

The Economic Impact of Research and Competitiveness: The SATT role in the valorization, acceleration and transfer of technology in France.

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Abstract: *This study addresses the strategy that, nowadays, have boosted academic production, knowledge transfer and economic and social benefits through the expansion of technology transfer mechanisms, showing how such strategy fits into the scope of universities' mission today, contributing to the theirre-signification. For so, the article exposes the role of acceleration, facilitation and mediation services of this process, taking the French Technology Transfer Acceleration Service, the SATT, as a case study. For this purpose, secondary sources were surveyed, such as statute, reports and institutional presentations, as well as the action research resource such as technical visit and interview. From this material it was possible to conclude an exploratory study able to offer a vision of SATT Erganeo that involves the Université Sorbonne Paris Cité, the Université Paris Est, the Université de Cergy-Pontoise, the CNRS, INSERM and CDC, favoring a panoramicviewof its mission, ambition, objectives, strategies and results.*

Keyword: *Universities, Technology Transfer, Innovation, Social and Economic Development*

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I. Introduction²

In the last 20 years, the French higher education, research and innovation system has faced major challenges and profound transformations, completely reshaping its landscape. These include, among other events, the creation of two major new national agencies, the National Research Agency (ANR) and the National Evaluation Agency (HCERES), the establishment of the Competitiveness Poles, changes in funding mechanisms and human resources management, the deepening of the competitive research funding model, the search for greater integration with the demands of society through the sophistication of acceleration mechanisms and the facilitation of technology transfer, as well as the consolidation of the European Research Area.

On the one hand, the neoliberal winds have imposed a budget reduction and made the management of universities and of knowledge production organizations to be rationalized. On the other hand, the contemporary challenges, especially those linked to the indispensable effort to mitigate the consequences of the capitalist production model and its impacts on nature, globally urge the system of higher education, research and innovation to bring its internal agenda closer to social and economic demands.

Thus, the university places itself on the global scene as one of the strategic instruments for addressing issues involving environmental resources, poverty eradication, health and well-being, infrastructure, gender conflicts, migratory processes, etc.

This article aimed to understand the French model of acceleration and facilitation of knowledge transfer, taking the SATT as a case study. The main objective of these societies is to follow up the projects, from their identification as an opportunity for dialogue with external actors to the final stage, when this technology becomes a product, generating a positive impact on society.

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According to the SATTs' internal documents, their success is largely based on their ability to identify inventions with strong potential, to take from them an industrially proof of concept and, finally, to transfer those inventions to the market. , either in the form of services, licenses or new business start-ups.

Therefore, the core of SATT's business is the transfer of applicable knowledge and scientific discoveries to the market through licenses with existing companies and the creation of start-up companies.

Understanding this experience allows us to expose a model that, while acting in the field of commercialization of academic results, allows the public spirit, ethics, and transparency to preside over its actions while preserving the great public mission of universities and research centers, but at the same time, allowing such establishments to be able to act in the process of the society development.

In order to conduct this study, a visit and interview were made with the representative of SATT ERGANE0, with the aim to collect and analyze documents available on the website. From this point and from the reading of a literature review on technology transfer and its impacts, it was possible to establish the discussion that underlies the study. Finally, the main result is the detailed presentation of the SATT management, governance, ambition and results process concerning SATT Erganeo data.

II. Discussion

According to the Agence Nationale de la Recherche - ANR, the Economic Impact of Research and Competitiveness (IERC) element is dual. First, it should bring the academic world closer to that of the business in order to develop productive and sustainable cooperation. Second, it should accelerate technology transfers and the creation of economic value through public research. No wonder that the ANR chose the word "partnership" as a key word, making clear the aim to promote the "cooperation between academic laboratories and companies", without neglecting the word "competitiveness", that refers to the creation of economic value.

The purpose is to transversally support an environment of interface and business relationship through mechanisms for the implementation of public-private partnerships (competitiveness clusters and interdepartmental working groups).

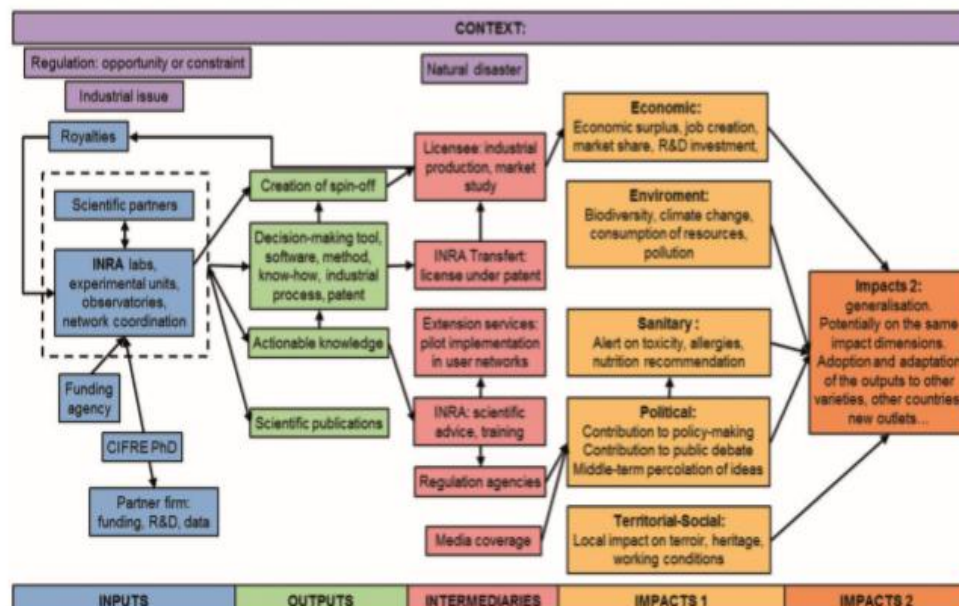
In order for the necessary connections between external actors, particularly the productive sectors of industry, and the knowledge produced to be established and transformed into applications of innovative solutions to society challenges, there must be investment, motivation and interest of all parties.

Between the motivation and the final results of university-industry partnership projects, there is a set of organizational actions along a path that involves raising awareness and disseminating opportunities for new solutions to intellectual property issues and patents, bureaucratic marketing mechanisms (contracts, working hours, salary, etc.), as well as the definition of institutional decisions, such as results recognition, that may include, for example, the performance of the laboratory / institution involved in the partnership. The "interaction with the social, economic and cultural environment" is a major criteria for the recognition of laboratories by the National Evaluation Agency - HCERES, thus fostering partnerships.

In addition, the development of databases internalizes impacts of public policies, by consolidating partnerships in indicators of results, progressively building up government data to back institutional and governmental decision-making tools. This set of actions were identified by P. B-Joly et al. (2015) as a key intermediate structure for the development of collaborations, operating on different fronts in order to make partnerships with external actors viable. These indicators back regulations, development of facilities services. They assist business plans building by start-ups, and back marketing and business training. They help projects to overcome bureaucratic barriers. They facilitate communication among stakeholders. They systematize and disseminate impacts and several other mechanisms , as assistance to build, guide and fund innovation projects; know-how, software, databases, corpora and copyrights, to transfer innovation from the academic research laboratories to the industrial sector; to promote the expertise and technological platforms; to obtain advice on value generation (Colinet et al., 2013); Klerkx and Aarts, 2013); (IDFInnov, 2017).

In fact, since the object of collaboration is complex and involves Scientists have no time nor competencies to deal with the legal, administrative and bureaucratic aspects that underlie their collaborations. Thus, this intermediate organizational structure has a fundamental character, since the alignment of interests and the institutional viability of partnerships depend on it, as shown in the following Figure 1(P. B-Joly et al., 2015):

Figure 1. A fictive impact according to ASIRPA



Based on the analysis of 33 cases, the ASIRPA Project (2005) confirms the decisive role of such structures, when it concludes that projects that succeeded in collaborations, sharing the same objectives with foreign partners, speaking the same language and consolidating a field of exchanges based on trust relations, received considerable support of intermediary organizational structures of coordination and showed significant adaptability in the face of regulatory requirements and technical objectives,.

According to data from the *Ministère de l'Économie et des Finances*, France invested approximately 7 billion euros in collaborative projects between 2012 and 2018, an important amount, thus expressing a structuring policy for higher education and especially research, which inevitably impacts HER organizations.

Among other consequences, NPM³ policies (Ferlie et al., 2009) strengthened a research market based on public and private funds. But, in spite of the commodification of activities, investments which are part of the French government agenda also included collaborations with a focus on regional and local development through of the ERDF (European Regional Development Fund), directing partnerships between local actors and university deans.

"In this new configuration, universities also appear to be relevant actors, interlocutors and partners" (C. Musselin and C. Paradeise, 2009). The strategic nature of the partnership between universities and external actors can be seen from different angles.

Firstly, regarding its academic dimension, the dynamics of cooperation between universities and industry involves interaction, exchange of knowledge, expertise sharing to solve problems, creation of new processes, mobilization of specific knowledge, constitutes an integral part of academic scientific activities (Estades, Joly et Mangematin 1996).

This interaction results in the updating of academic scientific guidelines. Besides, it feeds training with present-day challenges, generates results such as papers, seminars and theses, positively interfering with the performance of higher education institutions.

The connection between university and industry build a virtuous circle increasingly encouraged by the HEI's central administration and by public and / or private allocation of funds, based on the idea that knowledge transfer is key, as well to creating new businesses and to overcoming major challenges of humanity, such as fooding, housing, facing environmental changes, communication and mobility issues, etc. (A.Hughes & M. Kitson, 2012).

A vast literature deals with the growth of such connections, showing its positive impact on scientific agendas during the last three decades, creating for instance new areas of knowledge, such as biotechnology or bioeconomics, multidisciplinary fields which are expected to reach US \$ 714.6 billion globally by 2021 (RESEARCH AND MARKETS, 2017). Another example of the collaborations' virtuous aspect is evidenced in

³On the New Public Management and its impact to higher education in the European context, see Thoening J-C. & C. Paradeise, 2013.

the worldwide articulation of a new regulatory framework involving intellectual property, inspired by the 2010 Bayh-Dole Law in the United States, with results for practically all countries (Heller and Eisenberg, 1998; Berman, 2008; Powell, 1996; Evans, 2010).

Nevertheless, even if in France as elsewhere, the academic agenda increasingly focuses on public/private partnerships enhancing innovation and technology transfer, it should be recalled that the links between university and society are much broader than the transfer of technologies. Universities essentially interact with society through traditional activities such as training and education, culture, art, sports, as well as healthcare services, where university hospitals are emblematic (Ristoff, 2015).

Secondly, partnerships impact the effective performance of universities in knowledge transfer processes. They generate significant impacts on various segments of social life, especially by enabling the placement of innovative products on the consumer market, by changing behaviors, world view, quality of life and the routine of citizens on their territories.

Several terms are used in the literature to describe this impact, such as 'social benefits', 'quality of life', 'public values', and 'environmental impact', 'socio-impacts', 'political impacts', 'cultural impact', 'health impacts' and 'impacts on organizations' (P.B-Joly et al., 2015).

Since 1950 various methods have been developed for evaluating the impact of research on society, such as the Research Impact Assessment (RIA). The Lisbon Agenda (2001) gave rise to a revival of interest for methodologies of impact assessment, such as the Advanced Technology Program (ATP) (Ruegg and Feller 2003), the Public Value Mapping (Bozeman, 2003), the Payback Framework (Donovan and Hanney, 2011) and the Social Impact Assessment Method (SIAMP; Spaapen and Van Drooge, 2011). In France, the most important methodology, ASIRPA (Socio-Economic Analysis of the Impacts Public Agricultural Research) was developed at the French National Agricultural Research Institute (INRA) in 2011 to assess impacts of finalized research (Joly et al., 2015).

Thirdly, the impact of partnerships is to be observed in terms of commitment of partners. Strictly speaking, universities (or public research organizations) and industry have different motivations in terms of values, mission, priorities, time, work plans, terms of reference, etc.. In order to foster convergence between these actors, HER institutions have developed dedicated services, and governments Technology Transfer Offices (TTOs) (Freitas and Verspagen, 2017), as encouraged by the OECD (OECD, 2003).

As far as HER institutions are concerned, they most often have created their own facilitation structures with the same objective of acting as intermediary support structures for collaborations, from intellectual property rights to communication and interaction among the actors.

Organizational knowledge and its beliefs spread in various ways within organizations, generating codes and practices, which in turn adapt to individuals beliefs. This exchange between *exploration and exploitation* involves short-term and long-term conflicts and gains between individual knowledge and collective knowledge (March, 1991).

Often companies target universities to access and develop capabilities to solve complex problems or to generate incremental production processes in innovative contexts, new technologies and advice on highly complex problems (Meyer-Krahmer and Schmoch 1998, Lee 1996, 2000, Feller et al 2002, Carayol 2003, Lam 2005, Balconi and Laboranti 2006, Arza 2010, Subramanian et al., 2013 apud Freitas and Verspagen, 2017).

Reciprocally, public researchers are often keen to test the applicability of their theories and research methods. In addition, partnerships can provide resources to fund facilities, scholarships, as well as new research opportunities (Lee 2000; Lam 2011 Freitas and Verspagen, 2017)

Freitas and Verspagen (2017) analyze the commitment to develop knowledge transfer projects based on 30 cases of collaborations between university researchers and external actors. They sort out the following motivations of public researchers: 1) yield insight from the research's applicability 2) keeping in touch with the industry; 3) accessing to financing funds; 4) opportunities for future collaborations. On the side of the external partners, Freitas and Verspagen's (2017) research list the following reasons for the partnerships, in order of importance: 1) seeking support for products in development; 2) access to investment funds from the public sector; 3) search for technological solutions; 4) access to finding research opportunities.

Back to the French context, Competitiveness Poles are a good example of how the French government tried to establish a strategic policy for generating economic impact and competitiveness .

Created in 2005, the competitiveness poles and their projects are supported by an interministerial fund, the Single Interministerial Fund (FUI). Its purpose is to sustain and favor the development of particularly innovative collaboration and research (R&D) projects. Besides, the Agence Nationale de la Recherche (ANR) guarantees the funding of those projects of the poles that it considers being academic, with a budget between 118 and 213 million euros, as shown in the **Figure 2**, published by the Direction Générale de la Compétitivité, de l'Industrie et des Services - DGCIS (2013).

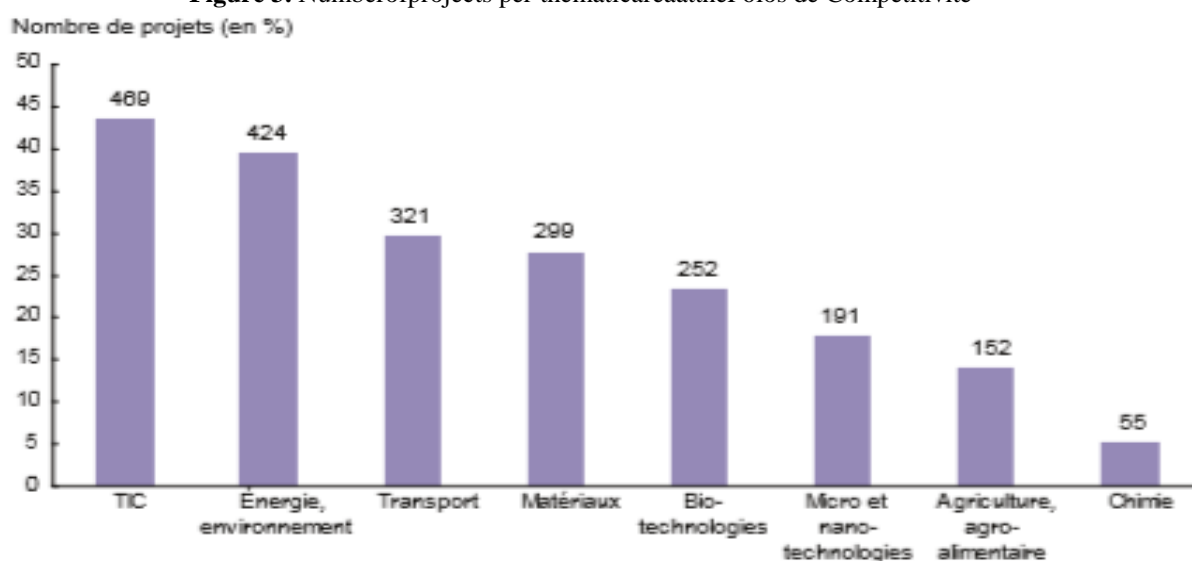
Figure 2. Dispositivos de financiamento dos projetos colaborativos dos Pôles de Competitivité

	Montant des aides (en M€)				
	2007	2008	2009	2010	2011
Fonds unique interministériel (FUI)	239	256	220	157	149
Collectivités locales	nd	227	167	164	167
Projets retenus par le FUI	125	152	128	118	109
Autres projets	nd	75	39	46	58
Oséo (y c. projets de l'ex-All)	242	219	159	172	144
Oséo Innovation	80	77	70	52	37
All puis programme ISI	162	142	89	120	107
Agence nationale de la recherche	194	118	192	213	182
Fonds européens	nd	77	117	114	72
Ademe	nd	nd	nd	nd	170

Source : enquête annuelle de la Dgcis auprès des pôles.

Regarding the impacts of the policy, the data indicate that it has achieved significant goals both for the economic growth, and for the production and transfer of knowledge, as shown in the **Figure 3**.

Figure 3. Number of projects per thematic area at the Pôles de Competitivité



* Voir encadré 3.

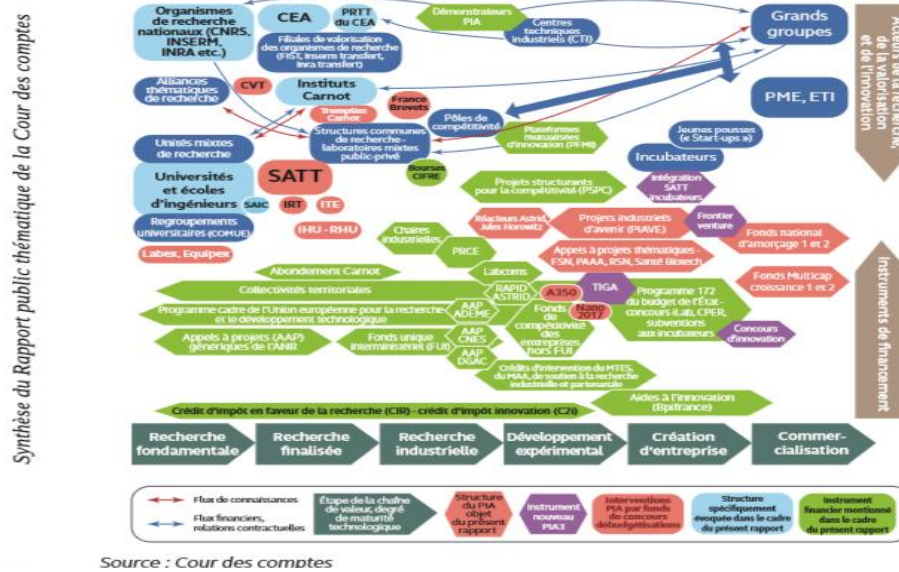
Lecture : la thématique des TIC est présente dans 469 projets du FUI, soit 44% de ces projets.

In the period between 2006 and 2012, just to mention the biotechnologies, one of the most sensitive sectors in the current global context, 252 new companies were created; likewise, the energy and environmental sector, with 424 new companies and the expected performance of the ICT sector with 469 new companies, according to the FUI data available in the 4 pages publication of the Direction Générale de la Compétitivité, de l'Industrie et des Services - DGCIS (2013).

Recent data (2017) show that promoting collaborative R&D partnerships and projects has created a new set of innovative products, processes and services. In 2014 France consolidated 71 clusters totaling 8,500 members and involving 1,500 research and training institutions.

Thus, it is now possible to identify in France a broad and complex ecosystem, involving research and marketing actors as well as external actors, according to the Figure 4 -, following map from the Rapport public thématique, Synthèse (Mars 2018):

Figure 4. Ecosystem of the research actors and innovation after the Program of Investissement de Avenir - PIA



The Framework involves research organizations, such as the CNRS, and is emblematic in the sense that it informs the complexity of the legal-organizational structures created since the Program of Investissement de Avenir - PIA, leaving a hook that redirects this study to an assessment approach of this model as a public policy. An effort that is intended to be followed at the moment, considering the experience of the Society for Acceleration for Transfer of Technologies SATT.

III. Methodology

To carry out this research, it was done a documentary survey, technical visit and interview, in addition to literature review. This methodology allowed a "photographic" approximation to the French experience in the field of technology transfer and a detailed reading of the internal processes of the analyzed Society, considering the following dimensions: organizational, technical, legal, political-institutional and economic. The survey was conducted between May and September 2019. Below is the table of the analyzed documents:

Figure 5 –Documentary sources analyzed in the research

DATABASE AND DOCUMENTS	
	a) Investissement d'avenir, Fonds National de Valorisation. SOCIETES D'ACCELERATION DU TRANSFERT DE TECHNOLOGIES: PLAN STRATEGIQUE ET PLAN D'AFFAIRES DE LA SATT le de France Innov, Edition , 2010
	b) Investissement d'avenir, Fonds National de Valorisation. SOCIETES D'ACCELERATION DU TRANSFERT DE TECHNOLOGIES: Eléments organisationnels du Projetle de France Innov, Edition, 2013
	c) SATT - Société par actions simplifiée au capital de 990.000€ Siège social : 190, Avenue de France, 75013, PARIS – Statuts, sem data.
	d) Ile de France Innov , Lettres d'engagement et de soutien, 2011
	e) Relatório de Atividades, SATT IDF INNOV (Atual SATT ERGNEO), 2017
	f) SATT - Fiche d'identité du projet, Investissements d'Avenir - Sociétés d'Accélération de Transfert applicatif
	g) Corporate presentation, ERGNEO, 2019
	h) WWW.SATT.FR (SATT NETWORK – julho de 2019).
	i) https://www.erganeo.com/ - julho de 2019.
	j) http://www.enseignementsup-recherche.gouv.fr/cid67054/www.enseignementsup-recherche.gouv.fr/cid67054/les-satt-societes-d-acceleration-du-transfert-de-technologies.html AGOSTO DE 2019
	l) https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000022630213&categorieLien=id AGOSTO 2019

IV. Results

4.1 The strategic role of technology acceleration and transfer services: the case of the Societes d'Acceleration du Transfert de Technologies - SATT

Created between 2012-2014 and defined as a network of follow-up, transfer and management of projects, the Societes d'Acceleration du Transfert de Technologies (SATT) concerns a cluster of private companies with public interest that can support both universities and research organizations in process of

technology transfer. This networking includes a common catalog of technologies, common communication, and performance with the same values.

Its mission is to create a favorable environment for research findings, so that they are translated into concrete applications. This activity includes patents, proof of concept, clinical testing, startups creation and licensing.

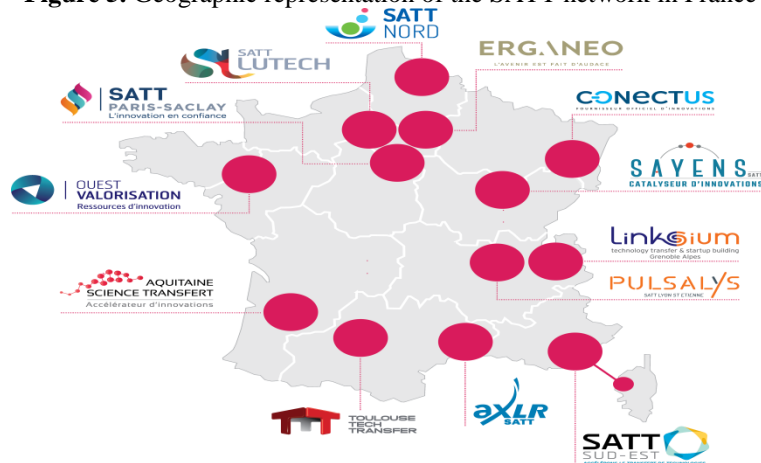
Born due to the Program Investissements d'Avenir - PIA, the SATTs have an investment of 856 million euros, with the purpose of generating the value of public research, stimulating the transfer of their results vis-à-vis the socioeconomic world, supporting both project maturation and industrial competitiveness through innovation. Its network performance aims to carry out shared actions, increasing the SATTs efficiency, legitimacy and visibility.

Considering 110,000 researchers and 175 universities and research organizations, France currently has a cluster of 14 technology transfer agencies throughout its territory, namely:

SATT Conectus Alsace (Strasbourg University, CNRS, University of Upper Alsace, INSERM, INSA Strasbourg, École Nationale Supérieure de Chimie de Strasbourg, CDC); **SATT Lutech** (Pierre and Marie Curie University, Panthéon-Assas University, Compiègne Technology University, Curie Institute, National Museum of Natural History, CNRS, CDC); Technology Transfer **SATT Toulouse** (COMUE Université de Toulouse, CNRS, CDC) **SATT Erganeo** (Sorbonne Paris University, Paris Est University, Cergy-Pontoise University, CNRS, INSERM, CDC); **SATT Sud-Est** (University of Aix-Marseille, University of Sud Toulon Var University, University of Nice Sophia Antipolis, University of Avignon and Alpes, University of Corse, CNRS, INSERM, École Centrale de Marseille, CDC) Science Transfer **SATT Aquitaine** (University of Bordeaux, CNRS, University of Pau and Pays de l'Adour, INSERM, CDC); **SATT Nord** (COMUE Lille Nord of France, University of Reims Champagne-Ardenne, University of Picardie Jules Verne, CDC); Valorization of **SATT Ouest** (COMUE Université Bretagne Loire, CNRS, IRD, CDC); **SATT AxLR** (Universities of Montpellier, Paul Valéry Montpellier 3, Perpignan, Nîmes, Montpellier's National Higher School of Chemistry, Montpellier Supagro, CNRS, INSERM, IRD, IRSTEA, CDC); **SATT Sayens** (University of Burgundy, Belfort Montbelliard University of Technology, Lorraine University, Troyes University of Technology, CNRS, INSERM, Agro-Sup Dijon, ENSMM, CDC); **SATT Pulsalys** (University of Lyon, CNRS, CDC); **SATT Grand Centre** : Centre-Val de Loire Université, Comue Clermont-Université, Comue Limousin Poitou-Charentes, C.N.R.S. IRSTEA, C.D.C, **SATT Linksum** (INP Grenoble, University of Savoie, University Joseph Fourier - Grenoble 1, Pierre Mendès University France - Grenoble 2, Stendhal University - Grenoble 3, CNRS, CEA, INRIA, CDC); **SATT Paris-Saclay** (COMUE Paris-Saclay, CDC).

Figure 5 shows the distribution of the 14 technology transfer offices in the French territory.

Figure 5. Geographic representation of the SATT network in France



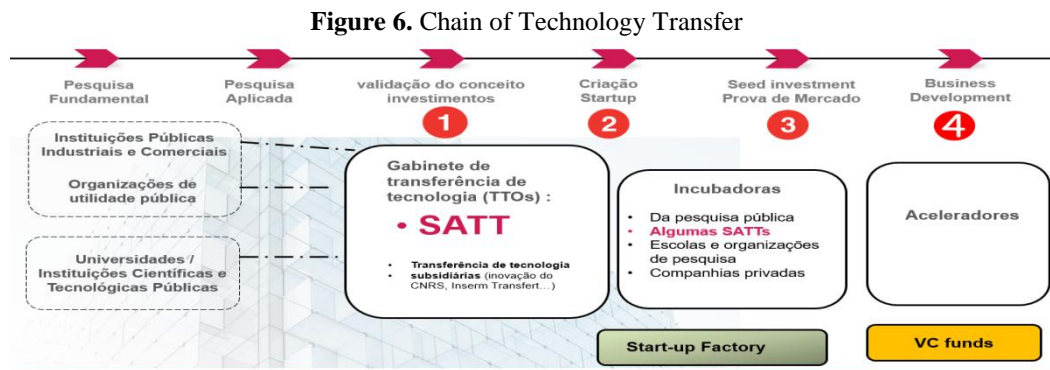
Source: SATT Network Presentation

Among its institutional ambitions is the idea of associating the results of scientific research with a virtuous context of social progress; thus, its focus is to bridge a gap between laboratories and the market through projects with potential to become enterprises with a strong social impact. .

Its actions happen in two moments. The first is aimed at offering maturation conditions of projects; it is considered the phase of design, ensuring the consolidation of startups, for instance. The second is the business phase, when new technologies and new services can be considered.

The SATTs structure is made up of 450 technology transfer professionals with specific training and skills: science, business development, intellectual property, investment, marketing.

Figure 6 below shows the steps of the technology transfer chain according to the SATT work process.

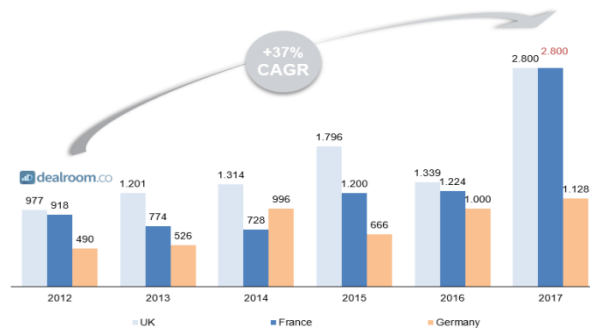


Fonte: SATT Network presentation

In terms of governance, the SATTs operate through a minimum management structure composed of an audit committee, a general council, an executive chairman and an operational structure (intellectual property committee and investment committee).

This strategy results have given France a prominent role in the European venture capital market, with EUR 2.8 billion in investments, as shown in Figure 7 below:

Figure 7. Investment of French Venture Capital Funds in M €



Source: DEEP TECH Program

In summary, the SATT strategy has a bold performance, as shown in Figure 8. Among the 148,000 French researchers, it could be identified 11636 market opportunities, projects with the potential to become products or solutions with significant social impact on society.

Consequently and with the support of SATT these projects generated 2596 new patents in France and 1889 received financial support. The end result of this circuit is the approval of 841 licenses and 370 innovative companies, generating 1361 new high qualification jobs.

Figure 8. SATT Strategy Outcome in Numbers, 2019



Source: www.satt.fr

Three concrete examples of the results achieved by the French technology transfer strategy:

1) Start-up: GOLIVERTHERAPEUTICS - Creation, April 2017 - Specializing in the production of differentiated pluripotent stem cells, it aims to repair the liver without transplantation; FUNDING: 700 k € from business Angels and Love Money in June 2017.

2) Start-up: ALMS THERAPEUTICS - offers insulin-resistant patients with type 2 diabetes the opportunity to lower their blood sugar levels by directly treating fat cells that play a central and leading role in glucose homeostasis. RESOURCES - The startup is the result of a project funded and matured by SATT Conectus Alsace (550 K €). It has concluded one of the most important A-series operations in France for the creation of a company: a 15 M € investment from Morningside Venture and Cap Innov'Est;

3) LKSPATIALIST, creation April 2017. Provides GIS Web applications for spatial planning actors, decision makers and individuals to qualify and evaluate plot potential. CAPITAL RESOURCES 600K € Soridecand Sofilaro (subsidiaries of regional banks Crédit Agricole Languedoc and Sud Méditerranée).

4.2 SATT ERGANE0 (Ex IDF INNOV): Case Study

Created as SATT IDF INNOV and transformed into SATT ERGANE0 in 2019, the strategy adopted in Paris and Île-de-France was created in 2010, bringing together the eight Sorbonne Paris Cité member establishments, the Paris Est University (UPE) establishments, the University of Cergy-Pontoise (UCP), CNRS and INSERM, representing an annual R&D budget of over 675M €.

The Society was created with the aim to develop the valuation process, respecting the scientific culture and the research specificity, however, with focus on the research scope and its interaction with the economic world, the industrial world and the knowledge economy.

Thus, its purpose is mainly to detect the most promising inventions, analyze their economic potential by expert committees, support their maturation, promote their business potential by transferring them to existing economic operators, as well as set up new startup companies.

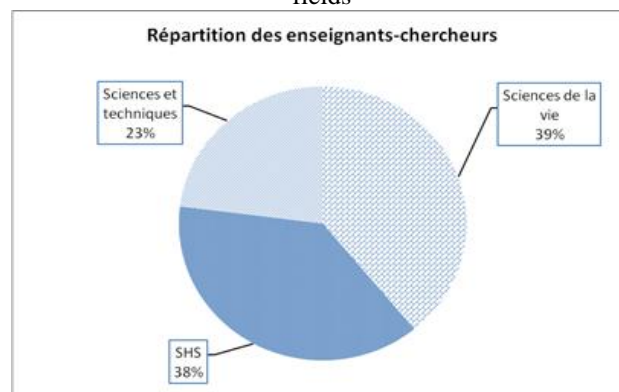
The SATT's main objective is the monitoring of projects, from detection in laboratories to the market. It is a structure capable of identifying inventions with a high potential for positive impact on society, taking from these inventions an evidence of their industry potential, and finally transferring these inventions to the market, either in the form of benefits, licenses or business creation. At the core of SATT's activity is the transfer of inventions to the market through licenses with existing companies and the creation of startup companies.

As an organizational strategy, it establishes its activity in four areas, namely: health, environment, education engineering, cultural / heritage industry.

It is important to note that society's emphasis is on technology enhancement operations aimed at transferring academic research results to the socio-economic world, in order to create economic or societal value, and this should not be confused with the activities that are recognized in many countries, as a university extension.

With this focus, these areas are considered prior thematic fields and are co-categorized as Life and Health Sciences; Sciences and Techniques (including materials sciences and engineering, earth sciences, mathematics, information and communication sciences and techniques - STIC) and Humanities and Social Sciences (SHS), reflecting the profile of researchers of their associates, as shown in **Figure 9**:

Figure 9 - Distribution of researchers from the SATT ERGANE0-associated units by the four main thematic fields



Source: SOCIÉTÉS D'ACCELERATION DU TRANSFERT DE TECHNOLOGIES, 2010

Having as ambition to provide socio-economic actors with both new products, such as methods, techniques, innovative processes and tools to support decision-making, the SATT Ergane0's strategy draws attention to its search for a territory-based action, in this case, Île-de-France region.

1.2.1 Areas of activity and partnerships characterization

The potential of this region is highlighted by the number of establishments, researchers, doctoral schools, research organizations, forming a favorable environment that brings together 7,000 researchers-professors and researchers in full time, as well as 7500 Phd candidates. Such enhancement is confirmed in the characterization of SATT ERGANE⁴ associates:

- The Sorbonne Paris Cité Research and Higher Education Center (PRES) associates four universities (La Sorbonne Nouvelle, Paris Descartes, Paris Diderot and Paris 13) and four major schools or institutes (Sciences Po, a Ecole des Hautes Études en Santé Publique, o Institut National des Langues et des Civilisations Orientales e o Institut Physique du Globe de Paris). It practically comprises all fields of knowledge. The projection of PRES places it in the 25th position in the world and in the first national line.
- The PRES Université Paris-Est (UPE), which reaches half of the eastern territory, brings together three major schools, two universities and two research organizations with four competitiveness centers. It aims to create a world-class university in the fields of city, environment and engineering, health and society, images and the media.
- Since its foundation in 1991, the University of Cergy Pontoise (UCP) has been a multidisciplinary university with recognized scientific research potential. The research is organized around four poles: study of materials and experimental sciences; analysis, modeling and management of complex systems; space intelligence technologies; cultural transfers and knowledge transmission.
- The National Institute of Health and Medical Research (INSERM) is a public institution of a scientific and technological nature, under the dual supervision of the Ministries of Health and Research. In France, there is a total of 318 research units. Sorbonne Paris Cité is by far INSERM's first university partner.
- Leading multidisciplinary research body in France, the National Center for Scientific Research (CNRS) develops its work in all scientific, technological and societal fields, covering all scientific fields. In addition, CNRS is present in all major disciplines grouped within ten institutes, three of which are national.

With this initial scope, SATT ERGANE⁴ has formed a portfolio of around 600 national and international patents, with about 70 new patents registered annually. A total of 217 licenses are currently in progress, making up an annual amount of 2.9 M €⁵.

In addition to the above associate members, SATT ERGANE⁴ has partnered with strategic actors that greatly strengthen its mission as follows:

- 1) Public Assistance - Paris Hospitals is a public health establishment of regional jurisdiction. It consists of 37 hospitals organized into twelve hospital groups. AP-HP is the first clinical trial center in France and Europe. It occupies a central place in the national device of clinical research.
- 2) ESSEC is one of Europe's most reputable Trade Schools, training future managers to reconcile personal interest and social responsibility, integrate reflection with a general interest vision and put economic challenges in perspective with social challenges.
- 3) **The Curie Institute**, a recognized charitable foundation, which links one of Europe's largest oncology research centers and two state-of-the-art hospitals.
- 4) **The Pasteur Institute** is a private non-profit foundation whose mission is to contribute to the prevention and treatment of diseases, primarily infectious, through research, teaching and public health actions.
- 5) **The PRES Paris Sciences et Lettres**–Quartier Latin brings together five establishments: the Paris Higher Normal School, the College of France, the Paris Observatory, and two Engineering Great Écoles, Paris Tech Chemicals and the ESPCI Paris Tech.

These partners shape the spectrum of SATT Ergane⁴'s activities according to the thematic area⁶:

LIFE SCIENCES–Cardiovascular research, with the cardiology services of Bichat-Lariboisière, the European Hopital Georges Pompidou and Mondor, and their associated teams (including the PARCC Research Center); Hematology and cancer with the Saint-Louis Hospital & Curie Institute, which is the largest cancer center in Europe; Genetics, pediatrics and biotherapy, with several teams that are arguably world leaders; Inflammation, immunity and vaccination strategies (Cochin, Necker, Strings, HEGP, H. Mondor); Microbiology, both fundamental and clinical, is also a strong point, thanks in particular to its association with the Pasteur Institute, and with teams from Necker or the Institute of Physical and Chemical Biology. Several innovative companies come from these different research teams (e.g. ATEROVAX in the field of arteriosclerosis, from Lariboisière and HEGP teams, which benefited from the Paris Biotech Santé incubator). In addition, pharmacology and

⁴ According to « Investissement d'avenir Fonds National de Valorisation : SOCIETES D'ACCELERATION DU TRANSFERT DE TECHNOLOGIES : Ile de France Innov, Edition 2010 » supplied by a interviewee.

⁵ Idem

⁶ idem

toxicology competences in the context of drug development at both molecular and clinical levels (Pharmacy, Santos Padres, Lariboisière, Fernand-Widal, Bobigny, Cochin, etc.), in particular, with remarkable specificity in child and infant pharmacology and competencies in new integrated approaches such as metabolism (Lariboisière, Bobigny, Pharmacy).

The value and transfer potential of these teams is very diverse, including the development of medical devices, the provision of specific and usable animal models for therapeutic trials, the identification of biomarkers and the development of diagnostic tests, innovative therapeutic strategies, biotherapies, development of biotechnological instruments (antibodies, testing systems, recombinant proteins, etc.) or adapted software tools (drug design, virtual screening, biological data analysis, etc.).

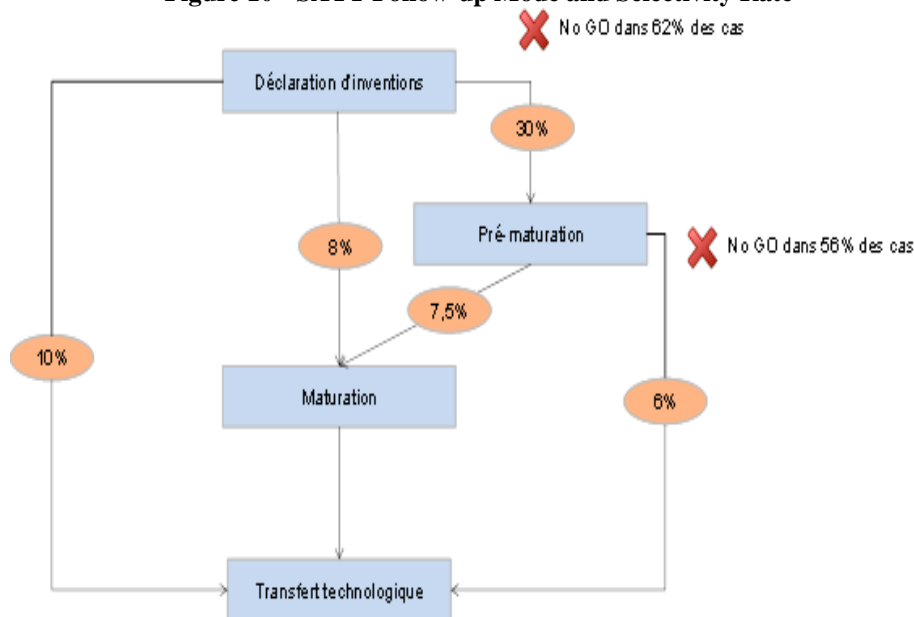
SCIENCES AND TECHNIQUES - Research in this area places shareholder institutions at the forefront of the world. A range of research fields, both cutting-edge and complementary, are covered: mathematics and computing, quantum and photonic physics, material science and nanoscience, soft materials and biophysics or interface chemistry are some notable examples. The cumulative research budget of the institutions in this area is EUR 185 million. Collaboration with the Competitiveness Poles: Capdigital, Systematic, Advencity, Astech and, in the field of financial mathematics, with the Finance Innovation pole. Other examples: Marguerite project, developed in particular by ESSEC, the International School of Information Processing Sciences (EISTI), the Telecommunications Institute and the Polytechnic School and the UCP aim to accelerate the development of digital services in the fields of education and culture. Their purpose is to make 'Cloud Computing' an instrument for disseminating culture and knowledge, as well as an instrument for accessibility, insertion and university success; the 'Broadband' (THD) platform for experimentation with digital content and services, developed by Paris 13 in partnership with the Competitiveness Hub, Cap Digital and various public or private institutions, brings together a set of resources and technical means to help companies develop prototypes and develop their innovative digital content and services on fiber optic networks. It was also an investigation pole on the strategies of industrialists and an observatory of emerging digital uses. It currently hosts 25 fiber-to-home experimentation projects. In addition to numerous projects in the area of the so-called earth sciences and environment.

HUMAN AND SOCIAL SCIENCES - In partnership with the Competitiveness Center: Capdigital or Systematic in the field of pedagogical engineering. Industry research is carried out on the cutting-edge digital remote sensing platforms (UMR RIATE from Paris Diderot University), census data collection (Medialab de Sciences Po) or linguistic and pedagogical engineering (INALCO SALW, etc.). In addition to projects in areas such as territory sciences (GéomediaMapper), urbanism, Environmental risk analysis, epidemiological risk analysis, Public Policy Analysis and Evaluation, Spatial Risk Practices Analysis, Ethics and Society Research Center (CERSES), Medical Ethics Laboratory, Medical Law Research Center, Cochin Hospital Clinical Ethics Center, etc. encompassing investigations into moral philosophy and applied ethics. Within this large area the sub-area **Analysis of cultural industries and cultural studies on heritage** - The Laboratory of Information and Communication Sciences (Labsic) at the University of Paris 13, as well as the EA185 - Film Research Institute and Sorbonne Nouvelle's Audiovisual (Ircav) together form the Laboratory of Excellence on 'Cultural Industries and Artistic Creation', in partnership with the National Center for Heritage Conservation (CNCP). Laboratory of Excellence focused on material heritage (PATRIMA) and involving the necessary cooperation between the exact sciences and the cultural professions. Such projects are partnered with the Louvre Museum, the BNF, the Branly Quay Museum, the Versailles Castle, the National Archive and the Rodin Museum. In addition to projects in the area of Linguistics / Languages / Pedagogical Engineering.

4.2.2 Organizational and management aspects

From an organizational point of view, the SATT has developed a methodology for project selection that includes the following typification: a) immediate technology transfer, in the case of relatively consolidated projects or projects which had links with an industrialist; b) technology transfer after a pre-maturation phase, which allows specifying the application market and resolving IP issues; (c) technology transfer following a maturation phase (whether or not preceded by a pre-maturation phase); and d) SATT's refusal to monitor the maturation and technological transfer of the project. Figure 10 graphically exposes this approach:

Figure 10 - SATT Follow-up Mode and Selectivity Rate



Source: SOCIETES D'ACCELERATION DU TRANSFERT DE TECHNOLOGIES – 2010.

The projects are evaluated according to their economic potentials based on the following criteria:

- project maturity: the importance of the required development to integrate innovation into a production process;
- Market potential: existence, absence, probability of emergence of a new market; market size; competitive environment; development probability;
- Project management: evaluation of the team and of the project owner whenever there are human and financial resources;
- Level of interaction with industry: identification of potential targets; existence of contacts with the economic world;
- IP quality: innovation patentability and status of existing patents to the same technology; other identified IP rights;
- Level of project innovation.

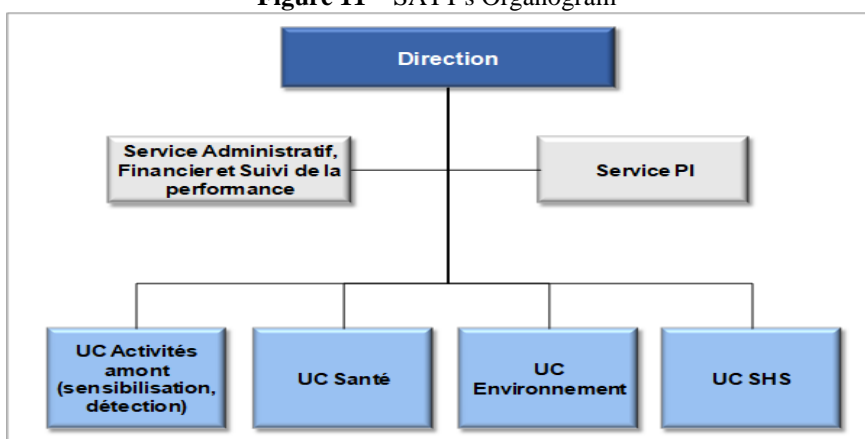
The study reveals the structuring role of the Board of Directors and the Investment Board in directing decisions. The SATT's chairman is simultaneously the Board of Directors leader. Such advice defines the strategies regarding the unit and its services. It is composed of representatives of the institutions (universities and research organizations) in the case of SATT ERGANE0: Sorbonne, Paris Diderot, Paris Descartes, COMUE Université Paris Seine, COMUE Sorbonne Paris Cité, CNRS, INSERM, COMUE Paris-Est.

In addition to these, the council also counts on representatives of the State: BPI France Financement, Île-de-France Regional Investment Bureau, the Ministry of Economy's Department of Economic Development and International Competitiveness, Regional Delegate for Research and Technology - Île -de-France Ministry of Higher Education, Research and Innovation and ESSEC Ventures.

On the other hand, the Board of Investment is an advisory body, acting as a complementary support, providing the Board of Directors with an assessment of the investments to be made. This board is comprised of international experts with outstanding experience in investment, venture capital, new business consulting and innovation entrepreneurs with significant market experience.

From an operational point of view, the SATT is structured according to Figure 11 below:

Figure 11 – SATT's Organogram



Source: SOCIETES D'ACCELERATION DU TRANSFERT DE TECHNOLOGIES – 2010.

Each business unit (thematic or not) is a profit center for the SATT, generating benefit income for the business unit centered on the activities and revenue generated by the transfer to the three thematic business units. Each thematic business unit is headed by a director. This director has sufficient industry knowledge to be able to appropriate the content of the analyzed investigations. They have significant experience in their target markets, as well as marketing skills and team management experience. They are responsible for commercial development in their activities (mature project, licensing, other services).

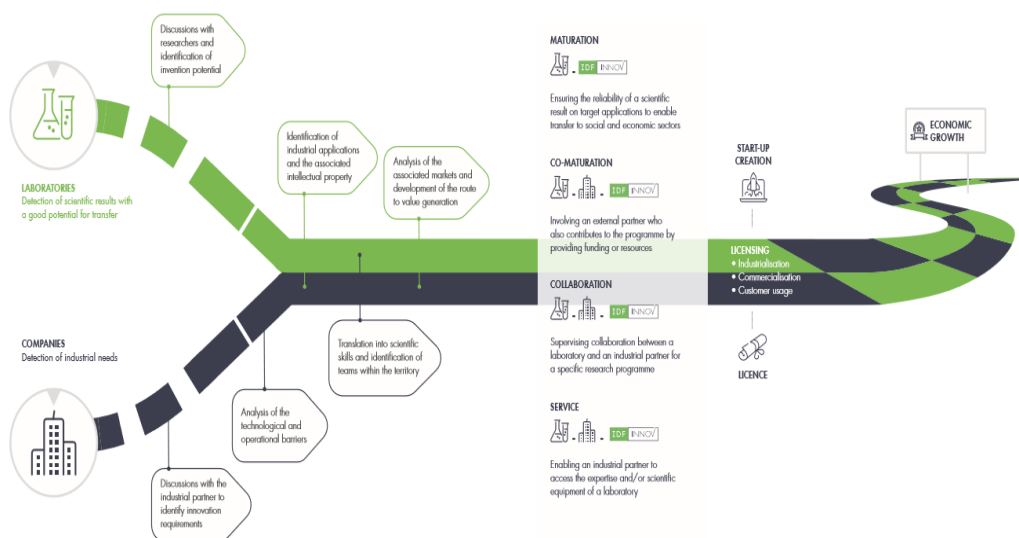
They are also responsible for drawing up and implementing their budgets. The number of business units is flexible. At the SATT ERGANE0 foundation there were three units: health; the environment, urbanism and the territory, SHS (digital pedagogical engineering, cultural heritage and the council).

In addition to these units, the company also has complementary support services in intellectual property, administration and finance and human resources.

Among the performed services, it is worth mentioning the strategy of sensitizing researchers, acting in partnership with the Competitiveness Poles, acting in partnership with the regional network of interests and supporting innovation in the territory, finding in these partners competence prospectors, research and development journeys and stakeholder meetings on R&D, innovation and projects with positive socioeconomic impact, production of road maps of interest to the economic needs in the SATT thematic domains and for the recognition of demands, offering of IP services, support and contract negotiation. However, the maturation phase is the core of the SATT's activities.

The project maturation consists of a flow that starts from the meeting between the members of a laboratory and the companies, until finally it becomes a transfer of technologies, as shown in figure 12 below:

Figure 12 – Valorization Process through SATT ERGANE0



Source: Activities report, SATT IDF INNOV (currently SATT ERGANE0), 2017

Attaining a project's maturation can generate both new companies and licenses. By 2017, 1533 projects were detected within the scope of SATT ERGANE0. Since its creation, SATT ERGANE0 has delivered significant results and has been asserting itself as a successful experience for France, totaling 370 new start-ups.

V. Conclusion

The creation of support mechanisms and follow-up of partnership projects for technology transfer is an international trend and is increasingly becoming an essential and complementary activity to academic production.

The study showed how recognition, strengthening and investment in such activities have positively favored both satiety in general and the very vitality of universities and research establishments.

Notably, the hostile environment left by the implementation of the so-called NPM reforms has brought discomfort to higher education and research, but at the same time has generated reactions that put the sector at the forefront of today's social and economic transformations as Researchers, professors and students have the potential to generate new products and processes that can contribute to solving serious problems related to health, environment, infrastructure, social issues, etc.

The interaction and exchange of knowledge between universities and industry is also, from the point of view of the academy itself, a virtuous reality. Inevitably, contact with the real challenges of the present and the search to overcome problems, update scientific guidelines and boost the knowledge production. Thus, the intensification of such partnerships brings universities closer to international standards of evaluation, which, although debatable, currently regulate the vitality and recognition of such institutions.

Society itself identifies and feels contemplated by this institutional model, which in its eyes represents an essential key for the common good, not only for the market, but also for the production of culture, research and innovation.

This is the background that has been encouraging the French government to invest billions of euros in strategies aimed at enriching the research and innovation ecosystem through partnerships.

When studying the SATT model, it was noted that such activities become successful through a bold project monitoring model, involving trained professionals, a highly complex legal service, integration capacity, network, management, governance, transparency, a consistent budget, attention to local scientific vocations vis-à-vis local industrial needs, ethics, transparency and professionalism. Indeed, a complex script and, for this reason, successful.

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