses. One in **Agroforestry Systems (SAF)**, another in the **Livestock** area, and finally in **Crop**. The Tomé-Açu **SAF** system, developed and evolved by the members of CAMTA (Cooperativa Agrícola Mista de Tomé-Açu – CMTA), is an important driver of sustainability in the Amazon, led by small and medium producers whose excellence is recognized by JICA.

The other two areas, Crop and Livestock, are the two most important items for Brazilian exports and, for this reason, are charged with greater reliability and transparency. In addition, being areas with greater maturity in the use of precision and digital agriculture, they have greater potential for project execution and completion with scalability. Emphasizing that, in the case of Livestock, more than two thirds of the Brazilian rural production area is occupied with pastures and this is where it has strategic importance for the advancement of production without occupying new areas.

These specific areas can also be understood as chains of the agricultural sector and will be treated as crosscutting to the Outputs and for this reason treated as vertical, as illustrated in Figure 3. It is noteworthy that as the progress achieved during the project, it will be possible to be expanded into more transversal vertical segments such as viticulture, poultry, among others, decided by the cooperation management committee.

In these three verticals (or cross-section areas to the outputs), there are expectations that data will be captured from well-established agricultural production units with advanced technological maturity so that data can be sent to the platform as fully as possible with sufficient volume, quality and density for the generation and extraction of value within the Brazilian reality. Thus, the aim is to reduce the risk in the implementation of a data generation system, in this case precision agriculture and in the resource management registration system. Still within the strategy of starting from systems with

differentiated maturity, it is reasonable to carry out the study with commercial systems that already produce ESG sustainability reports for their *stakeholders*, or who are looking for credits from markets such as carbon. It is therefore intended to establish partnerships with companies that present synergy and harmony with the objective of the project and thus, called in this present On-Farm Experimentation project.

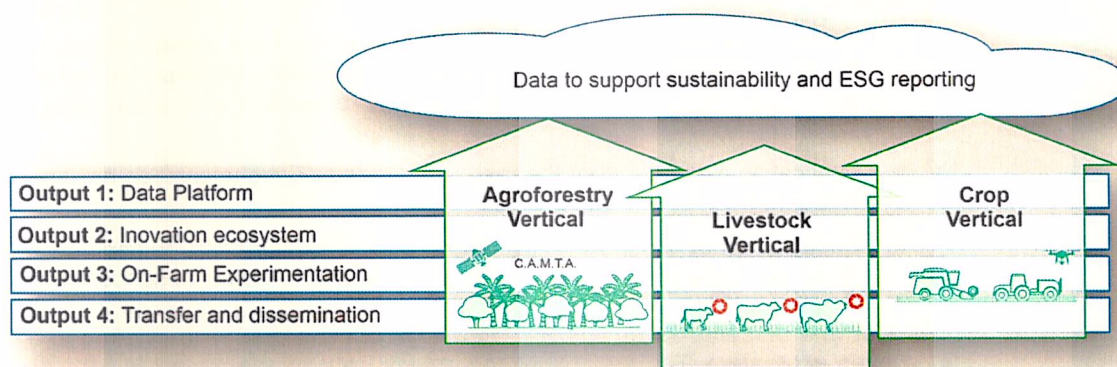


Figure 3: Relationship of the four *Outputs* (R/D) with the tree transversal themes of MVPs (Agroforestry, Livestock and Crop verticals).

Strategies for the four *Outputs* will be presented below.

i. **Innovation ecosystem:**

An innovation ecosystem is an environment for collaboration and interaction of experiences and knowledge between companies, universities and governments that generate and share common results.

Among the significant actions to promote startups, the following stand out: Hackathons, DemoDays, business rounds, matchmaking events and bootcamps (ROMANI et al., 2020) which, supported by experienced experts from technological institutions, deliver several innovation challenges, drives the generation of creative solutions and supports them to drive a successful implementation. Within the scope of this cooperation, the Innovation Challenges will be related to the real problems encountered in the project within the development of cases with the on-farm experimentation, with a view to the integration between Brazil - Japan startups to consolidate exchange activities.

It is, therefore, the strategy of this project to attract startups from Brazil and Japan, to participate, contribute and compose the results that help to achieve the expectations of this cooperation. For this action, the project must complement the existing events promoted by Embrapa and other partners, such as providing mentoring, training, digital infrastructure (virtual space in the Data Center and API implementations), attracting investors, and offering challenges for achieving the verticals' MVPs together with the farms (areas of the productive sector) to be select in this project (**Agroforestry, Crop and Livestock**).

ii. **Data platform:**

The agricultural platform to be designed and implemented with Japan's assistance is an online platform with its own character. Its basic purpose is to encourage the use of PA and provide greater transparency and a greater level of trust to the production process, with the aim of supporting the construction of an image of *Agro* in tune with the practices of leading, modern and most promising companies and corporations of the world economy.

The platform will facilitate the integration, analysis and organization of PA data, which will eliminate one of the main, if not the main one, technological obstacles currently encountered

by producers. With the data on the platform, it will be possible to build a —virtual observatoryll of the production system, deliver transparency and extract indices that, in hypothesis, can provide confidence in the level of sustainability of the operational processes used. It also presents the possibility for producers to control access to their data with the desired security. This process adds value, as it simplifies the auditing of sustainability certifications, which must necessarily be carried out by independent auditing companies. The platform will receive the contribution of the concept and architecture of the Japan's technologies, whose business models were studied and proposed. In addition to this model, all the possibilities mapped by the OECD (Organization for Economic Cooperation and Development) that typify online platforms will be studied (OECD, 2019).

The definition of the platform's business model will be decisive and fundamental for its destiny, after the termination of the cooperation. It is a high-risk activity, but with greater potential for return, which indicates the need for a robust monitoring and follow-up process by management with frequent course adjustments.

iii. **On-Farm Experimentation:**

In conceptual terms, there are no limits to the benefits of the platform, as its reach and commitments are global, with the potential to reach audiences in all countries where Brazilian *Agro* transacts values. In this context, the aforementioned platform has the potential to interact through all types of business models that have already been mapped by the OECD (OECD, 2019), not ruling out the possibility of creating other models.

The iii. On-Farm Experimentation, or case study, is not only applied to test the usefulness of the Platform in verticals, but as a validation process that the productive sector can continuously provide data and evolve by its own means and with the support of Agritecs.

In the **Crop** vertical, the strategy considered is to establish a partnership with one or more groups whose PA implementation is positioned at an advanced level, with a computerized resource control system and which are generating ESG reports. Groups like Amaggi, Scheffer and SLC are the ones being considered. These groups have AP implemented with field data generation by agricultural machines, have ERP implemented, as well as perform ESG reports and are demanding third-party audits to certify the sustainability of their production systems. They produce two crops a year, have trained teams and up-to-date machines. In other words, if there is any difficulty in using PA and DA, they will probably be on the technical frontier and, therefore, demand technological and scientific innovation of high complexity and will also be an excellent opportunity for Embrapa and the innovation ecosystem.

In the **Livestock** vertical, the strategy is to work with one or more groups that also have a mature structure, but unlike the crop vertical, it is not the cattle production properties that invest in integrated sustainability reports, but the meatpackers, such as JBS, BRF, Marfrig, Minerva, among others. In addition to the integrated reports, there is a —carbon neutral meatll certification process on the market developed by Embrapa and MAPA. As in farming, the difficulty is in proving the information from suppliers, currently carried out by independent certifiers. Although there are ways of identifying cattle such as earrings and RFID, provided for in systems such as Sisbov and *Agro* Trace, these still have limitations as a means of proof to auditors and there is an opportunity for this project to develop a more effective digital technology such as animal biometrics.

In the **Agroforestry** vertical, the experience of CAMTA (Cooperativa Agrícola Mista de Tomé-Açu), with SAF implemented in the 70's and currently called the Tome-Açu Agroforestry System - SAFTA, is recognized and supported by several JICA initiatives, which allows an optimistic expectation in the generation of good results. The MVP's strategy is to seek digital means and use the platform for an independent and automatic certification of the sustainability of the process, in this case, SAF. Audit processes developed and carried out by independent companies and verified by independent countries are more credible. The purpose of the MVP is to generate an audit process that is accepted by an institution such as the —J-Credit Schemell of Japan (<https://japancredit.go.jp/english/> consultation on 12 Oct. 2021).

iv. **Transfer and dissemination:**

As pointed out in section 2.2, the generation of data by farming and livestock depends on a wide adoption of Precision and Digital Agriculture by all actors somehow engaged in the production system. By generating data that will be used as information, the management process gains objectivity, helping to mitigate risks. Modern and sustainable agriculture must gradually employ data for objective assessment and support the modern farmer. For SAF, it is essential that this process is disseminated and that it promotes the replacement of pasture areas managed by small producers to scale the MVPs. Adoption is still crucial to minimize the risk of getting insufficient data.

Like Precision Agriculture, AFS's are complex, and their system is heavily dependent on an interaction between the environment and economic outcomes. The strategy of disseminating the SAF in the Amazon region has the scale and complexity of the very dimension of this region. CAMTA has a track record of pioneering, experimentation and commercial results that indicate the potential of the MVP. However, the MVP concept initiates a process of dissemination and use of SAF in the Amazon to replace the expansion of family economic activity, based on livestock, which causes the expansion of the clear cut of the forest to a pasture.

2.6.1. Phases

The stages were built according to the four Outputs agreed in the RD (record of discussions) was signed on April 27, 2021, and Minutes of Meetings added on May 2022, between the Government of Japan and the Government of Brazil), innovation ecosystem, data platform, On-Farm Experimentation and, finally, the transfer and dissemination. Macro activities were considered and divided into Project Breakdown Structure (WBS) or *Work Breakdown Structure (WBS)* according to *PMBOK (Project Management Body of Knowledge)* from *PMI (Project Management Institute)*. To agglutinate in themes, the figure of "verticals" was built, already illustrated in Figure 3.

The *Outputs* were detailed in three levels, being described in section 4 of the Work Plan, with the description of indicators and means of verification, as well as the execution schedule. In this section, explained in more detail, the *Outputs* for the purpose of this PCT were renamed —ResultsII due to their similarity. However, for a better understanding of the importance of the hierarchy, Output 1 was called Result 2 and Output 2 as Result 1. In the other Outputs 3 and 4, the correspondences were maintained.

So the four Results (Outputs) were broken down into steps and these steps into one more level of detail. Result 1 was detailed in 9 steps. Result 2 in 7, Result 3 in 19 and Result 4 in 9 steps, totaling 44 steps. Each of these stages was also subdivided and the whole project has 153 sub-stages. This division was included in the annex due to the excessive detail for a PCT, but it is essential to understand the stages through which the activities will take during the development of the project.

Project Exit Strategy:

After the evaluation of the levels of intensity and maturity reached, carried out in the periodic meetings of the JCC (Joint Coordinating Committee), the directions and an action plan will be defined. It is worth remembering that it is the project's strategy to survey and evaluate the potential business models of the platform and the subsequent orientation and negotiation for commercialization by Agritechs integrated in the execution. This subsequent iteration must feed the platform continuously and perennially, maintaining the exchange and link between institutions and stakeholders created in the project.

2.6.2 Risks and mitigating measures

Project risks will be prioritized considering the main focus of the project, which is the implementation of a technological platform for data and applications. It is necessary to be attentive to the prospection of events that capture facts that can lead to possible risks that affect the results. Thus, risk analysis has a preventive action by monitoring and prospecting events, whether internal or external.

It appears that the diversified and flexible nature of the project allows decision-making to overcome possible risks, so high probability and high impact risks, which can cause disruptions, are considered points of attention. The constraints that most affect the risk classification for the project are also defined, namely: financial, experience, capacity and planning.

Once the events are captured, their impact variables will be defined individually in a qualitative way, since each event has unique qualities that can affect both positively and negatively the objectives and results. Additionally, with the event variables defined, the impact that the fact under analysis can cause is determined, in order to define whether or not there is a risk in this event under analysis.

As for the limitation in the availability of funding resources, it can make it difficult for the team to move, crucial for the development and implementation of Output 2, 3 and 4. It is also observed that Output 3 validates the other Outputs and due to the verticality of the activities may compromise the generation of expected results. It is important to foresee and guarantee specific support for carrying out these activities in the project. Therefore, articulation with companies should be strengthened and involvement should be expanded, bringing new farms and companies whenever possible in the case studies.

Virtual meetings and teleworking are assimilated by employees, which optimizes travel and time resources. Due to the maturity reached by the team in this work process, no risk is foreseen, however, in specific cases there may be a need for update or maintain equipment and connections.

For bilateral exchange and collaboration, face-to-face activities are still essential. In these cases, all security measures implemented at Embrapa, as well as the institutions where project members will have contact must be compulsorily observed, including health insurance and vaccination certificates.

Embrapa has counted on the collaboration and support, including from the property's employees, to obtain data of interest to the production system. This process has the disadvantages of not being able to control all parameters of scientific interest, but it enables the development of processes in tune with practices that are easily adopted by producers. As the objective of this process is to make use of the data that are naturally obtained by the productive sector, this practice will be extremely useful. Therefore, it is essential to formalize well-structured agreements and offer a robust counterpart to employees.

For *Output 1*, innovation ecosystem, there are risks such as failure to define the orientation and scope of action of startups or monitoring and management, which can be mitigated through focused attention by managers of activities and projects. There is also a risk of a lack of interest from Agritechs in participating in this project, as well as from investors. For Agritechs, you must disclose and provide the right incentive to maintain interest. In this sense, exchanges, support and mentoring teams must be kept at a high level of attention, and ensure resources equivalent to the value provided by programs such as FAPESP's —Innovative Research in Small Businesses (PIPE)II, for Agritechs.

For *Output 2*, the data platform, the activities are structured to accommodate the architectures of the Japan's platform and AgroAPI platforms in a single integrated structure. Agritechs and other institutions will be trained to use the APIs and implement their needs. Thus, training is provided so that the existing risk for this type of activity is minimized. Yet there are two important risks to watch out for. The first is the possibility of not enough users. In this case, the role of *Output 4* – Transfer and Dissemination – will be fundamental to reach this number. The case of the second risk is the impossibility of acquiring the computer system.

For *Output 3*, the project has a strategy of executing with the creativity and motivation of startups, Agritechs, companies, farm infrastructure, that is, companies and private institutions. If, on the one hand, this strategy increases the potential for sustainability after the end of the project, it is necessary to guarantee the support of partnerships. Formalization of agreements as well as their compliance with the release of resources will be strategic to mitigate risks. To ensure the expansion of this resource, the project must always seek new partners to increase and enable the achievement of the platform.

For *Output 4*, well-structured dissemination actions must mitigate the risk of the project not reaching the intended audience. Another risk is that the training audience does not have enough support to implement it. Stakeholders from the interested chains must be brought in to foster support and

enable implementations. In addition, there are no, or very limited, educational publications within Precision and Digital Agriculture to help train specialists. This material would be essential to prepare the specialists for the work in the field. This limitation is considered to be one of the core obstacles that hinder the development of the theme. It should be a project strategy to search for didactic material both in the country and abroad to provide a set of appropriate literature.

2.6.3 Sustainability factors

During project execution, there will be strong interaction between Brazilian executing institutions, beneficiaries and other stakeholders at all stages of the project cycle, as illustrated in Figure 3. However, the executors who will act in the realization of the four *Outputs* will have to interact in several activities identified in the Work Breakdown Structure (WBS). As an example, there is the participation of the data platform proof-of-concept team in the preparation of public notices and preparatory training for Startup Agritech, an activity foreseen in the innovation ecosystem.

The APIs structure adopted by both Japan's platform and AgroAPI aims to ensure access to the platform. The main actors and beneficiaries of the ecosystem will be encouraged to develop their system incorporating the functions of APIs. Proofs of concept will test the use of the APIs and the platform to ensure functionality and benefits. These activities seek to ensure ownership of the positive effects of the project by the beneficiaries.

Embrapa has a communication team, located at the headquarters in Brasília, whose mission is to guide the communication actions of the decentralized Units. These Units, in turn, have a team specialized in communication within their scope and are competent to support and ensure that the knowledge and experiences accumulated in the project are made available.

Output 3 has the role of developing Agritech in a real production environment with producers. It is expected that this work will provide continuity of maintenance with economic sustainability to the Agritecs. The platform, in turn, is not static and can evolve into different formats and types, providing benefits in a sustainable and transparent way.

2.6.4 Capacity development

The project is large enough to work in key activities in Brazilian agriculture and can be considered highly complex. There will be training sessions to enable the team to build solutions of an unprecedented nature. This effort should generate innovations with enormous impact on society.

2.6.5 Multiplier effects

By acting in the promotion of the innovation ecosystem and in the delivery of a platform with the objective of being a basis for the creation of a new *Agro*, the multiplier effect can be considered one of the most important prerequisites of the project. Possibly, the number of accesses to the platform and the number of Agritecs exchange between the two countries is the metric that can be used to indicate the success achieved by the project, after its conclusion.

The expectation is that the use of the platform will reach the level of being one of the most accessed in Brazil to contribute to the provision of information and deliver dynamism in the exchange of values within the government, society, with specific population groups and in all links of the *Agro* chains.

2.7 Institutional Framework

2.7.1 Functions and technical contributions

Embrapa, over almost 50 years, has accumulated knowledge and technologies to support the development of tropical agriculture, helping Brazil to reach the leading group in the production of food and fiber. It has 9,450 employees, of which 2,416 are researchers and 2,425 are PhDs.

Japan, in turn, is a world leader in industry technologies, notably in electronics with significant success in high-performance computers. In recent years, it has built a robust government program for the construction of a 5.0 society, which generates the potential to contribute and build a new agriculture led by NARO.

Private companies in the *Agro* sector in Brazil have shown their production capacity with each record harvest, characterizing themselves as exporters to a variety of countries, competent in production in extensive areas.

Embrapa is able to identify and, when necessary, bring in new public or private institutions to co-execute throughout the four years of project execution.

SECTION 3:

OBJECTIVES AND RESULTS

3.1 Development objective

The project aims to —improve the environmental and economic sustainability of agriculture, the open innovation environment for precision and digital agriculture (as defined in the PDM (Project Design Matrix) found in Annex 2 of the RD document signed in March 2021).

According to the justification and given the above, the main objective of the project is to increase the transparency, reliability and efficiency of the Brazilian production process, stimulating databased management, expanding innovation and the use of precision and digital agriculture, having as a reference the Japanese technical collaboration.

3.2 Immediate goal

The specific objectives were designed so that, when jointly achieved, the PA and the DA deliver sustainability and increase the efficiency of the country's agricultural production system in a systemic and consistent way. The specific objectives are three:

- Structuring a digital integration environment on a technological platform to enable collaborative action by Agritechs in Brazil and Japan.
- Structuring the data used in PA and DA to prove the application of sustainable processes in Brazilian agricultural production and allow the country to deliver rapid responses in a transparent manner.
- Expand the use of PA and DA in Agroforestry systems (predominantly small and medium producers in the Amazon region), in crops (grains) and in livestock production areas (cattle) by two means that increase the potential for adoption: diffusion and the development of user-friendly technologies.

3.3 Results

The results in this section are the results of a higher level of abstraction. It is equivalent to the four —*Outputs* provided for in the RD and in this sense the four results follow.

Result 1 (*Output 2 Data Platform*) - The agricultural digital platform is improved by means of promoting the innovation ecosystem.

Result 2 (*Output 1 Innovation Ecosystem*) An environment for exchange human resources, technologies and information to co-create sustainability is established for innovation ecosystem by precision and digital agriculture.

Result 3 (*Output 3 On-Farm Experimentation*) - On-farm Experimentation of the areas (Crop, Livestock and Agroforestry) of a particular technology is carried out to confirm the usability of precision and digital agriculture data.

Result 4 (Output 4 Transfer and dissemination) - General knowledge of the project is transferred to agricultural innovation ecosystem.

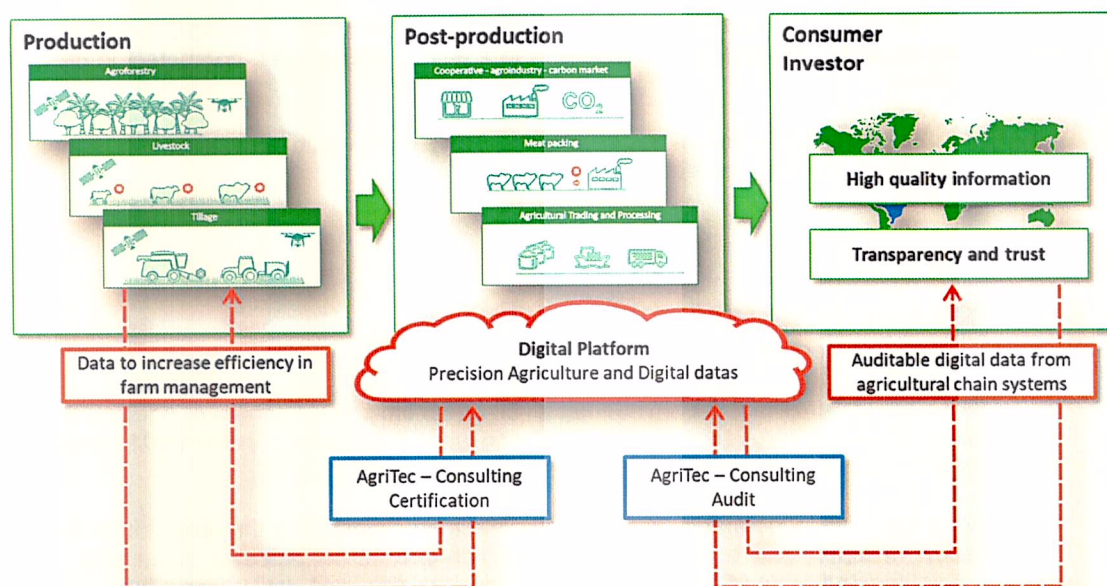


Figure 4 summarizes the objectives and results to be implemented to meet the challenge of producing more with sustainability and the need for sustainability indicators already illustrated in Figure 1.

SECTION 4:

WORK PLAN

4.1 Work Plan

Result 1: The agricultural digital platform is improved by means of promoting the innovation ecosystem.

Activity 1.1. Drafting the first version between Brazil and Japan of digital platform architecture.

Activity 1.2. Implementing the first version of database.

Activity 1.3. Collecting raw data.

Activity 1.4. Designing the first version of data analysis and presentation module.

Activity 1.5. Evaluating data security and connectivity in the data platform

Activity 1.6. Constructing database management system.

Activity 1.7. Designing the draft of business sustainability model.

Result 2: An environment for exchange human resources, technologies and information to co-create sustainability is established for innovation ecosystem by precision and digital agriculture.

Activity 2.1. Formation of area-wise sub-committees and scope definition of the On-farm Experimentation (crops, livestock, agroforestry).

Activity 2.2. Drafting the strategy and technology mapping and roadmap for implementation of ecosystem, considering digital platform and information dissemination.

Activity 2.3. Workshop on draft strategy and technology mapping and roadmap with private and public stakeholders in Brazil.

Activity 2.4. Announcement events for potential Japanese counterparts for each On-farm Experimentation.

Activity 2.5. Selection of implementing team from Brazil and Japan in each On-farm Experimentation.

Result 3: On-farm Experimentation of the areas (Crop, Livestock and Agroforestry) of a particular technology is carried out to confirm the usability of precision and digital agriculture data.

Activity 3.1. Implementing On-farm Experimentation for Crops.

Activity 3.2. Implementing On-farm Experimentation for Livestock.

Activity 3.3. Implementing On-farm Experimentation for Agroforestry.

Activity 3.4. Summarizing the result of each On-farm Experimentation.

Result 4: General knowledge of the project is transferred to agricultural innovation ecosystem.

Activity 4.1. Formulating the implementation plan of dissemination activities of On-farm Experimentation in each area.

Activity 4.2. Implementing the events in On-farm Experimentation in each area.

Products related to Result 1 - Data Platform:

Product 1.1. Design of the digital platform architecture for each scope (Crops, Livestock and Agroforestry) to enhance the function of existing platforms.

Product 1.2. Design of raw data and database management for each Scope.

Product 1.3. Capacity building of at least 20 business managers, Agri-FoodTechs, researchers, etc. to enrich capability of digital platform.

Products related to Result 2 - Innovation ecosystem:

Product 2.1. Digital transformation strategy for each area (Crops, Livestock, Agroforestry) through the collaboration Brazil and Japan, synergically with the *Agro 4.0* and other organizations representing society in this area.

Product 2.2. Scope Definition for each area (Crops, Livestock, Agroforestry) for On-farm experimentation.

Product 2.3. Technology mapping and roadmap (Crops, Livestock and Agroforestry) for On-farm Experimentation in accordance with the legislation in Brazil.

Products related to Result 3 - On-farm Experimentation:

Product 3.1. Technical notes/documents from the result of On-farm Experimentation on digital support system for certification, including setting and measuring ESG sustainability Indicators for audit in each area (Crops, Livestock, Agroforestry)

Product 3.2. Publication materials from the results of On-farm Experimentation.

Product 3.3. Capacity building of at least XX members from each On-farm Experimentation team (business managers, Agri-Food Techs, researchers, etc.).

Products related to Result 4 – Transfer and dissemination:

Product 4.1. 200 business managers, researchers, and disseminators learned sustainable agricultural systems based on precision and digital agriculture.

Product 4.2. 300 students and Agri-FoodTechs learned API and agricultural data platform functions and/or implementation.

Product 4.3. 600 professionals and students learned about the precision and digital agriculture.

Project management is adaptive, based on an impact/outcome-oriented monitoring system. For this reason, the above Work Plan will be reviewed and adjusted each year based on the analysis of the results obtained by the project monitoring system.

4.2 Indicators and Verification Means

The Project Results, presented in Section 3, are related to Indicators that allow measuring its reach.

The Means of Verification of the Indicators are also specified, as well as the respective Baselines and Targets.

Specific Objective / Result	Indicator	Baseline	Goal	Verification Means
Product 1.1. Design of the digital platform architecture for each scope (Crops, Livestock and Agroforestry) to enhance the function of existing platforms.	Publication of a Technical Note or similar document	Zero (0)	One (01)	Descriptive documentation of new registered APIs
Product 1.2. Design of raw data and database management for each Scope.	Publication of a Technical Note or similar document	Zero (0)	One (01)	Descriptive documentation of new raw data design and database management.
Product 1.3. Capacity building of at least 20 business managers, AgriFoodTechs, researchers, etc. to enrich capability of digital platform.	Number of persons trained	There are no trained persons between 2022 to 2025 (0)	Twenty (20)	Training certification issued and registered
Product 2.1. Digital transformation strategy for each area (Crops, Livestock, Agroforestry) through the collaboration Brazil and Japan, synergically with the <i>Agro 4.0</i> and other organizations representing society in this area.	Publication of a Technical Note or similar document.	Zero (0)	One (01)	Descriptive documentation of digital transformation strategy for each area.
Product 2.2. Scope Definition for each area (Crops, Livestock, Agroforestry) for On-farm experimentation.	Publication of a Technical Note or similar document.	Zero (0)	One (01)	Final report
Product 2.3. Technology mapping and roadmap (Crops, Livestock and Agroforestry) for On-farm Experimentation in accordance with the legislation in Brazil.	Publication of a Technical Note or similar document	Zero (0)	One (01)	Final report - roadmap.
Product 3.1. Technical notes/documents from the result of On-farm Experimentation on digital support system for certification, including setting and measuring ESG sustainability Indicators for audit in each area (Crops, Livestock, Agroforestry)	Publication of a Technical Note or similar document	Zero (0)	One (01)	Descriptive documentation of result of On-farm Experimentation on

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					digital support system for certification.
Product 3.2.	Publication materials from the results of On-farm Experimentation.	Publication of a Technical Note or similar document	Zero (0)	One (01)	Descriptive document
Product 3.3.	Capacity building of at least XX members from each On-farm Experimentation team (business managers, Agri-Food Techs, researchers, etc.).	Number of persons trained	Zero (0)	To define (XX)	Training certification issued and registered
Product 4.1.	200 business managers, researchers, and disseminators learned sustainable agricultural systems based on precision and digital agriculture.	Number of persons trained	There are no trained persons between 2022 to 2025 (0)	Two hundred (200)	Training certification issued and registered
Product 4.2.	300 students and Agri-FoodTechs learned API and agricultural data platform functions and/or implementation.	Number of persons trained	There are no trained persons between 2022 to 2025 (0)	Three hundred (300)	Training certification issued and registered
Product 4.3.	600 professionals and students learned about the precision and digital agriculture.	Number of persons trained	There are no trained persons between 2022 to 2025 (0)	Six hundred (600)	Training certification issued and registered

4.3 Execution schedule

The execution schedule will be adjusted according to the needs that arise during the project and the results obtained in the monitoring, in order to achieve the desired objectives.

Results / Activities	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Result 1: Data platform.												
Activity 1.1. Drafting the first version between Brazil and Japan of digital platform architecture.				x	x							
Activity 1.2. Implementing the first version of database.					x	x						
Activity 1.3. Collecting raw data.						x	x	x	x	x	x	x
Activity 1.4. Designing the first version of data analysis and presentation module.							x	x	x	x		
Activity 1.5. Evaluating data security and connectivity in the data platform										x	x	x
Activity 1.6. Constructing database management system.										x	x	x
Activity 1.7. Designing the draft of business sustainability model.												x
Result 2: Innovation ecosystem.												
Activity 2.1. Formation of areawise sub-committees and scope definition of the On-farm Experimentation (crops, livestock, agroforestry).	x	x	x									
Activity 2.2. Drafting the strategy and technology mapping and roadmap for implementation of ecosystem, considering digital platform and information dissemination.		x	x	x								
Activity 2.3. Workshop on draft strategy and technology mapping and roadmap with private and public stakeholders in Brazil.		x										

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Activity 2.4. Announcement events for potential Japanese counterparts for each On-farm Experimentation.			x									
Activity 2.5. Selection of implementing team from Brazil and Japan in each On-farm Experimentation.				x								
Result 3: On-Farm experimentation												
Activity 3.1. Implementing On-farm Experimentation for Crops.		x	x	x	x	x	x	x	x	x	x	x
Activity 3.2. Implementing On-farm Experimentation for Livestock.		x	x	x	x	x	x	x	x	x	x	x
Activity 3.3. Implementing On-farm Experimentation for Agroforestry.		x	x	x	x	x	x	x	x	x	x	x
Activity 3.4. Summarizing the result of each On-farm Experimentation.									x	x	x	x
Result 4: Transfer and Dissemination.												
Activity 4.1. Formulating the implementation plan of dissemination activities of On-farm Experimentation in each area.		x										
Activity 4.2. Implementing the events in On-farm Experimentation in each area.				x				x				x

SECTION 5:

EXTERNAL COOPERATION REQUESTED

5.1 Justification for choosing the external source

Japan has extensive experience in cooperation projects carried out in Brazil in various sectors. It has a good long-term relationship with Embrapa with successful projects carried out in the area of agriculture, one of the most important being the *Programa de Cooperação Nipo-Brasileiro para o Desenvolvimento Agrícola dos Cerrados* (Prodecer).

Prodecer was carried out in three major stages over 20 years of cooperation and effectively collaborated to increase food production and regional development in Brazil.

This Project is inspired by the experience and success of Prodecer, as well as intends to explore the potential of Brazilian agriculture in this new digital scenario.

In addition, Japan has experience in structuring Integrated Agriculture Data Platform, currently implemented and under continuous development in Japan. This Smart Food Chain Platform (WAGRI Japan's platform - dev), as it is called, was built under the Technologies for Smart Bioindustry and Agriculture Project managed by the Transministerial Strategic Innovation Promotion Program (SIP), as a platform for uniform sharing of data relating to the production, processing, distribution, marketing, export and consumption of agricultural products and food.

Thus, with the experience of both sides, it will be possible to develop an environment for the exchange of human resources, technologies and information for the joint creation of sustainable smart agriculture and the food chain in Brazil.

5.2 Technical support from external source

Japan has been working to advance fundamental technologies that shape the future such as artificial intelligence, data connection, robotics, etc. with the aim of creating innovative data-driven smart agriculture and the development of a smart breeding system and cooperation with the private sector. The innovation ecosystem of technologies that shape the industry of the future are present in Japan and participate very intensely. They dispute the leadership in high performance computers, proving

the unquestionable high technological maturity of this country. The application of this technology is being developed for agriculture and, among others, it is present in the development of machines, equipment and digital platform.

The Japanese and Brazilian technical teams will develop collaborative work and articulation for the development of sustainable agribusiness technology through industry-government-academy collaboration between the two countries.

The exchange of knowledge and experiences will take place through seminars and local events.

The Japan Training Program will take place to train the Brazilian technical team in the areas of interest to the Project.

5.3 Means of support from the external source

5.3.1 Experts

The external source team formed by expert with experience in bilateral projects in the area of digital agriculture (Integrated knowledge of information technology with agriculture), government-academy-industry innovation ecosystem and agricultural systems metrics and experts for precision agriculture, smart agriculture and sustainable agriculture.

5.3.2 Training

The last public selection at Embrapa took place in 2009, before Germany presented its —Industrie 4.0 project in 2011, inspiring the theme Agriculture 4.0, which, therefore, occurred a few years later. The monitoring of this issue has been carried out by the Company's employees through initiatives demanded by Research and Development (R&D) projects and more recently signaled by the Units and Portfolio managers, who have warned of the need to update and master the interdisciplinarity of different areas of new knowledge.

In a society where digital transformation is taking place in an extremely dynamic way, support from countries such as Japan on the following topics is essential:

- a) Training in agricultural and digital automation.
- b) Training on agricultural data platform.
- c) Training in data architecture and data security.
- d) Training in HPC (High Performance Computer).
- e) Training in design and development of agricultural machinery and equipment for small producers, including electrical controls to carry out communication between vehicles and coupled implements (ISOBUS – ISO 11783).
- f) Training to expand and improve the use of agricultural robots, drones in crops, satellite remote sensing and the processing and analysis of the data obtained.
- g) Training in Computational Intelligence applied to the Value Chain in the *Agro* Sector.
- h) Training in Deep Learning: image classification models and regression models (spectrum calibration analysis).
- i) Sustainability training and ESG reporting for *Agro*.
- j) Training in carbon market for *Agro*.

5.3.3 Equipments

The project can, through those involved counterparts, engender efforts to raise funds and enable the acquisition of strategic equipment in order to contribute to achieving the expected results, and show the sustainability of its processes, enabling the conception and implementation of the platform:

- Compatible computer system for development (complementary to the existing one) and implementation of an agricultural data platform built collaboratively between Brazil and Japan.

- Systems for monitoring and digitizing the field, agricultural production and operations carried out on the farm.

5.3.4 Trips

It is estimated exchange trips between technicians from both countries, from institutions such as MRE, MAPA and Embrapa, as well as specialists from Agritechs and equivalents from Japan. The strategy of encouraging partnerships through exchanges should favor the participation of highly qualified companies.

5.3.5 Publications

Publications are key materials to publicize the progress and results of the project, as well as recognition of Japan's assistance. In addition to the dissemination of partial results at events such as field days, congresses and fairs, there will be a need for publication to carry out a wide dissemination and to invite Agritechs to participate in a Workshop, in which it is intended to select those who present the best attributes to contribute to the project and exchange.

Result 4 will be the component that will most demand publications and dissemination events to promote the use of data-generating technologies and also the use of the data platform. There are no or very limited educational publications within Precision and Digital Agriculture to help train specialists. This material would be essential for these specialists to be prepared for the field. This limitation is considered one of the important obstacles that impede the development of the theme. Didactic material must be looked for both in the country and abroad to provide appropriate literature.

5.3.6 Events

There are two Results to whose achievement events are critical to: Result 2 Innovation Ecosystem and Result 4 Transfer and Diffusion.

Result 2 will hold a Workshop where it is expected to select startups from Brazil and Japan, present a proposal to mentors and investing companies, so that they are selected in our acceleration program in an integrated way to the construction of the platform (Result 1) and in the development of the proofs of concept in verticals. In this case, the target audience are the Agritechs and interested companies.

The second type of event is dissemination and transfer. They can be integrated with traditional agricultural events in Brazil and Japan (fairs, symposia and congresses), as well as training of multipliers, field days in face-to-face or virtual processes. In this case, the target audience is agricultural producers, potential customers of Agritech and users of the platform.

It is worth mentioning that the development of the project and the experience accumulated during its execution may require adjustments in the forms of support from the external source.

SECTION 6:

OFFERED COUNTERPART

6.1 Personal

Brazil has a complex agricultural production infrastructure with sectors and supply chains for inputs and organized distribution, storage and marketing, adapted to the regions and their products. Companies and Universities strengthen innovation ecosystems. Embrapa, the executor of this proposal, followed the evolution of current agriculture and created capillarity in practically all *Agro* production sectors.

Embrapa Instrumentação, located in the city of São Carlos, SP, has a National Reference Laboratory in Precision Agriculture and coordinates a network that gathers more than 20 research centers and more than 100 researchers and other partners. In the Digital Agriculture theme, in addition to

incorporating Precision Agriculture as one of its enablers, Embrapa Digital Agriculture was established, located in Campinas, SP, which has 54 researchers.

These two Units, due to their transversal character, with their basic themes, operate in all Brazilian regions and in all products.

6.2 Training

Brazil has been conducting sustainable technologies such as no-till, Integration Crop Livestock and Agroforestry systems, as well as adjusting Precision Agriculture within the Brazilian reality. Its dissemination is strategic to increase the number of adopters and contribute by interacting with data with the platform to be developed. The infrastructure and Brazilian specialists are the counterpart to carry out the trainings.

6.3 Permanent material

Embrapa has two laboratories that are able to assist and support most of the activities planned in this project.

National Reference Laboratory in Precision Agriculture (Lanapre)

1.6 thousand square meters of built area

3 thousand square meters of patio,

Installed in the Experimental Field in Agricultural Automation of 5 hectares

It works with implements, sensors and actuators with electronics embedded in the ISOBUS international standard.

Infrastructure for Drones focused on collecting aerial images in different bands of the light spectrum.

It works in the processing of aerial images for diagnosis of plantations.

Integrates training of multipliers in Precision Agriculture.

Embrapa Digital Agriculture Datacenter.

50 square meters area

20 IT racks with 42Us

4 air conditioning machines

2 modular UPSs with 90KW

2 independent electrical circuits (X and Y)

Cold air containment system

Fire prevention and fighting system

Biometric access control

2 Internet links (100Mbps and 1Gbps)

In addition to the infrastructure and equipment available at Embrapa, the project's strategy is to use the infrastructure and equipment of the production system (farms) to obtain data.

6.4 Installations

The main Embrapa Units that will participate in the project have an infrastructure that allows for face-to-face and virtual meetings. The pandemic favored the maturing of the use of this type of tool. Embrapa's partnership with the private sector is always well cultivated. Many of the main experiments in the field of Precision Agriculture are carried out on farms, which expands the infrastructure needed for this project.

6.5 Trips

The development processes of the platform and its APIs will largely be implemented at the datacenter terminals, which can also provide remote access, which favors a reduction in travel.

The strategy of conducting proof of concept activities in the three verticals on several farms will require an almost constant presence to accompany and monitor the systems installed or to be installed in the field, which in this case requires a significant amount of travel, in addition to holding events such as field days, training and workshops at these locations.

Specialists from various Embrapa Units and other institutions will be invited to train Agritechs in Result 2, which requires financial support.

Result 4 - Dissemination and Transfer will carry out a significant amount of training in order to disseminate the use of PA, DA and SAF concepts, which requires a number of trips.

6.6 Publications

Embrapa has a Communication Superintendence (SUCOM), responsible for the Company's communication. This secretariat coordinates local, regional and national matters. Until October 2021, Embrapa was mentioned in 89,575 online and printed articles, according to a survey presented by the Strategic Communication Management of the aforementioned secretariat, and if this monthly average persists, the trend is to exceed 100 thousand in 2021. This demonstrates the capillarity of Embrapa in publicizing in the media.

In addition to these publications in the various media, the data processing methodologies to be developed in the project are expected to be completed, validated and published in appropriate media.

6.7 Events

Result 2 and Result 4, despite their different natures, will be the ones that will hold the most events.

Result 2 will hold training events with a target audience focused on the organization of *Agro* startups. The events are intended to attract young entrepreneurs with the potential to innovate Brazilian *Agro*, within the verticals of the project and help in the achievement of proofs of concept.

Result 4, on the other hand, targets the productive sector that meets the project's verticals and accelerates the use of the platform, increasing productivity and sustainability in the field.

6.8 Translation / interpreters

The use of the English language should be the communication standard for the project. In exceptional cases, a translator/interpreter may be required, so that good communication between Brazilians and Japanese takes place. Noting that for professionals in the agricultural or even technology areas, mastery of the English language will not necessarily be required, which will entail the need for translation at meetings. Regarding the exchange of written information, automatic translation tools may be useful.

6.9 Infrastructure works

There is no demand for works. The existing infrastructure is understood to meet the project demands.

SECTION 7

PROJECT BUDGET

Total Estimated Budget: US\$10,611,371.03

Financial contribution from the external source (US\$): 5,023,450.26.

Brazilian non-financial counterpart (US\$): 4,328,701.49

Fundraising: US\$1,259,219.28

Such compensation does not imply extraordinary use of budgetary resources, only being limited to the compilation of resources already foreseen to be executed in the institutions within the scope of the implementation of their current policies.

The total budget is estimated and could be updated according to the project implementation.

SECTION 8:

MANAGEMENT, MONITORING AND EVALUATION MECHANISMS

8.1 Project management structure

The project management structure that is established in the record of discussions (RD) between the Government of Japan and the Government of Brazil signed on April 27, 2021, and Minutes of Meetings signed on May 2022, was adapted for this PCT according to the diagram in Figure 5.

Chairman of the Joint Coordinating Committee - JCC

Position: Secretary

Secretariat of Innovation, Sustainable Development, Irrigation and Cooperativism - SDI
Ministry of Agriculture, Livestock and Supply - MAPA

Assignment: overall responsibility for managing and coordinating the implementation of the Project by the Brazilian side, in agreement with the funding institution.

Deputy Chairman of the Joint Coordinating Committee

Position: President

Presidency of the Brazilian Agricultural Research Corporation (Embrapa)
Ministry of Agriculture, Livestock and Supply - MAPA

Attribution: responsibility for the management and implementation of the Project by Embrapa.

Project Director for the Brazilian side

Position: Deputy Secretary

Secretariat of Innovation, Sustainable Development, Irrigation and Cooperativism - SDI
Ministry of Agriculture, Livestock and Supply - MAPA

Attribution: responsibility for the management and implementation of the Project by MAPA.

Deputy Director(s) of the Project on the Brazilian side

Position: Director

Department of Innovation Support for Agriculture - DIAGRO
Secretariat of Innovation, Sustainable Development, Irrigation and Cooperativism - SDI
Ministry of Agriculture, Livestock and Supply - MAPA

Attribution: responsibility for the management and implementation of the Project by MAPA.

Project's coordinator

Position: Researcher

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Brazilian Agricultural Research Corporation (Embrapa)
Ministry of Agriculture, Livestock and Supply - MAPA
Assignment: responsibility for the management and implementation of the Project.

Assistant Coordinator(s)

Position: Researcher
Embrapa Digital Agriculture
Brazilian Agricultural Research Corporation (Embrapa)
Ministry of Agriculture, Livestock and Supply - MAPA
Assignment: responsibility for the management and implementation of the Project.

Brazilian technical team

Position: Researcher or analyst
Brazilian Agricultural Research Corporation (Embrapa)
Ministry of Agriculture, Livestock and Supply - MAPA
Advisors to the Coordinators, who act as focal points of support to the Brazilian Coordinator (and Assistant Coordinators, if any) of the project, depending on the components, Results of the project or departments of the Brazilian institutions involved in its execution. Focal points can contribute to project management regarding the coordination of work and dialogue between the Brazilian teams and the external source.
Assignment: carry out the technical activities of the project, such as: contributing to the preparation of the diagnosis, project design, Annual Work Plans, project monitoring and evaluation, reporting, information sharing, etc., under the coordination and in articulation with the coordinators of the project, and in conjunction with experts from the external source.

Coordinator of the external contribution to the project

Position: Chief Representative
JICA Brazil Office
Japan International Cooperation Agency
Attribution: Coordinates the work of experts and consultants provided by the external source in the project, in articulation with the Brazilian Director and Coordinator (and Deputy Coordinators, if any). Project executive strategic decision by the external source.

External source technical team

Position: Project Experts as described in item 5.3.1.
JICA Brazil Office
Japan International Cooperation Agency
Attribution: contribute to the elaboration of the diagnosis, project design, Annual Work Plans, project monitoring and evaluation, report, information sharing, etc. under the coordination and in articulation with the project coordinators, and jointly with the Brazilian technical team.

Brazilian Cooperation Agency

As a department of the Ministry of Foreign Affairs responsible for monitoring official bilateral technical cooperation, ABC will have the function of guiding Brazilian institutions on political, technical and procedural aspects related to the preparation, negotiation, processing, implementation, monitoring and evaluation of the project; monitor the development of your activities.

Joint Coordinating Committee

A Joint Coordinating Committee shall be established to facilitate inter-agency coordination. Indicate their attributions, members (includes ABC representative), indicate position, division/department; indicate the frequency of meetings (at least once a year); appoint the leader of the Committee, from the Brazilian executing institution. Typical duties of this Committee are:

- Review and approve the annual work plan, Progress Report, including its changes
- Evaluate and decide on changes to the scope and design of the project, review and approve the Project Document Review
- Review overall project progress

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- *Exchange views on key issues that arise during its implementation*
- *Socialization of the annual rendering of accounts, which each partner prepares according to its respective system*
- *Approval of the monitoring methodology and terms of reference for external evaluation of the Project, if any*
- *Provide political, strategic, technical and operational guidance for the project.*
- *Discussion on budget planning and Socialization of the annual budget, which each partner prepares according to its respective system*
- *Institutional support for international missions within the scope of the project*
- *Political and institutional articulation*

Management Unit

A Management Unit shall be established, with the function of carrying out the systematic and continuous coordination of the project and to facilitate inter-institutional coordination. Indicate their attributions, members Indicate position, division/department; indicate the frequency of meetings (at least once a year); appoint the Unit leader, from the Brazilian executing institution. Typical assignments of this instance are:

- *Coordinate the execution of the project, making adjustments when necessary, according to the Annual Work Plan*
- *Conduct monitoring and evaluation and review the overall progress of the project as well as the scope of implementation of the Annual Work Plan*
- *Formulate Annual Work Plan and Progress Report, including any changes*
- *Evaluate and propose any changes to the scope and design of the project, formulate the Review of the Project Document*
- *Propose monitoring methodology*
- *Discuss and approve the hiring of consultants and services*
- *Provide technical and operational guidance for the project*
- *Propose and manage "in-kind" budget and resources*
- *Designate a coordinator to manage the activities for each of the four Outcomes. Namely: A coordinator for Result 1 Data Platform; a coordinator for Result 2 Innovation Ecosystem; a coordinate for Result 3 Proofs of Concept; and a coordinator for Result 4 Dissemination and Transfer*
- *It will be at the discretion of each of the Results coordinators to designate a person in charge for each of the verticals and compose the respective sub-committees. The person responsible for verticals must interact with the vertical managers of each of the results*

Representatives

Nature of relationships	Focal points Brazilian institutions	Focal points Foreign international cooperation agency
Joint Coordinating Committee - JCC	President (Secretary - SDI/MAPA) Deputy President (President - Embrapa) ABC: General Coordinator of CRB	JICA Brazil office representative
Management Unit	Project Director (DIAGRO-SDI/MAPA) Deputy Project Director (DIAGRO-SDI/MAPA) Project coordinator (Embrapa Instrumentação) Assistant project coordinator (Embrapa Digital Agriculture) Brazilian Cooperation Agency	JICA Brazil office representative
Group of Technical Execution	Brazilian Technical Team (Embrapa) Implementers (public/private institutions, AgriTechs, NGOs and relevant actors for implementation)	Technical Team External Source (JICA Brazil)

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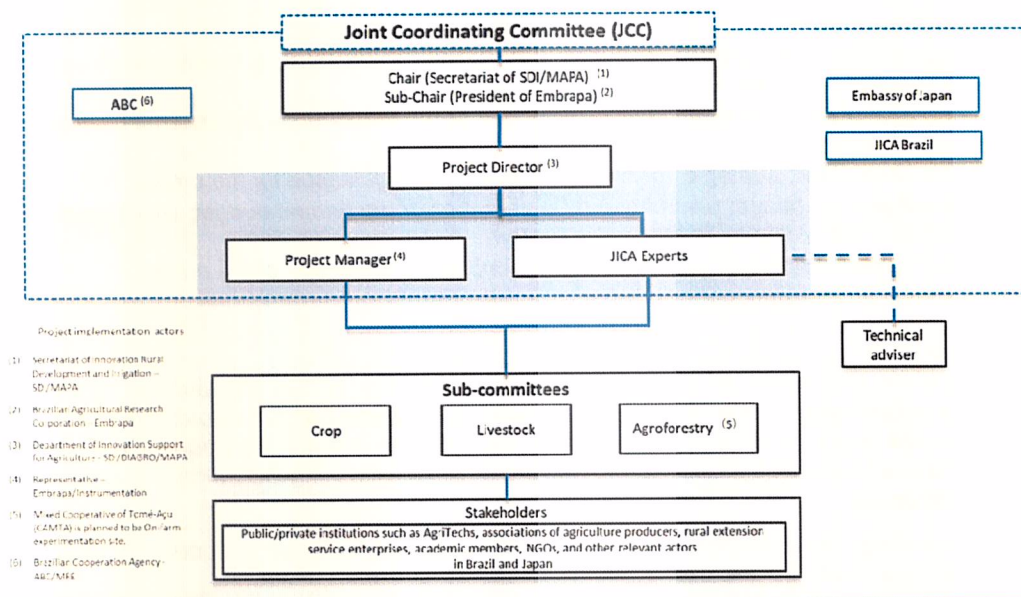


Figure 5. Joint Coordinating Committee, Management Unit and Technical Execution Group organized in a hierarchical structure adapted from the figure in Annex 4 of the MM.

Communication Flow

The strategic definition of the communication flow, internal and external, from the beginning of the project, is a crucial point for the best achievement of its objectives. For better understanding, we define internal communication as that directed to the project executors, that is, the P&D team, C&T institutions and partner companies. External communication, on the other hand, is subdivided into that aimed at the final consumer and that which will be conveyed in a personalized way to the links of the livestock production chains, crops and agroforestry production systems.

There are two goals for internal communication. The first objective is for the evolution of activities to be monitored by the JCC, making it possible to monitor and carry out its attributions. Just like the JCC, it is for the Activities Management Unit, the monitoring of activities is essential. For this flow to occur in the most natural way, the manager of the activities of each of the Results (1, 2, 3 and 4) must register their status, reporting the progress of the schedule. The second objective of internal communication is the integration of vertical activities. During the Workshops with Agritechs that will take place annually within Result 2 Innovation Ecosystem, there will be a meeting to synchronize the activities that belong to Result 1 Data Platform, Result 3 On-Farm Experimentation and Result 4 Divulcation and Transfer.

As it is essential that information flow properly in the structure of the organization chart illustrated in Figure 4 through hierarchical communication, all information on the project progress and activity status must be transparent and constantly updated in the form of a dashboard. The teams performing the activities must meet before, during and at the end of the activity for evaluation and adjustments.

Especially in this project, where the open and disruptive innovation component has great amplitude, there is a need for the target audience to have access to the generated knowledge and marketing information, always in an agile and updated way in the most far-reaching communication channels.

Embrapa has a very well-structured communication area, made up of a large team of journalists, public relations and content designers specialized in C&T and marketing communication. Each of the 43 research units throughout Brazil has an Organizational Communication Center (NCO). At Embrapa's headquarters in Brasília, there is a team that coordinates corporate communication, managing the channels on Facebook, Twitter and YouTube; in addition to producing various content for TV (Field Day on TV) and radio (Prosa Rural). Agricultural fairs, congresses, technical events, demonstration units and publications complete all the means that will be available for this project to

establish the best content and appropriate media so that the particular message has the desired impact on the target audience.

It is worth mentioning that internal communication will also benefit from the periodic meetings of the teams, as well as the evaluation workshops described in item 8.5.

8.1.1 Functions

8.2 Monitoring

Project progress monitoring will be carried out jointly and regularly by the Brazilian and Japanese parties, through the Project Monitoring Worksheets based on the Project Logical Matrix and Activity Plan. The Project Monitoring Worksheets will be reviewed every 6 months and a monitoring report will be forwarded to the Brazilian Cooperation Agency (ABC).

The implementation of monitoring actions to the execution of this project may be funded with the ABC's financial resources from the General Coordination of Technical Cooperation and Partnerships with Developed Countries (CGTP).

8.3 Project reviews

If the need for a Project Review is confirmed, a meeting of the Joint Coordinating Committee will be convened for discussion, analysis and approval of the matter and all the signing parties of the Project will sign the Review document. In case of engagement of new co- executing institutions on the Brazilian or Japanese side, this may be concluded by means of an Addendum to the Project Document.

8.4 Project closure

The Brazilian and Japanese parties will jointly carry out the Final Project Assessment in the three months prior to the termination and will prepare the Project Completion Report to be sent to the JICA Brazil office. This report must include the forwarding of actions that will maintain the perpetuity of the platform, the exchange of Agritechs and, finally, a virtuous growth of PA and DA. After carrying out the internal review, the content of the Project Completion Report must be approved at the project closing meeting of the Joint Coordinating Committee.

8.5 Intellectual Property

Regarding Intellectual Property, the rights of each party over assets prior to the project must be respected and any assets that may be developed within the scope of the partnership, subject to intellectual protection, must be dealt with by the Joint Coordinating Committee.

8.6 Evaluation

There are three assessments planned for the Project execution:

- 3 Intermediate Evaluations – An evaluation Workshop at the end of each year to verify the activities performed and identify necessary adjustments to correct possible failures and ensure deliveries within the established deadlines.
- Final Evaluation - Closing workshop to verify compliance with the goals and objectives established in the Project.
- Post-Project Evaluation - Check the impacts generated in the production chains through a satisfaction survey of the main links.

The definition of the Terms of Reference for the evaluations will be agreed between JICA, Embrapa, MAPA and MRE. The institutions and professionals who will carry it out must be of significant notoriety and reference in the areas of Precision Agriculture, Crop, Livestock and Agroforestry.

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JICA and counterparties will jointly and regularly monitor the progress of the Project through the Project Monitoring Sheets (Annex 6), based on the Project Design Matrix (PDM) and the Operational Plan (OP). Monitoring Sheets will be reviewed every six (6) months.

JICA's counterparties and Experts will jointly conduct the Project's Terminal Assessment, prepare the Project Completion Report (PCR) (Annex 7) and submit it to JICA's Brazilian office three months prior to Project completion. After JICA's internal PCR review, the PCR content will be approved in the final JCC.

VOCABULARY

Glossary and Concepts

Agri Trace – Integrated traceability system. It is a certification program brought together by CNA/SENAR and is integrated into the Voluntary Adhesion Traceability Protocols (Decree 7623/2011) <http://ranimal.cnabrazil.org.br/>

Agritech - According to Radar AgTech): AgTech and AgriTech, acronyms for —agricultural technologyll in English, generally more related to the on-farm and on-farm segments; FoodTech, acronym for —technology applied to foodll in English, generally more related to the segments after the farm; and Agri-FoodTech, an acronym that emphasizes the inclusion of the entire chain (<https://radaragtech.com.br/> consultation held on Feb. 04, 2022).

Agro - *Agro* is the set of agricultural, livestock and forestry value chains that can include a wide range of activities: development and dissemination of plant and animal genetic material, logistics and supply of inputs, organization of farmers, agricultural production technologies, management of post-harvest, processing, supply of production and handling technologies, standards and sorting processes, cooling and packaging technologies, post-harvest local processing, industrial processing, transport and storage logistics, finance and feedback from markets.

Agroforestry Systems - Based on the experience of Japanese immigration in Tomé-Açu, the implementation of agroforestry systems (SAFs), which consists of the combination of crops perennials, is an adequate system to occupy degraded areas. The concept of SAFs understood as a combination of perennial plants must also be evaluated in a macro-regional view with sets of monocultures.

CAR - Rural Environmental Registry is a public electronic record, mandatory for all rural properties, with the purpose of integrating with environmental information of rural properties and possessions, composing a database for control, monitoring, environmental and economic planning and combating deforestation (<https://www.gov.br/pt-br/servicos/inscrever- imovel-rural-no-cadastro-ambiental-rural-car> - <https://www.car.gov.br/#/>)

MVP - Minimum Viable Product – It is a business administration methodology that consists of launching a new product or service with the lowest possible investment, to test the business before making large investments. An MVP is a minimal version of the product, with only the necessary functionality for it to fulfill the function for which it was designed. From the MVP, the efficiency of the product, its usability, market acceptance, comparison with the competition, among other forms of validation, are tested. (<https://www.significados.com.br/mvp/> consultation held on Oct. 27, 2021)

On-farm experimentation - It is a scientific method that, starting from a hypothesis, consists of the observation and classification of a phenomenon under controlled conditions in the production system in rural properties. The hypothesis in the case of this project is the confirmation of the possibility of using the platform to store data and support and facilitate the analysis of field operations, as well as using this data to enable audits in ESG reports and certifications.

Pronasolos - is the largest Brazilian soil investigation program and will consolidate data integration and collaborate with the advancement of knowledge of land in Brazil. The lack of detailed information on Brazilian soils is a limiting factor for national development. (<http://pronasolos.agenciazetta.ufla.br/o-programa> <https://www.embrapa.br/en/pronasolos>)

RFID Radio Frequency Identification - Identificação por Radiofrequência. Data collection system, in this case the identification of an object with an —RFIDll device, which uses the radio signal to perform such a task.

Sisbov – Brazilian System of Individual Identification of Cattle and Buffalo <https://www.gov.br/agricultura/pt-br/assuntos/saude-animal-e-vegetal/saude-animal/rastreabilidade-animal/sisbov>

Vertical - in this project it was used as a term that defines the transversality of area or agribusiness segment that limits in a scope of application the activities of platform development (Output 2), ecosystem (Output 1), on-far experimentation (Output 3) and dissemination (Output 4).

ZARC, Agricultural Zoning of Climate Risk. Method developed by Embrapa and partners, officially applied in Brazil since 1996, through the Ministry of Agriculture, Livestock and Supply - MAPA, provides the indication of dates or periods of planting/sowing more favorable by culture and by municipality, considering the characteristics of the climate, soil type and cultivars cycle, minimizing agricultural losses. (<https://www.embrapa.br/en/busca-de-solucoes-tecnologicas/-/produto-servico/3933/zoneamento-agricola-de-risco-climatico---zarc>)

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ANNEXES

Annex 1: List of activity steps and detailing (there may be changes during the execution of the project as an adjustment process during the evolution of activities)

Level	Project stages divided into levels of detail
1.	Result 1: Data Platform
	Objective - Creation of the data platform and APIs
1.1	Mapping of information from the Japan's platform
1.1.1	Training on the Japan's platform
1.1.2	Japan's platform Information Mapping Report
1.2	Mapping of information from the AgroAPI platform
1.2.1	Training on the AgroAPI platform
1.2.2	AgroAPI information mapping report
1.3	Exchange of information BR and JAP
1.4	Platform conceptual model
1.4.1	Platform typification
1.4.1.1	Functional Typification
1.4.1.2	User-based grading
1.4.1.3	Typification based on the types of data collected
1.4.1.4	Typification based on actions taken with the data collected
1.4.1.5	Classification based on revenue sources
1.4.2	Data ingestion
1.4.2.1	Identification of data standards and interoperability
1.4.2.2	Identification of software for agriculture that allows the interconnection of different software and hardware systems
1.4.2.3	Definition of architecture and protocol for the ingestion and storage of collected raw data
1.4.3	Data quality
1.4.3.1	Identification and definition of data quality attributes and criteria
1.4.3.2	Defining data quality reports
1.4.4	Proposition of business models and legal framework
1.5	Integration between AgroAPI and Japan's platform
1.5.1	Service integration
1.5.1.1	Identification and specification of standards for the integration of services between platforms
1.6	Survey and specification of requirements for APIs for each vertical
1.6.1	Identification, mapping and specification of requirements for the Agroforestry vertical (activity integrated to Result 3: Proof of Concept)
1.6.2	Identification, mapping and specification of requirements for the Crop vertical (activity integrated to Result 3: Proof of Concept)
1.6.3	Identification, mapping and specification of requirements for the Livestock vertical (activity integrated to Result 3: Proof of Concept)
1.6.4	Reporting of identified, mapped and specified requirements
1.7	Specification and integration of APIs on the platform
1.7.1	Exposure of data and services

1.7.1.1	Definition of architecture, standards and protocol for exposing data and services (APIs)
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1.7.1.2	Dashboard definition for data access and visualization
1.7.2	Analytics
1.7.2.1	Toolkit definition for traditional data analysis
1.7.3	Machine learning
1.7.3.1	Definition of computational environment for the execution of machine learning models in application mode
1.8	Development of applications for data analysis and presentation
1.8.1	Database
1.8.1.1	Maintenance of data and metadata for Agroforestry vertical (test and validation in the field)
1.8.1.2	Maintenance of data and metadata for Crop vertical (test and validation in the field)
1.8.1.3	Maintenance of data and metadata for Livestock vertical (test and validation in the field)
1.8.2	Analytics and Machine Learning
1.8.2.1	Development of models for crop management
1.8.2.2	Development of models to support field operations in the field
1.8.2.3	Development of models for predicting animal performance and management
1.8.2.4	Development of models to support field operations in agroforestry
1.8.2.5	Development of models related to audits: identification of data veracity, carbon emissions, sustainability, SAF accounting
1.8.3	API implementations
1.8.3.1	Implementation of models for crop management
1.8.3.2	Implementation of models to support field operations in the field
1.8.3.3	Implementation of models for performance prediction and animal management
1.8.3.4	Implementation of models to support field operations in agroforestry
1.8.3.5	Implementation of audit-related models
1.8.4	Data presentation
1.8.4.1	Development of applications for data presentation based on Geographic Information Systems
1.8.4.2	Development of applications for presenting detailed data at different levels based on Dashboards
1.8.4.3	Development of applications to present consolidated data to support audits
1.9	Data security on the platform
1.9.1	Reliability assurance procedures
1.9.1.1	Implementation of physical protection procedures for equipment
1.9.1.2	Implementing user and group access controls
1.9.1.3	Implementation of network access controls
1.9.1.4	Implementation of access controls by data classification
1.9.2	Procedures for guaranteeing authenticity
1.9.2.1	Implementation of authenticity control in the insertion and updating of data
1.9.2.2	Implementation of constant verification control of entered and updated data
1.9.3	Integrity assurance procedures
1.9.3.1	Implementing controls to ensure data originality
1.9.3.2	Implementation of controls using digital signature mechanisms
1.9.4	Compliance Assurance Procedures
1.9.4.1	Implementation of controls to ensure data manipulation in accordance with current legislation
1.10	Data Center Update

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2.	Result 2: Innovation ecosystem
	Objective - Fostering the innovation ecosystem in agriculture

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2.1	Project integration workshop
2.1.1	Plan and execute opening event involving staff from all verticals (Agroforestry, Live-stock and Crop)
2.1.2	Prepare a summary report of the event (evaluate and adjust the next activities)
2.2	Team workshop focusing on Agroforestry, Livestock and Crop verticals
2.2.1	Define the demands and challenges of the Agroforestry vertical in a workshop
2.2.2	Define demands and challenges of the Livestock vertical in a work workshop
2.2.3	Define the demands and challenges of the Crop vertical in a work workshop
2.2.4	Demand mapping report
2.3	Public notices for choosing Agritechs for Agroforestry, Livestock and Crop verticals
2.3.1	Develop a call for proposals for the Agroforestry vertical (activity integrated into Result 3: Proof of concept)
2.3.2	Develop a call notice for the Livestock vertical (activity integrated into Result 3: Proof of concept)
2.3.3	Prepare a call for tender for the Crop vertical (activity integrated into Result 3: Proof of concept)
2.3.4	Execute Public Notices (open and elect)
2.3.5	Drafting of partnership contracts
2.4	Agritechs mentoring process for each vertical
2.4.1	Initial guidelines for Agritechs
2.4.2	Training for Agritechs for the Agroforestry vertical (activity integrated to Result 3: Proof of concept)
2.4.3	Training for Agritechs for the Livestock vertical (activity integrated into Result 3: Proof of concept)
2.4.4	Training for Agritechs for the Crop vertical (activity integrated into Result 3: Proof of concept)
2.4.5	Training on AgroAPI and WAGRI Japan's platform
2.4.6	Mentoring
2.5	Exchange BR and JP
2.5.1	Identify the main professional training opportunities
2.5.2	Identification of Japanese companies and institutions with potential for interaction
2.5.3	Establish a collaborative innovation promotion program between Brazil and Japan.
2.5.4	Establish a knowledge and training exchange program between the Japanese and Bra-zilian parties.
2.6	Documentation
2.6.1	Report generation
2.6.2	Preparation of publications
2.7	Execution of proofs of concept - meeting vertical challenges
2.7.1	Work plan for each Agritechs
2.7.2	Development and monitoring for each Agritechs
2.7.3	Finalization for each Agritechs
2.7.4	Test for each Agritechs
2.7.5	Field day or field validation
2.7.6	Launch for each Agritechs
3.	Result 3: Proof of Concept

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	Objective: Conduct a case study and enable test of data entry of the platform and deliver scope to Result 2 and Result 4
3.1	Establishment of an Agreement with Companies (objective: to obtain stakeholder involvement, including financial support when this is possible)
3.1.1	Expansion of contacts and establishment of agreements with Companies - Crop vertical
3.1.1.1	Amagi

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3.1.1.2	Scheffer
3.1.1.3	SLC
3.1.1.4	Others
3.1.2	Expansion of contacts and establishment of agreements with Companies - Livestock vertical
3.1.2.1	JBL
3.1.2.2	BRF
3.1.2.3	Marfrig
3.1.2.4	Minerva
3.1.2.5	Others
3.1.3	Expansion of contacts and establishment of agreements with Companies - Agroforestry vertical
3.1.3.1	CAMTA
3.1.3.2	Others
3.1.4	Drafting and signing of agreements
3.1.5	Financial management after fundraising
3.1.5	Crop vertical
3.1.5	Objective - Process of inserting AP data into the Platform for data extraction for audit generation
3.2	Definition of Farm for Crop vertical
3.2.1	Search and check of Farm with desirable requirements
3.2.1.1	Maturity assessment in the use of Precision Agriculture
3.2.1.2	Evaluation in the regular use of machines and services in Precision Agriculture
3.2.1.3	Assessment of support teams with the possibility of communication and exchange of information
3.2.1.4	Assessment in the availability of data and information through a confidentiality and use agreement
3.2.1.5	Assessment of the degree of commitment in ESG reporting and sustainability certifica- tion
3.2.1.6	Location assessment - Ease of access
3.2.2	Establishment of partnership agreement
3.2.2.1	Agree to use Company data and information
3.2.2.2	Agree access to the Embrapa data platform base
3.2.2.3	Agree an agenda of periodic meetings to monitor the progress of implementation
3.2.2.4	Agree a calendar of activities and follow-up
3.3	Choice of Agritecs for Crop vertical
3.3.1	follow public notices
3.4	API design/specification - MVPs for Crop vertical
3.4.1	Develop a list of available hardware and equipment
3.4.2	Conduct a survey of types of data and files used by the market (activity integrated into Result 1: Platform)
3.4.2.1	Property contour map
3.4.2.2	Satellite Images
3.4.2.3	Drone images (multi and hyperspectral)
3.4.2.4	Harvest maps (different formats and versions)
3.4.2.5	Input application maps (seed, fertilizer, agrochemical)
3.4.2.6	Soil sampling and analysis maps

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3.4.2.7	Pest sampling maps
3.4.2.8	irrigation map
3.4.2.9	Rain/weather maps
3.4.2.1	Apparent electrical conductivity map of the soil

3.4.2.11	Field operation schedule map
3.4.2.12	Maps with proprietary data
3.4.3	Elaborate an initial definition for the data formats that will be worked with the farm
3.4.4	Design Data Organizer Specification - User Interface
3.4.4.1	Design of the database and Apps (activity integrated into Result 1: Platform)
3.4.4.2	Define APIs for data compatibility (activity integrated into Result 1: Platform)
3.5	Software development project for Crop vertical
3.5.1	Definition of data acquisition and storage process (satellite, drone, machines, ground, field)
3.5.2	Definition of data analysis process (cleaning, pattern extraction, model generation, validation)
3.5.3	Process definition for data certification and auditing
3.5.4	Process definition for information presentation (GIS, Dashboards)
3.6	Validation by the Farms for Crop vertical
3.6.1	Validation of models developed in APIs through applications (mobile)
3.6.2	Validation of models developed in APIs through web applications
	Livestock vertical
	Purpose - Sending an identifier (biometric or otherwise) with geolocator and time of identification to the Platform
3.7	Definition of Farm for Livestock vertical
3.7.1	Desirable Farm Requirements
3.7.1.1	Desirable use of Sisbov or private protocol (Bovine Identification Guarantee Protocol) and chip
3.7.1.2	Regular use of scales and animal management software
3.7.1.3	Support teams with the possibility of communication and exchange of information
3.7.1.4	Availability of data and information through a confidentiality and use agreement
3.7.1.5	Length in ESG reporting and sustainability certification
3.7.1.6	Location - Ease of access
3.7.2	Establishment of partnership agreement
3.7.2.1	Use of Company data and information
3.7.2.2	Access to the Embrapa database platform
3.7.2.3	Periodic meetings to monitor the progress of implementation
3.7.2.4	Activity calendar and follow-up
3.8	Choice of Agritecs for Livestock vertical
3.8.1	Creation of Public Notice/Scope
3.8.2	Drafting a partnership agreement
3.9	API Design/Specification - MVPs for Livestock Vertical
3.9.1	List of available hardware and equipment
3.9.2	Survey of data types and files used by the market
3.9.3	Initial definition for the data formats that will be worked with the farm
3.9.4	Data Organizer Specification - User Interface
3.9.4.1	Design of the database and Apps (activity integrated into Result 1: Platform)
3.9.4.2	Define APIs for data compatibility (activity integrated into Result 1: Platform)
3.1	Data acquisition system design for livestock vertical
3.10.1	Biometric reader development (2D, 3D image or others)
3.10.2	Required hardware feature for image taking
3.10.2.1	Study/survey of alternatives
3.10.2.2	Camera quality (resolution, brightness, viewing angle, sample rate, environmental protection, etc.)

3.10.2.3 Local processing/storage (remote access)

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3.10.2.4	Communication/data transmission (capacity of transmission distance/ baud rate)
3.10.2.5	Installation system alternatives and energy availability
3.10.3	Location/positioning of systems on the farm (weighing, trough, etc.)
3.10.3.1	Study of equipment positioning/location alternatives
3.10.3.2	Quantities of cameras to obtain 3D
3.10.3.3	List of sampling points (aisle, trough, scale, etc.)
3.10.4	Detailed project for the implementation/installation of the data acquisition system on the farm
3.10.4.1	Towers and support infrastructure
3.10.4.2	Communication design (signal coverage)
3.10.4.3	Signal transmission/communication system for the Platform (blockchain?)
3.10.5	Acquisition of equipment
3.10.6	Infrastructure implementation
3.10.7	Communication tests
3.11	API Design/Specification - MVPs for Livestock Vertical
3.11.1	Initial definition for the data formats that will be worked with the farm
3.11.2	Data Organizer Specification - User Interface
3.11.2.1	Database and app design
3.11.2.2	APIs for data compatibility
3.11.3	Compatibility with field/herd/animal operations management systems
3.11.4	Minimal data system
3.11.4.1	Birth registration (Bull, cow, date of birth, place, weight, etc.)
3.11.4.2	Weaning (Date, location, weight, earing id, chip id, etc.)
3.11.4.3	Create (Date, location, weight, id, etc.)
3.11.4.4	Recreate (Date, location, weight, id, etc.)
3.11.4.5	Fattening (Date, location, weight, id, etc.)
3.12	Software development project for the Livestock vertical
3.12.1	Definition of data acquisition and storage process (satellite, animal weight, animal physiological data, inputs)
3.12.2	Definition of data analysis process (cleaning, pattern extraction, model generation, validation)
3.12.3	Process definition for data certification and auditing
3.12.4	Process definition for information presentation (GIS, Dashboards)
3.13	Field validation for vertical Livestock
3.13.1	Validation of models developed in APIs through applications (mobile)
3.13.2	Validation of models developed in APIs through web applications
	Agroforestry vertical
	<i>Objective - Digitization of the inventory and monitoring of agroforestry to account for carbon sequestered from the CAMTA system</i>
3.14	Digitization of properties registered with CAMTA and that will participate in carbon accounting
3.14.1	Establishment of partnership agreement
3.14.1.1	Use of Company data and information
3.14.1.2	Access to the Embrapa database platform
3.14.1.3	Periodic meetings to monitor the progress of implementation
3.14.1.4	Activity calendar and follow-up
3.15	Choice of Agritecs for Agroforestry vertical
3.15.1	Creation of Public Notice/Scope
3.15.2	Drafting a partnership agreement
3.16	API design/specification - MVPs for Agroforestry vertical

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3.16.1	List of available hardware and equipment
3.16.2	Survey of data types and files used by the market
3.16.3	Initial definition for the data formats that will be worked with the farm
3.16.4	Data Organizer Specification - User Interface
3.16.4.1	Design of the database and Apps (activity integrated into Result 1: Platform)
3.16.4.2	Define APIs for data compatibility (activity integrated into Result 1: Platform)
3.17	Data acquisition system project for Agroforestry vertical
3.17.1	Survey of remote sensing system for inventory of SAF accepted by environmental agencies.
3.17.2	Required hardware features for SR and SAF inventory (CMTA co-op area as MVP)
3.17.2.1	Study/survey of alternatives (satellite, drone and piloted aircraft)
3.17.2.2	Camera quality (resolution, brightness, viewing angle, sample rate, environmental protection, etc.)
3.17.2.3	Local processing/storage (remote access)
3.17.2.4	Communication/data transmission (capacity of transmission distance/ baud rate)
3.17.3	Detailed project for the implementation of the monitoring system
3.17.3.1	Computing architecture in fog and cloud computer
3.17.3.2	Communication design (signal coverage)
3.17.3.3	Signal transmission/communication system for the Platform (blockchain?)
3.17.4	Acquisition of equipment
3.17.5	Infrastructure implementation for data transfer
3.17.6	Communication tests
3.18	Software development project for Agroforestry vertical
3.18.1	Definition of data acquisition and storage process (satellite, drone, notes, traps, pests).
3.18.2	Definition of data analysis process (cleaning, pattern extraction, model generation, validation)
3.18.3	Process definition for data certification and auditing
3.18.4	Process definition for information presentation (GIS, Dashboards)
3.19	Field validation for Agroforestry vertical
3.19.1	Validation of models developed in APIs through applications (mobile)
3.19.2	Validation of models developed in APIs through web applications
4.	Result 4: Transfer and Dissemination
	Objective: Dissemination of precision agriculture and digital technologies in the Agro- forestry, Livestock and Crop verticals to expand the potential use of the project's digital platform
	<i>Crop vertical</i>
	<i>Objective - Expand the use of precision agriculture in crops to increase the potential of use of the platform</i>
4.1	Definition of target public for the Crop vertical
4.1.1	Survey of properties/producer characteristics with potential to use AP and AD
4.1.2	Geographic definition of the target audience
4.1.3	Definition of event numbers to be attended
4.1.4	Definition of multiplier sectors (SEANAR, USP-ESALQ, University, Technical schools, etc.)
4.2	Definition of topics (menu) and strategies for the Crop vertical
4.2.1	Academic workshop to discuss project dissemination/transfer strategy

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4.2.1.1	Brazilian Precision Agriculture Commission (CBAP) - MAPA - https://www.gov.br/agricultura/pt-br/assuntos/sustainability/tecnologia-agropecuaria/agricultura-de-precisao-1
4.2.1.2	Brazilian Association of Precision Agriculture - AsBraAP

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4.2.1.3	Chamber of <i>Agro</i> 4.0 (MAPA/MCTI) - Working Group 2: Professional Development
4.2.1.4	Equipment manufacturers and suppliers
4.2.1.5	Input suppliers
4.2.1.6	Embrapa's Precision Agriculture Research Network
4.2.2	Training promotion strategy
4.2.3	Strategy to encourage the production of teaching materials
4.2.4	Insertion, participation in "official" events of entities, society and vertical organizations
4.3	Realization/participation - Training events for Crop vertical
4.3.1	On-site multipliers training
4.3.2	Distance/remote multipliers training
4.3.3	Field days on farms and in institutions (Embrapa)
4.3.4	Promotion of academic systems - extension/complementation
	<i>Livestock vertical</i>
	<i>Objective - Expand the use of precision agriculture in livestock to increase the potential use of the platform</i>
4.4	Definition of publicity target for the livestock vertical
4.4.1	Survey of properties/producer characteristics with potential to use PA and DA
4.4.2	Geographic definition of the target audience
4.4.3	Definition of event numbers to be attended
4.4.4	Definition of multiplier sectors (SEANAR, USP-ESALQ, University, Technical schools, etc.)
4.5	Definition of topics (menu) and strategies for the Livestock vertical
4.5.1	Workshop for academics and stakeholders to discuss project dissemination/transfer strategy
4.5.1.1	Embrapa Southeast Livestock
4.5.1.2	Embrapa Beef Cattle
4.5.1.3	Embrapa Dairy Cattle
4.5.1.4	Embrapa Cerrados
4.5.1.5	Embrapa Agrosilvopastoral
4.5.1.6	ILPF Network
4.5.1.7	Refrigerators (JBS, Marfrig, Minerva, BRF, etc.)
4.5.2	Training promotion strategy
4.5.3	Strategy to encourage the production of teaching materials
4.5.4	Insertion, participation in "official" events of entities, society and vertical organizations
4.6	Realization/participation - Training events for livestock vertical
4.6.1	On-site multipliers training
4.6.2	Distance/remote multipliers training
4.6.3	Field days on farms and in institutions (Embrapa)
4.6.4	Promotion of academic systems - extension/complementation
4.6.5	Establishment of partnership agreement
	<i>Agroforestry vertical</i>
	<i>Objective - Digitization of the inventory and monitoring of agroforestry to account for carbon sequestered from the CAMTA system</i>
4.7	Definition of publicity target audience (With CAMTA) for Agroforestry vertical
4.7.1	Survey of SAF properties/producer characteristics with inventory digitization potential
4.7.2	Geographic definition of the target audience

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4.7.3	Definition of event numbers to be attended
4.7.4	Definition of multiplier sectors (SEANAR, USP-ESALQ, University, Technical schools, etc.)
4.8	Definition of topics (menu) and strategies for the Agroforestry vertical

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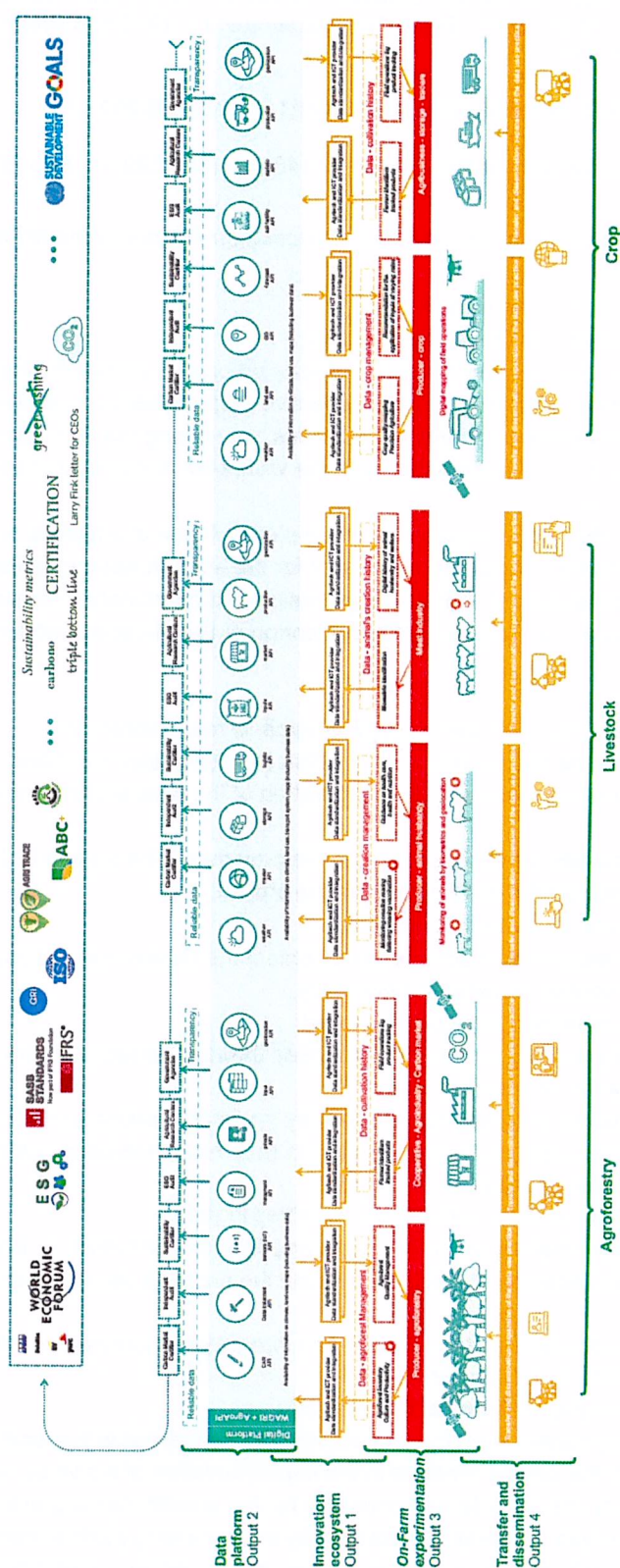
4.8.1	Workshop for academics and stakeholders to discuss project dissemination/transfer strategy
4.8.1.1	Embrapa Eastern Amazon
4.8.1.2	Embrapa Western Amazon
4.8.1.3	Embrapa Acre
4.8.1.4	Embrapa Amapá
4.8.1.5	Embrapa Forest
4.8.1.6	Embrapa Rondônia
4.8.1.7	Embrapa Roraima
4.8.1.8	Embrapa Territorial
4.8.1.9	ILPF Network
4.8.2	Training promotion strategy
4.8.3	Strategy to encourage the production of teaching materials
4.8.4	Insertion, participation in "official" events of entities, society and vertical organizations
4.9	Realization/participation - Training events for Agroforestry vertical
4.9.1	On-site multipliers training
4.9.2	Distance/remote multipliers training
4.9.3	Field days on farms and in institutions (Embrapa)
4.9.4	Promotion of academic systems - extension/complementation
4.9.5	Establishment of partnership agreement

Annex 2: Project infographic

Available at the link

https://drive.google.com/file/d/1bEpqV1zfb7yWzSqKPKW4Ot_ehJ1h5G39/view?usp=drive

link (request at ricardo.inamasu@embrapa.br to access the file)



ANNEX 3 – Summary of obligations of the parties.

Sources:

Basic Technical Cooperation Agreement between the Government of the Federative Republic of Brazil and the Government of Japan / Signed on September 22, 1970 and Promulgated by Decree No. 69.008, of August 4, 1971.

Record of Discussion (R/D) available at SEI number 21185.000256/2021-17

Minute of Meeting (MM) available at SEI number 21148.006438/2022-11, May 2022

The Government of Brazil, through the Brazilian Cooperation Agency of the Ministry of Foreign Affairs, is responsible for:

- join the Joint Coordinating Committee;
- coordinate the implementation of this project;
- receive, analyze and approve progress reports on project actions by the implementing partner institutions, according to their respective responsibilities, specifying their progress;
- support capacity building and training activities, monitoring the disbursement of JICA's financial contributions in accordance with the work plan and in accordance with the specific payment schedule;
- coordinate with the parties involved in the implementation of activities, when any changes and adjustments are considered necessary for the smooth running of the activities;
- support the organization of technical supervision and coordination missions, according to the ABC Annual Work Plan regarding the monitoring of Brazil-Japan cooperation programs;

The Government of Brazil, through MAPA and Embrapa, is responsible for:

- support and execute the present project within the designated functions;
- guarantee the maintenance of the remuneration of the local professionals involved in the project;
- designate specialists, according to the profile provided, to be trained in Japan and Brazil;
- monitor and evaluate the development of the project;
- prepare reports on implemented activities;
- monitor the development of activities and contact the Government of Japan, through JICA, when any intervention is deemed necessary;
- coordinate the implementation of this project;
- support capacity building and training activities through contact with the parties involved in the implementation of activities; and
- receive and analyze progress reports sent by the implementing partner institutions, in which they describe their performance in relation to their responsibilities, informing and specifying the implementation of activities in progress.
- make available an area for carrying out activities in Brazil;
- identify the main challenges in Precision and Digital Agriculture in Brazil and share the information with Japanese experts; - integrate the project's Joint Coordination Committee;

The Government of Japan, through the JICA (Japan International Cooperation Agency), linked to the Ministry of Foreign Affairs, is responsible for:

- coordinate the implementation of this project;
- support capacity building and training activities as scheduled in the work plan;
- coordinate with the parties involved in the implementation of activities, when any changes and adjustments are considered necessary for the smooth running of the activities;
- receive and analyze progress reports sent by implementing partner institutions, in which they describe their performance in relation to their responsibilities, informing and specifying the implementation of activities in progress;
- provide transportation in Japan to Brazilian specialists.