PROPOSALS REQUEST

TECHNICAL GUIDE

STRATEGIC TECHNOLOGY PROGRAMS

"Towards advanced manufacturing from technology revolution"

July 2018

TECHNOLOGICAL CAPABILITIES DIVISION

1. INTRODUCTION

The innovation policy tackles challenges of the future for the development of Chile. These challenges correspond to relevant issues or necessities for the society and with positive effects in savings, investments, work and exportations, as well as in people's daily life.

One of the challenges of the future that we are working out, based on science, technology and innovation, is the technological revolution, taking care of its social, cultural and economic impacts in a proactive way, anticipating and looking for a sustainable and inclusive development of the country.

The technological revolution is and will continue having impacts on and transforming various social, economic and political sectors, as confirmed by many international studies. This impact is given by the adoption and application of disruptive technologies which have the potential to change the way we do things, we connect, as well as the way we understand the world. We are talking of technologies like internet of things, big data, cloud computing, artificial intelligence, advanced robotics, 3D and 4D printing, nanotechnologies, advanced and virtual reality, blockchain and biometric technologies, among others.

Within this framework, the objective of working on technology revolution consists in preparing our economy for the adoption of digital technologies, minimizing its negative impacts in the working market, protecting our competitive advantages and increase the productivity of all economic sectors. CORFO's Strategic Technology Programs were created to address these challenges, to improve the rate of technological innovation in products and processes of Chilean companies through the articulated execution of applied research and technological development project portfolios with a long-term vision. These facilitate the closure of known gaps: know-how, scientific, technological, infrastructural and human resources, improving productivity and contribute to diversify and sophisticate the productive ecosystem.

While it is a non-specific instrument that can be used to resolve technological challenges in any sector or cross platform, the scope, objectives, expected results and impact are tied to specific technological challenges. To this end, the Technical and General Rules of the calls are accompanied by a descriptive document titled Technical Guide.

The purpose of this Technical Guide is to assist users in drafting their applications to the present call providing relevant information to use in the application.

2. GENERAL BACKGROUND

The concept of “Industry 4.0” was first developed in 2010 by the German government to describe a vision of manufacturing with all its processes interconnected by internet of things, with more flexible and personalized productive schemes which allow for the creation of new markets and a new way of interacting between economical actors[1].

Also known as the fourth industrial revolution, it is based on the digitalization of industrial and manufacture processes or the implementation of cyber-physical systems based on the interaction of artificial intelligence with machines and the optimization of resources to create new products and business models. The concept of industry 4.0 digitally merges different disciplines to ensure customer satisfaction and personalization of services.

This technological revolution assigns a great value to the closeness with the client, flexibility, response capacity and variety and quality of the services associated with the commercialized products, which opens unsuspected market opportunities for a wide variety of companies, in particular SMEs that traditionally could not compete with traditional manufacturing systems, preferably based on economies of scale.

Although this transformation can open niches of opportunity in various areas, in Chile it is especially relevant in those where the country has "leading industries" that are global leaders, such as mining, aquaculture, agro-industry, wood industry, construction and renewable energies; in B2B schemes (business to business) in a wide range of companies that can provide digital technology-intensive products and with high added value services.

To date diagnoses on the Chilean manufacture, which are part of this call, such as those made by the working group on manufacture in SOFOFA, the National Manufacturing Council, or the Advanced Manufacturing Program supported by CORFO, highlight its low productivity, little technological sophistication and limited technological absorption capacities, which has resulted in a sustained fall in its share of the gross domestic product during the last decade, confirming a decrease in the number of manufacturing establishments and related employment.

Indeed, the contribution of the manufacturing industry to the national GDP decreased from 11.2% in 2008 to 9.95% in 2014 (Central Bank of Chile, 2014). While the total GDP was increasing by 24% in that period, manufacturing was losing relative participation. The number of manufacturing establishments moved from more than 4000 in 2009 to less than 3000 in 2013, with a number of jobs reduced by 26%, reaching under 300 thousand nationwide (ENIA, INE, 2009 and 2013).

Although Chilean companies with some expression of advanced manufacturing have been identified, these are a minority. In the survey conducted in the first semester of 2017 as part of the diagnosis of

[1] Digital Transformation Monitor, Germany: *“Industrie 4.0”*, European Commission, 2017 www.ec.europa.eu/growth/toolsdatabases/dem/monitor/sites/default/files/DTM_Industrie%204.0.pdf

the Advanced Manufacturing Program, about only 200 companies demonstrated some expression of advanced manufacturing. Several SMEs moved towards automation and robotics for manufacturing processes, some SMEs use additive manufacturing with polymers, metals or cement, and a few have managed to integrate manufacturing processes with digital technologies to move towards products with high added value services.

2.1 International experience

The international reality shows that the manufacturing industry in developed countries is moving towards advanced manufacturing (AM) in an accelerated way, and important phenomena of industrial relocation or "reshoring" are taking place. Countries such as the United States, Germany and the United Kingdom are developing aggressive technological and commercial strategies to recover their industries, which migrated in recent decades to Asian countries, mainly due to the low cost of labor.

Manufacturing used to be two thirds of exportations worldwide, compared to services and primary products, and almost half in terms of added value of exports (WTO, 2008). However, it is estimated that penetration levels of advanced manufacturing will grow by 40% in the next 5 years (Switzerland Global Enterprise: Industry 4.0, 2016). In fact, the industry 4.0 market was evaluated USD 67 million in year 2016, with annual growth perspective of almost 15% until year 2022[2].

The United States implemented an ambitious program called "Manufacturing USA" to increase the competitiveness of its manufacturing economies, to facilitate the technological transition and train the workforce[3]. The case of the State of Georgia shows that 4% of the 350'000 jobs in manufacturing in year 2014 was created by AM from 2011 to 2014, developing an infrastructure and human resources ecosystem that allows attracting leading companies[4].

In Germany, Industry 4.0 is one of the projects of future of the federal government, part of the Strategic Plan of High Technology 2020. In operation since 2011, various initiatives were developed with contributions from public funds of about 200 million euro and focusing on 3 areas:

a) Platform 4.0, a collaborative alliance of the government with industry that brings together the main guilds, large companies, technology centers and trade unions;

b) The network of test centers LNI4.0 ("Labs Network Industrie 4.0") that already has more than 50 centers providing prototyping, piloting and testing services, especially for SMEs;

c) The Standardization Council 4.0 which designed a reference architecture and promotes interoperability[5]. According to estimates by the Boston Consulting Group, productivity returns

[2] Industry 4.0 Market by Technology: Global Forecast to 2022, marketsandmarkets 2017.
[3] How advanced manufacturing is helping U.S. companies compete globally, 2015.
[4] Georgia: A leader in Advanced Manufacturing, Georgia Power Community and Economic Dev., 2014.
[5] Digital Transformation Monitor, Germany: "Industrie 4.0", European Commission, 2017.

worth 90-150 billion euro are expected within the next 5-10 years[6].

In countries like Australia, which does not have a long tradition of manufacturing, advanced manufacturing is considered an enabler of new business opportunities for the industry ("Advanced manufacturing, a roadmap for unlocking future growth opportunities for Australia", CSIRO, 2016).

2.2 Industry 4.0 and advanced manufacturing challenges

Advanced Manufacturing (AM), in addition to the design of the product, the selection of raw materials, and the sequence of processes through which the product will be manufactured, includes technological processes that complement the productive chain. The information, previously digitized, is available to all stakeholders from anywhere and at any time, thus enabling optimization of the design, production, logistics and sales processes, as well as new business models. This translates into the manufacture of products with high technical specifications demanding both more sophisticated raw materials and components, as well as high value services (advanced design, specialized engineering, etc.), high digitalization and software, among others.

The creation of value in products and processes has positive impacts, on the one hand on companies, in their production chains and operations and, on the other hand, on users and others related to the value chain.

The following figure shows some of the frequent challenges, solutions that advanced manufacturing can provide accompanied by enabling technologies. This is a non-exhaustive list.

[6] Boston Consulting Group (2015) Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries.

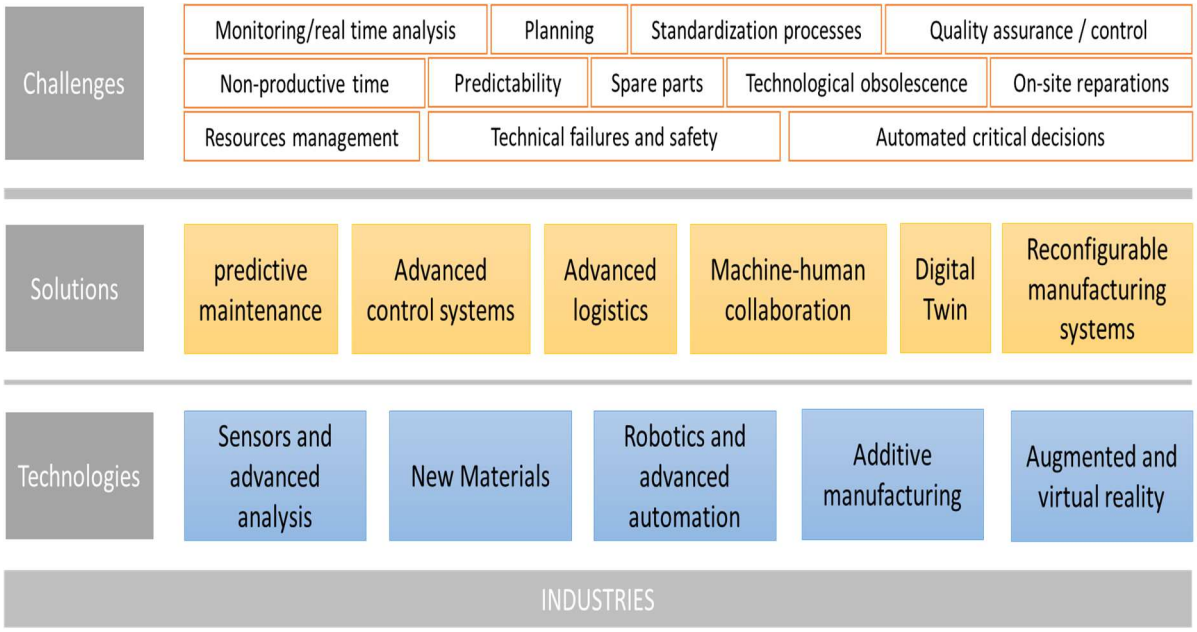

Fig.1 Manufacturing process requirements and technological solutions of advanced manufacturing. Elaborated by CORFO based on various technological roadmaps of Industry 4.0 and advanced manufacturing.

The main identified challenges range from real-time analysis to automated critical decision making, including the ability to predict critical events in the production chain, or to avoid security failures, for example.

For such challenges, advanced manufacturing proposes solutions such as predictive maintenance that responds to the main challenges of maintenance and repair thanks to the convergence of control systems, surveillance and monitoring, or advanced control systems that allow optimizing processes and take corrective actions automatically.

These solutions in turn require technologies such as additive manufacturing or 3D printing. This technology refers to the process of manufacturing parts by joining material layer by layer with computer-aided design. This applies for plastic components and others[7]. These solutions also require advanced automation (lighter and with collaborative robotics), advanced metrology (non-invasive measurement capabilities with low consumption sensors adapted to the industrial environment[8]),

[7] The global market of 3D printers is expected to reach about US$ 4 billion by the year 2022 ("Growth Opportunities in the Global 3D Printer Market", Lucintel, 2017). On one hand, 3D printers of polymeric components, plastics, represent an already well established global market and with an annual growth rate for the next 6 years over 20% ("Global 3D printing plastic and photopolymer material market - analysis and forecast, 2017-2023 ", BIS Research, 2017). On the other hand, the current market trends allow forecasting a world market of 3D printing metals reaching US$ 12 billion in the year 2028 ("3D Printing Metals 2018-2028", IDTechEx , 2017).

[8] The so-called "smart" sensors are more efficient as they are miniaturized and connected so they achieve, together with advanced analytical capabilities, manufacturing processes of optimal efficiency, integrating into the productive chains ("Industry 4.0: How to navigate digitization of the manufacturing sector", McKinsey Digital , 2015). In 2016, the global market of sensors used in manufacture was estimated to be US$ 8.7 billion ("Industrial IOT Market - Global Forecast to 2020", Marketsandmarkets, 2016).

advanced materials designed with specific properties according to the use[9], or augmented reality for the optimization of the operating environment[10].

These technological progresses are catalyzing the development of AM, enabling a new way of manufacturing with new business models that increase the effectiveness of companies, generate innovations and competitive advantages taking shape in new products and related services with potentially high added-value.

2.3 Opportunities for Advanced manufacturing in Chile

For the purpose of this call, applications of advanced manufacturing (AM) will be considered in any area or sector that has a relevant market opportunity, not only for the national market, but also for the region, as well as in niches of global scope, especially in the B2B (business-to-business) approach where Chile has large-scale "market-pull industries" that are global leaders.

Some of the sectors in which specific challenges were identified, and can be addressed through AM, are mining, aquaculture, agro-industry, wood industry, construction and renewable energies. Gaps and opportunities related to these areas of application were analyzed through a public-private-academy coordination[11].

However, consortium projects may be proposed in sectors not mentioned in this guide, as far as the addressed market opportunity is demonstrated and with appropriate R&D&I agenda.

2.4 International collaboration within EUREKA network

The EUREKA global innovation network is an intergovernmental initiative whose mission is to promote the productivity and competitiveness of the economies of its members, by mobilizing research capacity and stimulating innovation in companies. Thus, Eureka helps companies to combine their resources and collaborate with research institutes and universities working in the development of advanced technologies and in the introduction of innovative processes, services and products to the market.

Currently Chile is the only participating country in Latin America and has access to all EUREKA's programs, in particular SMART, an initiative (www.smarteureka.com) that promotes the creation of technological consortia in the field of Advanced Manufacturing with regular biannual calls to projects[12].

[9] The main market trends are in 3D printing dyes, construction sector, and textile industry, among others. The technological developments that allow such uses are focused on soft robotics, weight reduction of components in particular in the transport sector, energy conversion or soft electronics. ("Advanced materials: global trends in use and development, and R & D in Chile." Technology Prospective Report, CORFO, 2017 ").

[10] The augmented reality market is expanding from the electronics and games industry to manufacturing, impacting on product and plant design. It is estimated that the global market will reach US$ 120 billion in 2020 ("Tapping Opportunities in Augmented Reality, Stratecast", Jude, M., Frost & Sullivan, Mountain View Vol.16, N31, 2016).

[11] Roadmap for Advanced Manufacturing designed by the Advanced Manufacturing Program, CORFO.

[12] The selective process of SMART projects follows a two-step approach. First, "project outline" (PO) is evaluated. The PO provides a brief general description of the concept, the objectives of the project and the parties involved. Following the first step, a deeper evaluation is

In this way, if the initiative or initiatives awarded in this call include companies or entities from other Eureka member countries, the proposal may be supported by CORFO for its presentation to the SMART Eureka initiatives selection process, through which companies or institutions of other member countries can apply for funds through their respective national agency.

3. SCOPE, OBJECTIVES AND EXPECTED RESULTS

Participants need to take into account all requirements established in the Bases of the Strategic Technology Programs of CORFO. However, this document includes additional guidelines on the scope, objectives and minimum results to be included in the proposal.

3.1 Scope

With respect to the scope of the program:

- The technological developments that are expected to be generated within the framework of this Program should be focused on the manufacturing processes, whatever the scope, sector or industrial area they address, focusing the objectives of the Technological Program to a chain or production line, to products or services with higher added value.

- Moreover, the products, processes and/or services developed within the program must be part of a discrete manufacturing[13], which is through the manufacture of components, parts and pieces, as well as the integration or assembly.

- Proposals for technological developments will be considered only when based on a previous level of proven knowledge with a first prototype, even if demonstrative (laboratory prototype).

- Technological developments have to be implemented within 3 years in order to be commercialized within a maximum of 5 years.

- The proposal must be associative and including companies, in particular SMEs in partnership with large companies, suppliers and "market-pull industries", as well as research and development support entities such as technology centers or universities, of Chile and from abroad.

performed, requiring the presentation of a “full project proposal” (FPP) from which the "Eureka label" is awarded. The label allows accessing specific funds for the realization of the project, at least for those components of the project developed by the entity member of the network. Second SMART call for projects is open to submit PO until November 19, 2018 (more details www.smarteureka.com).

[13] “Discrete manufacturing” differs from “manufacturing by processes” because the manufactured products are made of a list of materials, which are taken to different operations to be assembled and thus produce a new product. In this way, each of the components of the manufactured product can be separated, which is not possible in the case of manufacturing by processes. In this case the value is added by mixing, separating, forming and/or carrying out chemical reactions, which can be discontinuous or continuous.

3.2 Program Objectives

Development, deployment and commercialization of technological solutions to move from a traditional manufacturing to advanced manufacturing, with intensive use of digital technologies and new business models, generating a positive impact on the productivity and quality of products and services, and at the same time able to install technological capabilities in Chile to capture new business opportunities based on modern, flexible and scalable manufacturing processes.

To ensure compliance with the above, the following specific objectives have been defined:

a. Encourage an **associative dynamic** between technology providers, technological centers, national and/or international universities with Chilean and foreign companies, resulting in a technology transfer strategy that ensures the deployment and to capture the maximum possible profit in the production chains for Chile.

b. Develop **technological solutions from a prototype level to a pre-commercial solution**. The proposed solutions can be applied specifically to one or another area or productive sector, also to several sectors at the same time.

c. Demonstrate the **technical and economic feasibility** of the proposed solutions through industrial tests and prototypes, as well as tests in real industrial conditions that provide the necessary empirical background and comply with all safety protocols for subsequent commercial packaging and scaling up.

d. Develop a national and international scale-up and marketing strategy that includes the **strengthening of local suppliers of the production chain**, whether national or foreign installed in the country, in the provision of new services, production of components and/or integration of solutions.

e. Develop a **dissemination strategy** that contributes to a better understanding of the opportunities offered by advanced manufacturing and its acceptance among the various stakeholders and main interest groups.

f. Develop a strategy for training **advanced human capital** in the program areas, leveraging other national or international public support lines, strengthening capacities at the technical and professional levels that will be necessary for the technical and commercial deployment of the results.

g. Implement a **management and operation model** of the program with the best practices for associative consortia, which ensure adequate governance and address the requirements of intellectual property management, technology transfer and quality management of the generated R&D&I.

3.3 Expected results

The offer should assure results consistent with the specific objectives, including at least the following:

1. Consortium[14] built with SMEs and large manufacturing companies, Chilean and foreign technological providers, national and/or international universities or technological centers, including associative mechanisms with companies that are part of the economic sectors or "market-pull industries" where efforts will be concentrated**.**

2. Portfolio of R&D projects oriented to the adaptation and/or development of technological solutions including the procedures to comply with safety standards and protocols for testing and certification of results, which make viable the proposed developments.

3. Scale-up of the developed prototypes that made possible the definition of the critical parameters and metrics for the integration into the industrial environment.

4. Piloting of technologies developed under real operating regimes, with demonstrated performance in the industrial environment to which the solution aims to be used, together with a further analysis of effects on the possible existing system (in case of adaptation) or on the production chain.

5. Strategy of industrial/commercial scale-up of new products or technological solutions, including mechanisms of transfer and adoption over time, such as adaptation of existing processes, planned replacement according to useful life, mechanisms of accelerated turnover with incentives, etc.

6. Technology transfer plan that maximizes the capture of value for the country, including the option of integration and/or local manufacturing, partially or totally, through national or foreign private investment, alliance between foreign companies with local suppliers or others. This should be expressed - for each product that has been successfully developed at the pilot level - in a business case analysis (such as new products or services in established companies, new companies/spin offs, alliance between foreign companies with local suppliers or others) and an investment decision based on feasibility studies during the execution of the program. Proposals with an attractive plan and faster calendar of investment decisions will be evaluated positively.

7. Dissemination and communications strategy, adapted for different audiences and groups of interest.

8. Plan to strengthen technological capacities within the ecosystem of science, technology and local innovation, through the incorporation of advanced human capital and the strengthening

[14] This consortium does not necessarily entail the creation of a new legal entity.

of technological competencies in various actors and decision makers.

9. Management and operation model of the technological program, including i) governance, ii) intellectual property and transfer management, and iii) quality management system of the generated R&D&I, with possible required certifications.

3.4 Results indicators

The proposal must include a detailed plan with milestones and expected results for each stage of the program, including related performance metrics. The following are to be considered as minimum results to achieve within the indicated terms:

Verifiable results	Indicator	Means of verification	Year 1	Year 2	Year 3	Year 4	Year 5
Consortium of SMEs and large manufacturing companies, Chilean and foreign technological providers, national or foreign technological centers or universities.	% progress in the conformation of governance and operational statutes	governance and operational statutes constituted	100%				
Portfolio of R&D projects validated by the governance	Validation by the Technical and Strategic Councils	Minutes of both councils	100%				
Tests and results certification protocols, safety protocols for applications in the manufacturing sector	% progress in protocols	Report validated by the program governance with validation of relevant authority	100%				
Definition of critical parameters and metrics for the integration of technological solutions within their industrial environment	% of progress in preliminary tests	Results report validated by the governance	100%				
Industrial prototypes	% progress in prototype	Prototype built and approval of the company where tests will be performed.		100%			
Products at pilot level for performance verification of the technology under real operational conditions and analysis of the effects on the operational environment	% progress in pilot test	Results report validated by the governance.			100%		
Technology transfer plan for the industrial scale-up and commercial exploitation of solutions resulting from the program.	% progress in the plan	Plan validated by the governance, agreements signed			Prelimin-ary plan	Defini-tive plan	

Technology transfer plan based on products with commercialization potential, focusing on local value capture for the integration and/or local components manufacturing	Number of products/services commercialized	Business cases with prefeasibility/with investment decision				Business cases with prefeasi-bility	Cases with investment decision

4. OFFER REQUIREMENTS[15]

In accordance with item 6 of the technical bases, proposals have to consider at least the following:

a) Starting an associative dynamic between companies and technology centers focusing on the adaptation and/or development, scale-up and commercialization of technological solutions that allow for the transformation of conventional manufacture to advanced manufacturing.

- Build international collaboration networks with leading entities on this subject in order to guarantee state of the art developments.
- Design a technology roadmap used as a reference and propose a competitive strategy based on an analysis of how attractive is the industry, local competitive advantages and foreign competitors.
- Elaborate a logical framework for the project, including objectives and results with performance metrics and milestones over the execution of the program, as well as post-project impact indicators.
- Design a risk management plan (technological, market, financial, reputational among others) to visualize and mitigate the main risks of the program.

b) Set in motion a strategy and action plan for the adaptation and/or development, scale-up and commercialization of technological solutions for the transformation of traditional manufacture to advanced manufacturing through the development of tests, prototypes and packaging, technology transfer and commercial scale-up.

- State of the art, technological trends and preliminary feasibility analysis of available technological alternatives for the proposed solution(s) that justify the selected technology. This includes the technical challenges that must be faced in the development of the solution and/or its adaptation for the challenge(s) to which the proposal refers.
- Present an impact study of the proposed solutions that consider the impact on the suppliers and the customers or the "market-pull companies" demanding the product or service. Based on this, present a preliminary survey of opportunities in the nationally and global market, accompanying this preliminary study of a competitive analysis that provides a quantitative estimate of the main contributions or improvements that the incorporation of this technology

[15] All information delivered by the applicants will be treated with strict confidentiality and will only be handled by CORFO staff and external evaluators with prior signature of information confidentiality contracts.

could provide to the manufacturing process, associating these ranges with the indicators of success of the program.

- Detailed description of the selected technological solutions with a preliminary description of critical parameters and factors for the performance of the solution under regulations and standards of the related industry with the objective to facilitate a further commercialization of the technological solutions developed within the program.
- Preliminary R&D plan with details on the development stages, both on preliminary tests and piloting, taking charge of the technical challenges identified in the first point above , indicating objectives and expected results for each stage, type and terms of the test plan and operational implementation.
- The proposal must include the realization of an ex-post analysis of the eventual modified manufacturing processes, if these were not fully developed but based on the existing, for the certification of the technological solution, in order to establish the possible technical impacts that these could have suffered due to their adaptation of their operation.
- Include the plan for the strengthening of technological capabilities.

c) Design of a strategy for scale-up and exploitation of the results

- Define a strategy for technology transfer that involves, at least at a future stage, the manufacturers to ensure technological packaging and commercial scale-up of technological solutions developed in this program.
- Include a plan for the industrial/commercial scale-up of the new products or technological solutions, including mechanisms to ensure the deployment in the shortest possible term, like evaluating retrofitting of existing processes, scheduled replacement according to lifetime, mechanisms for accelerated replacement through incentives and others.
- Activity plan to facilitate contacts and potential alliances, for example: Business and technology missions, business visits, demonstrative activities, join a EUREKA iniciative, among others.

d) Communication and information strategy

- Description of a communications plan, including the presentation of project results in fairs, congresses, national or international seminars, to ensure spreading the information and developing interest among suppliers and companies that are potential users of the technology, in particular national and international companies of the sector, as well as the other stakeholders.
- Develop a plan to inform clearly and timely, contributing to the acceptance of the technology between different stakeholders, including, but not limited to, certifying entities, in workers and contractors of the sector considered, etc.
- Diffusion material with program results.
- Workshops for the diffusion of results to public and private organizations.

e) Design a management model and governance including at least the following.

i. Policy for Intellectual Property and Technology Transfer:

- Rules stating the ownership of all results derived or produced with direct or indirect resources of this program. Including any request or registration of patents, creations, tangible or intangible developments and/or any other form of intellectual property that exists or may exist.
- Rules on ownership can be determined among the participants considering previous contributions and those made during the program. In situations with two or more owners someone needs to be individualized as responsible to protect intellectual property rights or to transfer or commercialize those rights.
- Information management and knowledge developed during the program through the following mechanisms (these are only examples):
    - Labeling the information according to the sensitivity level (confidential, property, public, for example). Each one of these categories limits or authorizes: modification, transfer, custody and use for some goals or specific objectives.
    - Proper custody of knowledge produced in the present program through physical, digital and legal means, to ensure future protection through intellectual property rights.
    - Use laboratory logs to register developments of the project and keep it safe as previously described.
    - Set confidentiality clauses for all hiring, supplying or services contracts, to protect the information generated by the program.
    - Demand written authorization for publications or presentations in order to prevent intellectual property rights violation.
    - Make the revelation of results mandatory, using a form to fill in with this information to help ease the process.
    - Keep record or a repository of intangible value activities in order to facilitate the management, valuation, protection and later transfer.
- Respect intellectual property rights, verifying the proper use of protected resources by others within the program through the necessary analyses in order to ensure future transfer of results obtained from the program.
- Someone in charge of the management, protection and knowledge and technology transfer.
- Design and set up strategies for the protection of tangible technologies, on the basis of the following:
    - Report on state of the art of the technology (patents, markets, scientific information, etc.)
    - Competing technologies and competitiveness of them.
    - Market potentials.
    - Regulatory barriers.
- Define rules for conflict of interest to ensure all participants favor program objectives over individual interests or those of organizations involved in the program.

ii. Governance Model:

Governance model describing the mechanisms of decision making and the organization structure established for the program management, making explicit the coordination mechanisms, in particular focusing on:

- Propose a composition for the Board of Directors or Strategic Council that balances the interests between the sector/industry, the academia/investigation sector, and other stakeholders.
- Clear definition of the roles of the managing entity, Board of Directors or Strategic Council, and all committees to be created.
- Guarantee transparency and good faith in all administrative and financial dealings.
- Establish resolution mechanisms to face potential internal conflicts.
- Ensure the incorporation of a representative of the Digital Transformation Committee into the Board of Directors/Strategic Council
- Propose a Technical Council according to what is established in the Bases, incorporating professionals who are independent from the execution of the Program.

iii. R&D&I quality management system

- Description of the preliminary strategy to set up a quality management system for all the R&D activities of the program, using international best practices, specific requirements of the technologies/services to be developed and the potential customers/market, including all certifications and accreditations required.
    - UNE 166002 is an example of standard for R&D management "requirements of the R&D management system". The offer has to consider other standards as well. Examples are EPA, ASTM, ISO, UNE, IEC, FDA among others, based on the requirements of the technological developments or the projects portfolio. The previous requirements are needed so all generated developments comply with target market demands, to be replicable and reproducible.
    - Additionally, compliance with environmental sustainability and safety requirements for people must be ensured in accordance with the current regulatory framework, with special consideration to safety standards in the manufacturing sector. Coordination with the local entities and corresponding superintendence(s) must be ensured.
- Use of collaborative platforms for project management needs to be considered to ensure quality and traceability of information.

5. ADMINISTRATIVE ASPECTS

All administrative aspects referred to program execution are contained in the Technical and Administrative Rules, which must be complied in full.

5.1.1 CORFO subsidy

CORFO will co-finance up to 70% of the total cost of the program with a limit of up to CLP$ **2,000,000,000** (Two billion Chilean pesos), as per subparagraph 8.1 in the Technical and Administrative Rules (mode S-4, P-3).

5.1.1 Participants' contributions

The program requires the commitment of all participants to ensure its execution. For this reason, the following structure of contributions is established and must be made during the execution of the program, as per subparagraph 8.2 of the Technical Rules:

Nature of Contribution	Percentage
Minimum contribution of participating entities (including pecuniary and non-pecuniary contributions).	A minimum of **30%** of the program's total cost.
Minimum pecuniary participation by participating entities (C-2).	A minimum of **20%** of the Program's total cost

According to subparagraph 10.3 of the General Administrative Rules, the cash or pecuniary contribution consists in the disbursement of funds as part of the Project's execution and to this end the concept does not consider the use of the contributing party existing facilities, infrastructure or human resources.

5.2 Deadlines and stages

Duration of the program is up to 5 (five) years, but can be less, and divided in 2 (two) stages at least;

i) Components validation at laboratory scale with pre-existing prototypes, integration of components for pilot test and adaptation to real operational conditions, with maximum of 3 years;

ii) Strategy for technology transfer and exploitation of results, with maximum of 2 years.

5.3 Program Monitoring and Follow-up

For the purposes of monitoring and following up on the program, the Division of Technological Capacities will implement a strategic accompaniment model that considers coordination with other public institutions if necessary.