

Processes Proposal for the Intellectual Property Commercialization Management in a Technology Licensing Office from a Brazilian Scientific and Technological Institution

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Abstract—Considering the quantity and the quality of filling applications for protection requests (i.e.: patents), it is possible to conclude that Brazil has an important and high technological production level, although, very limited some deeper analysis about questions of protected commercialized technologies are done (i.e.: licensing). The technology commercialization can be defined as a negotiation process, which involves technical and commercial aspects in order to allow that the developed technology done by a Scientific and Technological Institution (STI) can be transferred to another company that will use it and, by consequence, promotes its innovation. Technological Licensing Office (TLO) is responsible for commercialize technologies in a STI so, when the functioning of TLO is analysed, it's possible to realize that they still need to develop their organizational skills, in order to achieve their goals, mainly about the commercialization of technology strategies. In this article, it's presented a model of process, which allows to view and examine the specifications of the technology developed and protected by a STI. So then, be able to define strategies for its commercialization. Such model was applied in a TLO, of a military STI with positive results.

I. INTRODUCTION

Analyzing the statistics given by INPI [33], it is possible to perceive that Brazil shows a relevant production of high technologies, when observing -- the quantity and quality of protection order deposits (i.e.: patents). However, to deepen this analysis regarding the marketing of protected Technologies (i.e.: licensing) that are creating value; it is possible to realize that licencing is very limited. In other words, eventhough the amount of protection order deposits has increased in Brazil in the last decades and it has become very important, this condition hasn't significantly changed the innovative Brazilian environment that continues with a lack of actions to spread output technology.

In some branches of academic literature, it is possible to identify the technology commercialization as a technology transfer. In this paper, a distinction is made between these two terms. A technology commercialization may be generally defined as a process of negotiation, which involves technical and commercial aspects. Once that process is completed, it is possible to start the process of transferring the technology to another organization that will employ it to generate an innovation. In Brazil, the technology transfer process is protected by a specific legislation - the Intellectual Property

(IP) Law. In that context, the technology transfer is a process that goes beyond commercialization, because it deals with the legal aspects of such transference. It is about knowledge transfer about technology to a receiving organization, ensuring that the receiving part will be able to use this technology.

Even with the minimal consequences defined by law, when Technological Licensing Office (TLO), in Brazil, is analyzed, it's possible to realize that they are organizations that still need to develop their organizational abilities in order to achieve their goals. Mainly for Technologies commercialization strategies, with the purpose to add potential value to the technology and promote its transfer to the productive sector. One of the several hypothesis is that the more proactive TLOs have been well succeeded on the technology commercialization, in other words, on the technology transfer promotion from its portfolio, because they had developed a more suitable approach to the management of IP from their Scientific and Technological Institution (STI), which means that it's presumable that the management in IP in a TLO requires the definition of a suitable organizational structure. A STI is an agency or entity of public administration whose institutional mission, among others, perform basic or applied research activities of a scientific or technological nature (i.e.: research centers and universities).

Thus, the aim of this paper is to present a process model to manage the technology commercialization based on IP, constant in a TLO portfolio. Such model was successfully applied to TLO from the Technological Aeroespacial and Science Department (TLO/TASD).

To achieve this goal, an action research was performed in a TLO/TASD, in Brazil, a STI of the defense area. The action research was performed and supported by a literature review, conducting research in relevant books and periodicals on technological innovation and intellectual property, notably relating to the subject commercialization and technology transfer. In addition to the literature review, it was also carried out visits in 6 different TLO from different STI. During these visits, benchmarking techniques were applied to identify the activities that each TLO played on the management of technology commercialization, and its respective results. Along the duration of action research, there was direct contact and continuous with all TLO professionals

studied, the researchers said STI, and professionals from other six TLO. As the process model and associated tools were developed that they were applied to the TLO in question. The result of the application was discussed with the team of professionals from that TLO, to direct improvements to be made. After the improvements, the new application was made and the cycle continued until it reached a level considered adequate. Thus, the model has been completely applied to ten (10) technologies and partly in over 46 (forty-six). This action research was conducted over two years.

Considering 101 technologies from the TLO/TASD portfolio, there is none commercialized to the productive sector before the development and application of the model which was suggested in this paper.

This article is structured in four parts. The second one refers to the literature review which talks about the concepts of the marketing technology. The third part presents the technology commercialization proposed and applied to TLO/TASD and, the last part presents the final regards of this subject.

II. TECHNOLOGICAL COMMERCIALIZATION BASED ON INTELLECTUAL PROPERTY

In cases where it's important to transform technologies on innovations, it's necessary that the developed technology by a STI be transferred to an organization that will use it in its process or will embody in their products and services, creating a competitive edge. Along the same line, [34] describe that a technology protection is relevant only if it was transferred, generating beneficiaries, thus fostering innovation. However, when [59] is considered, the invention or creation of a technology by a researcher in a STI doesn't mean that it will be automatically transferred to another organization and it doesn't mean that this technology will turn in an innovation either.

For [48], the innovation is divided in two parts: one of them is the generation of an idea or the invention itself; the other is the conversion of that idea or invention in a business or, other useful application. Thus, it can be said: Invention + Commercialization = Innovation. This same concept can be applied to the Technologies that compose a TLO portfolio. Thus, the TLO receives and protect the technology developed by the STI. Afterwards, it's necessary that such technology be commercialized by the TLO, and only, then, it may be transferred to another organization that will use it, turning this technology into a process, product or service, making it been part of a society, and potentially creating, innovation. After all, considering [17], a technology developed by a STI and properly protected is an asset able to be commercialized and transferred.

Since commercialization promotes technology transfer, it's necessary to establish a set of activities for the commercialization of the technologies managed by a TLO, such as: the strategy planning to search for potential interested organizations of this new technology, offer it to the

the organizations and, negotiate the transfer of it. To [17], [49] and [57], the commercialization of the Technologies created by a STI is an economic event, once, it's a way to generate value, including social value. Still, to highlight what it was already said before, the technology commercialization activities are vital in a STI, because there is no way to accomplish a technology transfer, without a previous negotiation first.

The technology commercialization, according to [10] and [56], involves an expertise to negotiate it by a STI to another organization, and, still, considering [16], [31], [41] and [61], to commercialize a technology is just an strategic issue, which is linked to the competitive forces of a STI. In the context of this paper, it will only be discussed matters relating to the commercialization of technologies based on IP.

In the same way, as there is not only one way to protect the technologies, there is not one way to commercialize it either. According to [35] and [54], from the information analyses about the goods or assets of IP, or, about the technologies, and also the interests of the STI, it is possible to define the structure to access to a particular technology, which is more appropriate. Such structure can consider: making licensing or franchising contracts; sell the good to another company or transfer the *know-how*, create *spin-off* or *start up* and *joint ventures*; encourage the incubation of the companies or the generation of a company with an specific purpose, licensing in the form of cross-compensation to gain access to a partner's technology, among other possibilities.

It is also necessary to point out that in some organizations, such as companies of capital goods, technologies are developed focusing the market needs, aiming its commercialization. On the other hand, in a military STI, technologies are developed for internal usage, focusing its application. Just some of them in that case, just the technologies which present civil and military application possibilities, will be send to the TLO to be commercialized and transferred. These are only a few examples to show that not all technologies developed by a STI have the goal to be transferred to another organization.

In order to explore the commercialization process, it must be pointed out that for each technology a commercialization strategy must be defined. To elaborate this strategy it's necessary to know precisely the technology, and also its potential in the market. References [20] and [42] deepen this definition, describing that to succeed on a technology commercialization, the market information where this technology will be placed, must be considered.

In this sense, to [54], in a general view, the definition of a more suitable modality and, afterwards, the means or strategies to an effective commercialization depend on several factors, among them: stage of the development of the technology (bench stage, laboratory, prototype, validation, etc.); protection existence and its nature (patente, utility model, register, brand, industrial secret, etc.); demand an specific market; plan of action (radical or incremental); different kinds of transfer contracts (with or without

exclusivity); ease of copying by third ones; applicable law to the technology; and investments to end or to place the product in the market.

Still, [5] and [52] present a set of other points that are critical to promote the commercialization of the protected technologies, such as: the technology itself; the nature and the refinement of it; the scope of the technology; identification of points where technology is more fragile or superior to the others that exist in the current market; the qualitative and quantitative benefits realized by the potential user; the necessary time to end the development of the technology to a market; innovation speed diffusion; the entrance barriers; a prototype available; the technical viability; the rapport with others technologies, the inherent risks, the developing company; the technological market needs; the size and the growth fee of the potential market; the short time to the technology get into the market; and, the short term return on the investment.

Based on these two previous paragraphs, and considering [23], [38] and [45], it's possible to conclude that the commercialization process requires a reliable evaluation method from the incoming technology to the TLO. Moreover, according to [11], the technology commercialization, as IP, is different from the tangible assets, including those ones that incorporate new technologies, as machines, equipments and productive inputs. It is a business that happens in a highly asymmetrical market, where the buyer doesn't know what he/she is effectively buying. That's why it is normal that negotiations flow slower than in the case of business involving well-known goods and services. In this case, the reputation of the company that is selling is also another facilitating factor in the negotiations.

Also, according to [24], the attractiveness that the potential receiver realizes about the offered technology is an enable factor to the technology transfer. Reference [26] strengthens this idea, describing that to be succeeded on technology commercialization it's necessary that the potential technology receiver realizes how this technology can add value to its business.

Therefore, even knowing that the processes of commercializing technologies and the tangible goods are different, there is no way to commercialize a technology, before offering it to the market, or, introducing it to potential demanders. So, it's necessary to utilize, as [55] and [62] indicate, communicative or promoting marketing tools because they have been essential to activities related to innovation. Thus, [26] and [37] describe that a marketing strategy should be used to technology commercialization. They argue that there is not a specific strategy, so that the marketing strategies to offer a given technology must be built, focusing in such technology, specifically.

Thereby, it is important to carry out an analysis about the possible consumer markets, which would react to develop strategies to the technology under analysis, including the right way to offer it to all potential stakeholders. According

to [39], the promotion covers all those communication tools, which get the message to the target audience.

In order to offer a technology to its potential demandant, [22] and [36] indicate that for each technology it should be created a business profile, with a short report describing:

- the real problem that can be solved by the technology in its specific area of application;
- the market potential, and its growth rate;
- the replaceable and/or rival technologies;
- the potential clientes or retailers;
- the strategic options related to technology commercialization (licensing, exclusive rights, a new company starting, etc.).

This profile should be sent to the organizations with potential to receive technology, as a way of disclosure.

Another meaningful issue related to the technology commercialization is the definition of the price, or, placing monetary value to an IP. Although relevant, set a price to be paid for the technology demandant is a very difficult point, because there are no completely clear or accepted methods among the technology managers. References [9], [18] and [43] corroborate such statement when they affirm that a technology valuation doesn't mean to be an easy task. It's just the other way around, it's one of the most critical tasks in an IP management.

References [4] and [15] describe that the price of a technology is determined by the business model used to bring it to the market. The same technology taken to the market by different business models will ensure in different settlement values. So, it's important to build a business model to support the preparation of a technology commercialization strategies, which include issues related to valuation or technology pricing. This is important because, according to [53], the IP value is affected by the actual value of the future income expected for the technology. Given this business model it's possible, then, to break through valuation. Reference [46] describes that there is a wide range of models, approaches, and theories that try to value the technologies. Therefore, [25] point out that is necessary to look for the necessary subsidies among the available models so that the price can be better valued.

Considering the available models, [43] indicates that, generally, the technology valuation is commonly done following three distinct approaches: one of them is based on price (it's about to define the price that can be supported by the acquisition or a construction of an asset with the same utility); another approach is based on the market (use the prices of the identical or similar active markets); and, the last approach, is the one based on an income flow, calculated using utility tactics to convert future monetary values in a present one, so that this value be based on the expectations of a current market about future returns. To apply these approaches, [50], describe that accounting can contribute, establishing standards to measure, register and prove the intellectual property.

For [60], the value of the commercial transactions with IP may vary depending on the sector in which the technology can be placed, and the kind of protection achieved. This way, [6] describes that one of the most required instruments to pay a STI for its researches are royalties. The royalties are a kind of compensation paid for those who have the IP rights over a technology. According to [35], the value of a royalty fee is, commonly, calculated as a percentual of a net value from the selling of the products or the licensing services. To establish a fair and realistic value for royalty to the parts on the contract, it's suggested that a solid business model be used. This must include financial settings and calculation of profitability from licensing objects, as well as the economical advantages it might bring in to the licensing company. The royalty calculation is based on:

- the competitive advantage from the licensing (distinction of the products due to innovation, impact on the production costs, etc.);
- the competitive edge time connected to IP protection period (e.g.: validity of a patent);
- the licensing activity of profitability;
- the market size opened to licensing.

So, the TLO can use the business model initially made to support the valuation, yet, during the business commercialization of the technology, it's necessary to request the business model that the potential receiving of this technology intends to apply to it, in order to get a fair value for both parts.

On the other hand, according to [26], for a given STI, the best conditions during a commercialization technology stage do not end when the price to be paid to the technology transfer is settled. There are other aspects to be considered, such as: the human resources training, and the possibility to apply and increase the knowledge about the technology transfer. Another aspect that deserve a special attention at the technology commercialization stage, is the drafting of license agreements, where all the previous traded aspects will be detailed. For [28], the technology commercialization using contracts that include IP, was shown present in the reality of TLO, and, as an identified difficulty factor in all processes, the highlight was the slow pace of legal and administrative area for the execution of the contract. They also indicate that it was clear to everybody involved that it was possible to consolidate the partnership quickly presenting at the beginning to the technology receiver that the transaction has a long waiting period and that sometimes there is a lack of information during the procedure, which could be discouraging. According to [19], a TLO and the potential receiver of the technology must devote efforts to settle a contractual agreement as soon as possible.

To expedite the legal administrative processes, it's possible to make models of processes previously approved by the legal administrative area, and, in these models the aspects of the negotiation with the company, which will receive the

technology can be included. For [8], the legal section from STI can help with these new models of contracts.

Still, according to [35], an extremely important issue to the management of contracts of technology transfer is to make a periodic verification of the performance of the licensed object. That is, to monitor if the contract is being fulfilled, from time to time. This type of monitoring is crucial, inclusively, to guarantee the estimated financial return, and it must be seen as a good business practices, to be adopted by TLO, which can be used to detect plausible problems, and to encourage best performance from whom is receiving the technology.

Considering the issues addressed until here, it's possible to observe that the commercialization of protected technology by IP is not a process completely known by some Brazilian TLOs yet. For [32] and [40], this theme is little discussed, and they talk about missing international *benchmarking* on the market. Reference [32] supplement their idea describing that technology commercialization misses sense of comprehension, organizational support and a proper set of standard for doing such commercialization. However, the definition of the mentioned process must be discussed and controlled by TLO. Afterall, according to [14], the success on technology commercialization, among other aspects, depends on the TLO team's experience, who will negotiate the technology itself.

Although this activity won't be controlled by TLO, the commercialization of the technologies, created and protected by IP, is a very importante issue because according to [2], [51] and [63], these activities represent a source of resources to support or to get the return with Research and Development (R&D) developed by STI. According to [3], one of the most tendencies to STI is a higher level of the charge by its sponsor, by the income capacity of the commercialization results from R&D. This makes STI looks for innovation in its management models, to search for better efficiency and efficacy in its process. Reference [13] indicate that the success of the technology commercialization demands practical knowledge of the business. In the same line, [44] describes that increasingly the STIs are trying to adjust their TLO to a development business profile and [7] and [47] point that it's necessary to boost the commercialization process of the technology with new techniques and management policies, developed to a more effective way to promote technology transfer.

Strengthen the issues described so far, for [1], [14], [30], [58] and [64] the protected technology commercialization is not an ordinary activity, but a complex one, which must be emphasized properly by STI, specially by TLO. It's a much more complex activity than to simply analyse the items of the contract, differently from what it is done in most of the Brazilian TLO. Taking this complexity into account, [12] and [41] describe that an important approach to IP management in a TLO, and at the same time a big challenge, is to elaborate and draw a strategy establishing mechanisms for the technology commercialization really to happen. In another

words, it's necessary to identify the opportunities to commercialize the technology, to plan and take actions, instead of waiting for the potential receivers of it getting in touch.

III. PROPOSAL OF A MODEL OF THE TECHNOLOGY COMMERCIALIZATION TO TLO AT TECHNOLOGICAL AEROSPACIAL AND SCIENCE DEPARTAMENT. (TLO/TASD)

The Technological Aeroespacial and Science Departament (TASD) is a military institution which has as a mission "to increase the knowledge and develop scientific-technological solutions to strengthen the aeroespacial power, using teaching, research, development and specialized technical services, at the aeroespacial field" [21].

Among other matters, this issue leads to the need to show to the society, the results obtained by its researches and developments results accomplished at TASD. Only with the transfer of the technologies to companies that will use them to improve their manufacturing process or their products, is that innovation can happen for real and then benefit society. In order this transfer happens, it's not enough to protect and make this technology available. It's necessary to ensure the rights coming from Intellectual Property, but, this is again, not enough. It's required an effort to transfer this technology to a company that will use it and promote innovation, which means, that is necessary to commercialize this technology.

Despite the importance of having a technology commercialization process the TLO/TASD lacked in 2010, when this research action was started, a well-structured process was needed. By requiring the protection of a technology (registers, patents, etc.) the TLO/TASD used to provide, in its website, the description of the technology available for transfer and then, waited for a potential company to get interested in doing business with the TLO/TASD. In this context, none of the protected technology were transferred, which doesn't mean that the TASD doesn't make the transfer of the created technologies. On the contrary, there are several technologies that were transferred

by other kind of arrangements that do not considerate the intermediary help of the TLO. Despite this type of technology transfer, it should be pointed out that this paper is focused on studying the promotion of technologies that are expected to be transferred only by TLO.

So, it was necessary to review the activities already done and create a model of process to point out the issues related to the Technologies Commercialization. The guidelines to create this model of process, as well as its activities and tools were chosen after analysis of several TLOs, performed by the authors of this paper along with other researchers, that were developing a public financed project called PRONIT. Results obtained by this project, which included results obtained from the most important universities centers of Brasil, allowed to construct a benchmarking of best practices. In 2014, among those TLOs, only two of them had an active technology commercialization process; or, at least, had some guidelines.

Also, in order to create the model of the Commercialization Process, the academic literature about marketing has revised and it offered a relevant support. Thus, the activities and tools were proposed considering the reference made between the commercialization of a product or service and the specific commercialization of the protected technologies.

Still, to focus the efforts to the technology commercialization, it's essential to have a good analysis of the technical and commercial aspects of the technology, at the time it is notified to TLO, before its protection. This analysis is important to, strategically, identify the following key points which are the most attractive technology aspects to the market; which would be the best way to introduce this technology in the market; if it's necessary to continue the development of it for its use; which companies, in the supplier chain, would be realistic and its acceptance; and, all the other aspects, necessary to the approach of the following companies to commercialize and transfer the technology. Such analysis is necessary to define the strategies of the technology commercialization, i.e., the actions needed to offer it to the market to its transfer and commercialization.

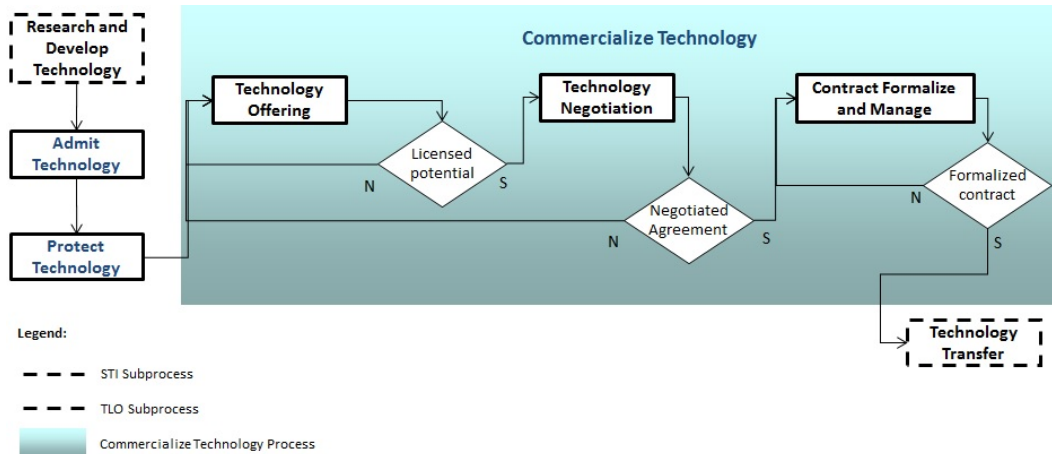


Figure 1: Commercialize Technology Process

So, it was presented a process to commercialize the technology of the portfolio from TLO/TASD, which is composed by subprocess: Technology Offering, Technology Negotiation and Formalize and manage contracts. The representation of this process is shown in Figure 1.

The TLO receives or admit the technology, and in this process is performed a technical and marketing analysis of the technology, which allows to develop preliminary strategies for the protection and commercialization of technology. After this, begins the process of protecting technology through the IP. Only after the protection of technology, the technology commercialization process starts. Note that the transfer of technology is a process that is not part of the scope of the TLO, but the STI. Such process was successfully implemented, creating the first technology commercialization done by TLO/TASD. In the following sub-items, this subprocess will be better described.

A. Technology offering Subprocess

In the Literature about marketing, one of the main points to promote the commercialization of a product is the promotion. Based on the supervision made during benchmarking, and the available tools about marketing, features were made to offer protected technologies. Such tools have created a technological profile, similar to a folder with the technology description, to help their understanding and disclosure, on a standard achievement, to help with technology demonstrations to a potential investor and, also, on the creation of a technology showcase on IFI website. Some changes on the technological showcase TLO/TASD (IFI website) were proposed and they contemplate the inclusion of a technological profile. These suggestions were accepted and they have been implemented so far.

However, even with the instruments and the activities created to its use, it's necessary, previously, to perform a review about the technical market analysis, to collect information and include the instruments, so the activities can have a sequence. Thereby, it was possible to conclude that even with the features and activities following a specific pattern, its content should be determined according to a strategy that is unique and specific for each kind of technology. Only then, it would be possible to attract the stakeholders on the technology reception. So, the subprocess Technology Offering consists of providing intel about the technology, identify the stakeholders (consolidated companies or new ones – *spin-off* or *start-up*) and attract them to a possible negotiation with recommendation analysis and technology protection.

This subprocess is played, preferably, right after the application requested for legal protection or the transaction processing (actions conclusion) by a trade secret. But, depending on the nature of the R&D project done, for instance a Project with a company, or the strategies that were created to the commercialization protection, such initiatives

can happen parallel to the technology protection process. The Technology Offering is based on the following steps:

- Analyse the layout and the requested protection done, by legal means or trade secret.
- Evaluate the effort to the technology transfer, based on its analysis, due to its technical and market point of view. For each effort level, actions have to be made aiming to achieve the goal, in other words, to bring over possible stakeholders to technology transfer.
- To set a preliminar report with strategy papers (actions or rules) for the technology commercialization offering.
- To form a commission to deliberate about the technology commercialization offering strategy.
- To create a technological profile to present the main features of each technology for the possible stakeholders.
- To insert the technological profile, reviewed or updated, on the showcase, on the TLO website. This technology showcase aims to dispose information about the protected and available technologies for transfer. This makes the dissemination of the information concerning to the technologies easier.
- To a set a good presentation, based on the analysis performed, so it can be used on the initial demonstration to the potential stakeholders, if necessary.
- To schedule a meeting with the stakeholders, so the technology can be presented, properly. To present the technology to the possible stakeholders asking them, previously, a confidentiality signature term.
- To refer a model of an expression of interest on the technology transfer letter, so the possible stakeholder can express himself/herself, formally.

This subprocess is important because it traces strategies to search for potential stakeholders on the technology and leads the information about it to them. It plays like marketing and promotion. Reference [27] emphasizes the marketing appeal in a TLO to promote the transfer of the protected Technologies. So, the subprocess aims to attract the potential stakeholders on technology to a negotiation of the transfer aspects with TLO. It's a continuous subprocess, and its actions must be held until a potential stakeholder on its transfer and a commercialization contract be formalized. When a letter of interest is received the subprocess should change to Technology Negotiation.

B. Technology Negotiation Subprocess

The benchmarking that happened in two TLO which, actively, commercialize technology and in two more that partially did it, contributed to develop the structure of the ideas and the creation of tools, such as the solicitation that the receiver showed a plan or a business model so it/he/she can use/explore the technology, it could understand how it would be applied on its business and how this technology

should add value, so, from this point, establish a value, which means, assign a price to the technology.

Regarding to technology valuation, it was also executed a bibliographical research and some methods were found, however, the literature used for the research hasn't described in details how these methods should be applied. So, the TLO team decided to use the profit margin from Royalty Rates to this negotiation. After multiple team's discussions, it was clear that the model should contemplate the need of an evaluation method, but it shouldn't be specified any pattern method, once that the price charged for the technology will depend on the model that will be undertaken for the receiver and other issues, and, also will differ from technology to technology. Then, for each case, a suitable method can be chosen. As [29] wrote, to assess the commercial value of a protected technology by IP, it's important to consider how this tech can be used in the company, that is to say, how the company will use it in its innovation strategy. In this sense, for [64], the market potential influence the choice amid the kind of commercialization contract will be followed between STI and the technology receiver.

Still, through the benchmarking used, it was possible to incorporate other tools to give support to this activity, such as: solicitation of a letter of interest from the potential technology receiver, implementation of an internal commission to the technology transfer, implementation of a standard procedure related to technology transfer contract and the inclusion of a technical visit to the receiver, to verify its capacity of receiving the technology.

Basically, this subprocess consists of the formal presentation of the technology to the stakeholder, besides the main technical and commercial points, related to a better response to the proposal formalization and its closure according to both parts using legal procedures and everything else to keep the information secret.

The beginning of this subprocess takes place with the letter of interest from a potential organization interested on the technology transfer, due to the foreseen actions on the technology offering. For [51], the negotiation, or the commercialization, from the protected technologies by IP shows the need of both organizations, the one that developed and protected it and the one that wants to use or apply it.

The technology transfer can be negotiated and done by two different means: transfer with exclusivity or transfer without it. The definition of the most suitable way of the Technology Transfer is done using drafted strategies, considering the technical and market aspects, the characteristics of the technology, the economic sector and the niche market valued at that moment. The TLO manager with the person responsible for STI have to decide how the negotiation of the technology transfer is going to happen.

The procedures adopted for the negotiation of the technology transfer are detailed below:

- Transfer with exclusivity: In a case like that TLO can't negotiate the terms with the potential stakeholder. The terms are:

- Ask to the stakeholder to present the Letter of Interest with a plan or a preliminar business model to use and economic exploitation of the technology.
- If the interest was confirmed, proceed with the technology valuation and prepare the draft contract. The technology should be priced according to the technical and market analysis, reviewed and updated, according to the plan or the preliminar business method for the stakeholder.
- If new stakeholders show up, the technology has to be shown for each one of them in a way that they are all equally treated.
- Appointing an Internal evaluating committee and a Technology Transfer committee to submit the technological valuation and the draft contract to deliberation of the committee.
- Submit the process for those who are in charge of TLO and STI to get the approval of the papers, presenting the transfer strategy and the final draft of the legal instruments.
- Promote administrative transaction of the hiring process, that exists in the published call, if necessary, and/or grant the contract to the technology transfer.
- Carry out a technical visit to the stakeholders to evaluate their technical competence to receive the technology. Such study can be done with other areas of the STI. After the visit, a technical report has to be done.
- Monitor and support the license/holder STI during the process of the technology transfer (working projects preparation, calendar of the stages of the transfer and technical support from technology, procurement and notice of the contract, among others).
- Prepare a technical report about the technology commercialization.
- If new stakeholders appear after the technology transfer, they must be notified that the technology was transferred with exclusivity, just like the public notice.
- Transfer without exclusivity: If this one was the option, TLO will be able to negotiate with the potential stakeholder the terms of the transfer. The terms without the exclusivity are:
 - Perform a technical meeting only with the agent(s) of the stakeholder, the researcher/liable technical who will represent the STI research center (holder/owner) and members of the TLO. The stakeholder must sign the confidentiality term. During this meeting it's necessary to enlighten and lead the presents about the technology that will be transferred; explain how the technology works (except details that can allow copy or duplication); reconcile the questions in the Interest Letter, notifying the stakeholder about the further steps of the Technology Process.
 - Request the stakeholder to present the confirmation of the interest about the Technology Transfer, by the Endorsement Letter, with a plan or preliminar business

model to use and economic exploration of the technology, to be assessed by TLO, attached.

- If the interest was confirmed, proceed to the valuation of the product and the drafting of the contract. Transfer with exclusivity must be the standart procedure here.
- Compound an Internal Evaluating Commission and Technology Transfer (ECTT) and submit the technology valuation and the draft contract to them for deliberation. If there were suggestions, corrections can be done.
- Have a specific commercial meeting with the stakeholder agent(s), a STI representative (holder/owner) and members of the TLO. In this meeting aspects related to the draft contract must be negotiated, including the financial questions and confidentiality agreement about the information. In order to get the best proposal, the numbers of meetings have to attend both.
- Resubmit the draft contract negotiated with the stakeholder to ECTT for approval. If the proposal was not approved, it must be renegotiated with the stakeholder, until they both get in an agreement.
- Technical visits to the stakeholder to evaluate its/his/her technical competence to receive the technology must be done.
- Prepare a technical report and send it to the STI responsible (holder/owner).
- Promote the administrative formalities of the hiring process, at the public notice, if necessary, and/or the award of contract to the technology transfer.
- Lead the stakeholder to proceed according to the administrative formalities of the hiring process at the public notice, and/or the award of contract to the technology transfer.
- Monitor and support the STI holder/owner on the process of the technology process (developing a work plan, schedule of the transfer stages and technical assistance of the technology, award and the draw up of the contract, among others).
- Prepare a technical report about the Technology Commercialization.
- If new stakeholders show up, the technology must be presented to each one of them, so an equal treatment of the process can be guaranteed. The technology can be transferred to new stakeholders again and again.

This subprocess is about the activities related to the protected technology commercialization. It's a vital process, because the terms settled in it will be the terms of the technology transfer to be considered on the formalized/management contract, and, naturally, that will guide the Technology Transfer. After this subprocess is ended, the next step is Formalize and Manage Contract.

C. Contract Formalize and Manage Subprocess

After negotiating the technology transfer, next step is to formalize the contract. In T ASD situation, specifically, the responsible for formalizing and managing the contract is not TLO/TASD but, another agency, called Grupamento de Infraestrutura Aeronautica (GIA), that, among other agencies, is up for the legal matters. However, TLO is the agency that negotiates technology, so, TLO must be responsible for drawing up the terms of the contract. So, besides the aspects pointed by literature and the benchmarking, there was an extensive debate with the TLO/TASD team to create a model of a standart contract to that transaction. Such model was created considering the technology that was offered to the potential stakeholder, as referred in the previous topic. After drawing up this prior model, there were several interactions with GIA-SJ and the model had suffered some amendments to improve its content.

This subprocess is about a draft contract designed and negotiated at the formalization of the contract and its management activities, to monitor its fulfillment. This subprocess can be divided in two main parts:

- Formalize the Contract:
 - To evaluate the terms determined at the draft contract, negotiated at subprocess – Negotiating Technology;
 - To formalize the contract, drawing up it, with the signatures from all the parts involved.
- Manage Contract:
 - Monitor sistematically the performance of the activities expected on the technology transfer contract, including the physical-financial schedule;
 - Promote auditing on the companies which received the technology to make sure that its use is under the negotiated standarts on the transfer technology contract; and,
 - If irregularities are found in the execution of the contract terms, legal actions have to be taken to put them right or terminate the contract.

By the time of the formalization of the contract, the technology transfer can be initiated. During the technology transfer and along the contract, it should be managed. The management of the contract must happen, mainly, as a preventive way to potential problems, because if all the preventive actions were taken and the manage of the contract were serious, problems with the terms of the contract can be avoided. That's why this activity is so important.

IV. CONCLUSIONS

Reaffirming, the technology commercialization process seeks to establish strategies to offer developed and protected technologies by STI to potential stakeholders and negotiate them, promoting technology transfer. Such process is considered tricky and demands a massive interaction among the associates.

So, in this article, it was presented a model of processes, that allows to preview and analyze the features of the technology developed and protected by STI, so, it will be possible define strategies to its commercialization. Such strategies can come true in action plans, for protection and commercialization of each technology to be adopted by the TLO, following the general guidelines from TLO and the relationship and direction given by each STI. Thus, the strategy used for one kind of technology may or may not be valid or realistic for another one. In other words, for each technology, a different commercialization strategy has to be designed. Such strategies must add value to the potential technology.

As a result of the application of the model, management practices from TLO/TASD were changed, creating internal procedures to customize this process. These procedures direct the acting area of this agency to achieving its institutional goals. Still, it's possible to consider that this model of the commercialization process from IP and used in TLO/TASD seems to be suitable, once it was coherently executed and, so far, a contract of the technology transfer was commercialized, which means technology transfer actually happened. The commercialized technology was the first one in which the model was applied, it was called "sistema portátil de aquisição de dados meteorológicos." (portable system of meteorological data acquisition – PSMDA)

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