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Governance framework for the maturation phase of the Research and Technology Development Unit of the UNAM at the Hospital General de México Eduardo Liceaga

Marco de gobierno para la fase de maduración de la Unidad de Investigación y Desarrollo Tecnológico de la UNAM en el Hospital General de México "Eduardo Liceaga"-

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Abstract
The Case of the Research and Technological Development Unit of the Institute of Applied Sciences and Technology of the UNAM, at the Eduardo Liceaga General Hospital of Mexico, is presented and analyzed. In 2012, the parts signed a strategic alliance agreement to establish the Unit. A crucial aspect in the operation of this organization have been its governance mechanisms. The conclusion is that a governance model must be implemented for making the next growing stage of the R&D Unit feasible.
Key words: technological alliances, operational mechanisms, governance.

Resumen
Se presenta y analiza el Caso de la Unidad de Investigación y Desarrollo Tecnológico del Instituto de Ciencias Aplicadas y Tecnología de la UNAM, en el Hospital General Eduardo Liceaga de México. En 2012, las partes firmaron un acuerdo de alianza estratégica para constituir la Unidad. Un aspecto crucial en el funcionamiento de esta organización han sido sus mecanismos de gobernanza. La conclusión es que se debe implementar un modelo de gobernanza para hacer factible la próxima etapa de crecimiento de la Unidad de I+D.
Palabras clave: alianzas tecnológicas, mecanismos operativos, gobernanza.

1. Introduction

Five decades ago, Porter (1980, 1988, 2003) established the concepts of "competitive strategy" and "competitive advantage." These concepts were clearly aimed at productive organizations that make up the microeconomy of

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a country. They immediately extended to macroeconomics because when organizations belonging to any economic sector are competitive, the economic sector will automatically be competitive as well. A person, an organization or a society is competitive when they do something that others do not do; That is, they innovate and do better something like what others do, but with higher quality. The concept of competitiveness can also be extended to most countries, which, as we see daily, has effects on their geopolitical situation.

Besides, we know that technology and innovation are key factors not only for productive companies, but also for the competitiveness of all types of organizations, such as education, health, safety, research, and social institutions, among many others. To increase competitiveness as well as offer solutions to society's relevant problems, technological alliances (joint ventures) are increasingly formed between organizations of different types and corporate purposes, to promote applied research and interdisciplinary and transdisciplinary technology development.

For Rodríguez (2018), strategic alliances constitute a new way of doing business in the globalized world and can also occur between private professionals who practice their profession, such as dentists with different specialties who associate to establish clinics or care centers where they can offer better and more complete services to the market, generating benefits for both users and providers.

Santiago, (2015 op. Cit, page 222) considers that when micro and small companies, and even large ones, need to develop technology to increase their competitive advantages, they can do so in cooperation with external agents, such as other companies, suppliers, universities or other higher education centers, public research organizations and technology centers.

Thus, the technology developed by universities can be transferred to public and private companies and organizations that constitute the economic drivers of society. For Castillo-Vergara and Álvarez-Marín (2015), universities can use Spin Offs to transfer results from public research in the economic system. So, the importance of technological transfer from public universities to the different economic sectors of a country lies in the fact that it can help society solve multiple social problems. It is also well known that Universities represent essential agents in national innovation systems via their basic research activities or through research results close to industrial innovation. (Calderón-Martínez and García-Quevedo, 2013). The most common form of technology transfer is the licensing of patents, utility models or industrial models, brands, and other intellectual property figures.

This article studies the development of a public-public strategic alliance, created in 2012 between two Mexican government institutions. The purpose of the alliance was the establishment of a Research and Technological Development Unit (UIDT) to develop research and technology in health in Mexico. The participating institutions were the General Hospital of Mexico “Eduardo Liceaga” (HGMEL) and the Institute of Applied Sciences and Technology (ICAT) of the National Autonomous University of Mexico (UNAM). Likewise, the importance of establishing appropriate operational and governance mechanisms is shown and a proposal is made.

1.1. Theoretical framework

In the theoretical framework we will review the concept of social contract that requires rules of coexistence to make the peaceful coexistence of a society feasible. We immediately observe that society could be divided into small, organized groups, giving way to Organization Theory and the concept of economic sectors. Organizations require management and governance schemes through operational standards and guidelines. Nowadays it is very common for organizations to establish cooperation and alliance networks to have access to intellectual resources and technology, among others. The minimum case of a network is a *strategic alliance* between two different organizations. In this field, we find that the objective of some of them, is the development of

intermediate organizations that interface the allied organizations with a common purpose, such as the development of innovative science and technology projects.

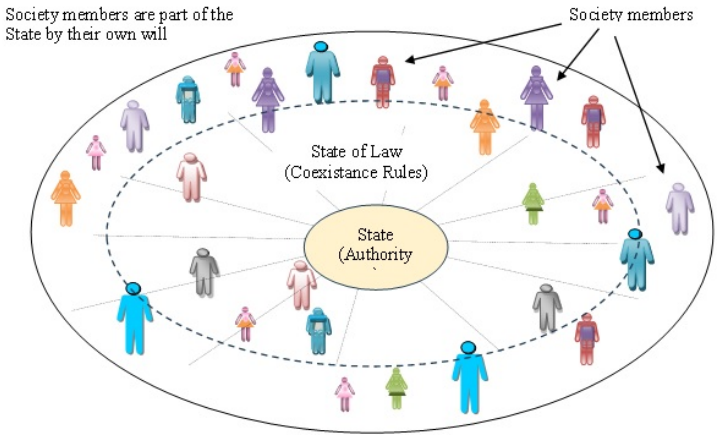
In this work it is proposed that to improve the chances of success of strategic alliances, well-defined governance schemes for the intermediate organizations are mandatory required.

1.2. The social contract

Jean Jacques Rosseau wrote "The Social Contract" in 1764. It is a work on political philosophy and deals mainly with the freedom and equality of men under a State established by means of a *social contract*. The fundamental concept is that the members of all society are equal and admitted by their own free will, then to have a peaceful and constructive coexistence, they require the recognition of an authority (the State) and a State of Law that are the rules that ensure freedom living together in peace and harmony. In that sense, Chevallier (1972) clearly states: “Each of us puts his person and all his power in common under the supreme direction of the general will”. (Chevallier, 1972, pp. 23).

Notably, the main issue is that the general will determines the rules of harmonious coexistence of a society. These rules establish the rule of law and to exercise it there is an authority in charge of implementing and monitoring harmonious and constructive coexistence. Figure 1 shows, in a very simplified way, the different elements of the social contract in a complex society.

Figure 1
Elements of the social contract in a complex society



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1.3. The theory of organizations and governance

A fundamental assumption is that the members of each organization are part of it by free will and in turn are led by coordinating agents. This is how sectors, groups and new subordinate societies are built. For the proper functioning of the subsystems in the context of organizational subsystems, Organization Theory is clearly related to Governance Theory.

For Ganga-Contreras and Nuñez-Mascayano (2018), governance is the study of all the mechanisms, processes and rules through which the economic, political and administrative authority of an organization is exercised For Brower & Vargas (2020), governability is generally the capacity that societies have to provide a system of government that allows the development of social systems and obviously, of the individuals that are part of

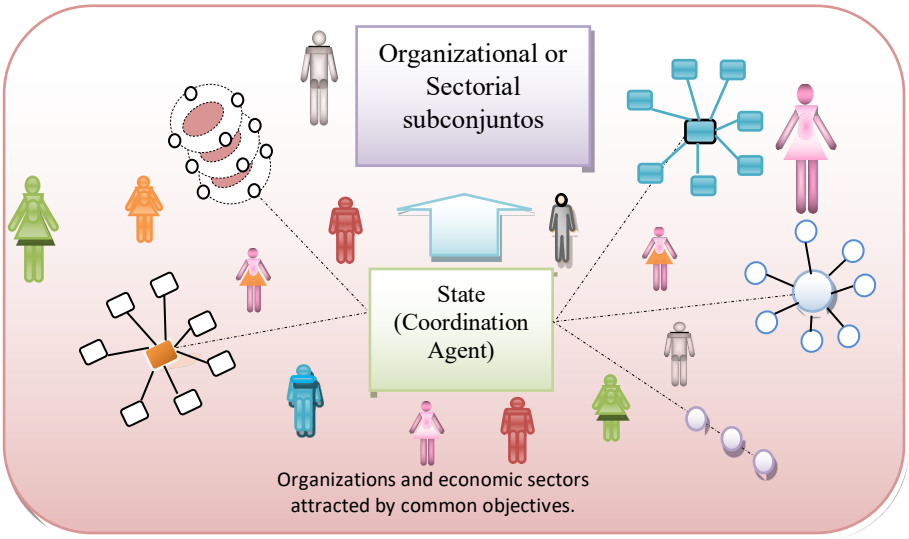
them. Governance is a field oriented to action through the production of rules of the game to protect institutions. Brower & Vargas (Op. Cit., page 296).

As we can see in Figure 2, the great universe of society can be divided into many subsets or sectors and organizations of all types, public and private, governmental, social, productive, industries, companies, and non-governmental organizations, among many others.

Quintero's proposal (2017) intends the harmonization of the governance theory and the organizational theory. In that regard, governance is defined as:

"…the process by which the actors of a society decide their fundamental and temporary objectives of coexistence — and the coordination forms to realize them: its sense of direction and its direction capacity". (Aguilar, 2014)

Figure 2
The complex society divided into organizations of all types



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Unquestionably, through governance mechanisms a link is created between the society, the economy, and the state. There are public and private governance. The first must consider the three phenomena that society faces: complexity, diversity, and dynamism. Public governance occurs in one of the following three modes: self-governance, co-governance, and hierarchical governance. (Quintero, 2017, pp. 41)

Kooiman (2009) points out that governance action is that which is carried out using government instruments that affect and regulate interactions between actors, which allows them to take advantage of opportunities and solve problems. Aguilar, (2011, p. 6), points out: "in short, governance refers to the set of values, institutions, norms, beliefs and technologies through which the government and society address the public issues on which the achievement of their preferred and constitutionally established social order depends".

It is also important to consider that public organizations will compete with private organizations in its respective actuation fields. For that reason, public organizations with legal and regulatory framework must warranty equal conditions in the competing markets to avoid market distortions.

The Organization for Economic Cooperation and Development (OCDE, 2011) proposed the document "Guidelines for corporate governance of public companies."

The guiding principle of these Guidelines is to think that the State acts as an owner and that there are some shareholders or interested parties in corporate development.

The approach also includes the way in which the relationship between the different interested parties should occur. Public companies should develop an active policy of communication and consultation with all shareholders. We propose that this last concept be applied to all types of public organizations, not necessarily to corporate ones.

1.4. Innovation systems governance

Based on the approach of Hillman *et al*., (2011) and Lange *et al.*, (2013), Sandoval-Nehme *et al.* (2023) affirm that it is possible to analyze the innovation systems governance responding the questions ¿Who? ¿How? and ¿What? It is governed.

Due to the importance of these questions, authors elevate them to the category of "dimensions". The *WHO* dimension of an innovation system will include actors and coordinators of the governance mechanism. They can be companies or associations of companies, universities, interest organizations and government agencies. Informal and formal networks will also be included if they have specific tasks. The third and last element would be given by the institutions related to culture and behavioral norms which regulate the interactions between actors.

The *WHAT* dimension deals with which parts of the system are the goals of governance. The *HOW* dimension would involve the various management modes or mechanisms that can be understood as a tools or instruments of governance. (Hillman *et al*., 2011)

Currently, markets and private companies predominate in global economic activity. Therefore, within an extraordinarily dynamic macroeconomic environment, access to information about markets and trends is required, among other things; incentives are also required to search for new activities, which must be increasingly advanced and risky, and to make investments in them; learning how to innovate through imitation or creative adaptation of technologies for commercial applications; access to credit. They are also required an educational system that generates qualified labor; availability of essential public goods; a conducive business environment, sector coordination and articulation, and marketing and product differentiation techniques.

Collaboration is broadly understood as any joint process, by two or more (substantially) autonomous organizations, intended to create public value by working together rather than separately. (Hickey *et al*., 2023).

In last decades there have been intense changes in all economic sectors. In such a situation, the establishment of strategic joint ventures have been recognized as a mechanism to overcome lack of resources without losing the organization's politic control., while maintaining the actives property and creating flexible institutions without incurring in large investment expenditures. (Ochoa *et al*., 2013)

Hence, strategic alliances, also known as Joint Ventures, have become the most popular collaboration form all over the world. They are a kind of networks thought to foster legitimacy, social learning, communication, and joint understanding to achieve shared objectives and reduce unproductive conflicts. Koza & Lewin (1998), affirm that the most common motivation to establish a new Joint Venture is the joint use of complementary assets. (Gorbaneff, *et al*., 2008, p.114)

Furthermore, in a strategic alliance, diverse policy actors engage in formal and informal interactions; therefore, they must use shared norms and rules to understand each other to plan, coordinate and implement the work that will be realized with common objectives. (Hickey *et al*., 2023, pp.1)

Besides, for partnerships to be effective, stakeholders must agree on a common vision and mission; negotiate roles, responsibilities, and actions; define the objectives; and establish negotiation and power-sharing procedures, all this can be materialized using adequate governance mechanisms.

The first type of strategic alliances occurs between companies; because of that, they have an eminently private nature and are developed as a complex managerial and organizational process guided mainly by economic and non-economic issues, and by a rational assessment of the economic costs and benefits in accordance with the perception and interpretation of the managers of the companies. Carrying out a strategic alliance *is not easy*; on the contrary, it is very challenging since it requires aligning the goals and objectives of the partners. (Regge *et al*., 2018)

Of course, private to private firms Strategic Alliances (SA) could have a local or international character, in such a case, it is important to note that the SA is frequently established having in mind that multinational companies and their innovation processes have access to other markets and technology, improving their competitiveness in the global world. Clearly organizational behavior is an important factor that drastically influence its performance. (Gehrisch y Süß, 2022)

According Gellert y Kaznady (1991), health international public-private collaborations have permitted to overcome the iron curtain limitations. Through this type of collaborations Soviet government developed the ability to integrate to a dynamic economic growth through interventions in the public sector for social well-being.

Gutiérrez de Mesa *et al*., (2004) points out that an interesting type of strategic alliance occurs when traditional, pharmaceutical, food, and processing companies, among others, which base their production processes on mature technologies, seek to ally with modern companies that master hi-tech technologies such as biotechnology, new materials, nanotechnology, and others, for the development of new products, generating value in them due to positive operational synergy.

Private businesses dominate markets while public organizations, typically aim to address social problems. So, one of the underlying strategies of the economic development guidelines of developing countries is that the parties have access to public policies that allow their legal alliance and that contribute and promote attention and solutions to social and economic problems.

A second modality is the legally constituted “public-private alliances”, which emerged from the global financial and economic crisis that broke out in the second half of 2008, in Latin America and the Caribbean, when intense collaboration developed between the government and private sector, influencing the development of long-term strategies and the way in which these are implemented through programs and incentives, within a public good framework. So, to overcome economic lags, the adoption of a more proactive and strategic public policy is required to promote innovation from the private sector. The underlying idea is to promote the economic development of the countries in the region in terms of their level of income and GDP. (Devlin and Moguillansky, 2009)

A particular case is public-private alliances that occur in the health sector in the world. In recent decades, this sector has undergone continuous changes, which is why public hospitals have sought ways to make alliances with other private hospitals, or with health service providers and insurance companies to reduce costs, expand markets and of course prepare for the continuous reforms of the Health Systems.

An example of this type of strategic alliances in the health sector is developed between public hospitals and private companies for the provision of hospital services, which can exhibit technical and financial viability, showing positive healthcare results in patient care. Ochoa *et al*., (2013), relate the experience of the San José

Hospital, in the city of Popayán, in Colombia, which in 1997 established and operated the strategic alliance with the multinational company Renal Therapy Service, a subsidiary of Baxter International Corporation.

This is a public-private technological alliance concept that requires great care to be based on the relevant regulatory framework.

The focus of the alliance is that a state company decides to privatize the provision of one of its services, creating a new private company, with a partner that provides its own technology and oversees managing the service. In this way, access was facilitated for patients with kidney deficiencies to the treatments they require to improve their quality of life, and at the same time achieve a reduction in morbidity in the region. Of course, one of the requirements to accomplish this type of alliance is that the country's commercial legislation allows the establishment of companies with public-private share contributions. In some cases, alliances allow physicians greater opportunities to participate in hospital governance and management **(**Thompson, 1967).

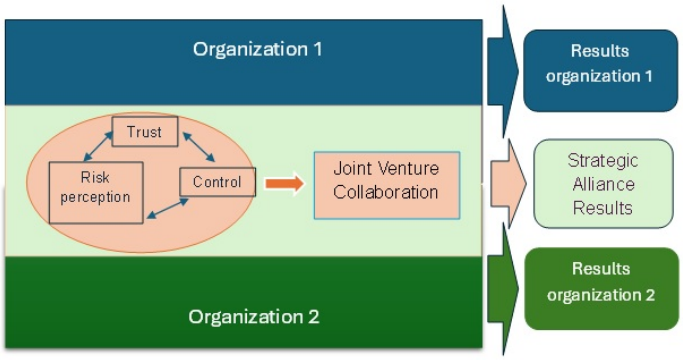
Based on the examination of real experiences, the company Antares Consulting (2018) concluded that a strategic alliance is considered an organizational formula that represents a framework of stable collaboration between two or more organizations, which pursue common objectives through carrying out joint actions that involve exchanging, sharing and/or generating resources and/or capabilities. For an alliance to be considered strategic, it must meet the following requirements: (1) have explicit common objectives, (2) maintain the legal independence of the participating institutions, (3) *explicitly formalize the institutional collaboration framework*, (4) develop collaboration in a continuous time frame (medium/long term), (5) contribute to the development of strategic objectives of the participating organizations, (6) *establish a strategic management framework, based on shared and coordinated decision-making between the parties, establishing control and monitoring mechanisms of the designed objectives and actions*.

In this regard, Rodríguez (2018) agrees and emphasizes the need to establish a good governance and monitoring model to advance in a sustainable manner. Martín and Martínez (2004) point out that to understand the behavior and evolution of a strategic alliance, it is necessary to study different levels, such as the strategic and organizational context, reaching the level of projects and individuals. Likewise, Doz (1996) cited by Martín and Martínez (op cit) points out that it is necessary to understand the objective and tasks that are part of the alliances, their strategic and organizational context, and the processes they carry out. Because the three aspects interact intimately, focusing only on any of them would not allow us to understand the determinants of how alliances develop over time.

Strategic Alliances also can be established to perform research. Miranda *et al.,* (2019) mention that one of the objectives of Health Pan-American Organization (HPO) health research is to establish alliances to execute appropriate and sustainable health strategies. The HPO Member States with powers that allow the exchange of knowledge from research; and promote collaboration among various stakeholders, including the public, government, and academia and private to address national and regional priorities.

Whatever the objective of a Strategic Alliance, it can be formed by a minimum of two organizations network, where risk, trust and control are the main variables of the collaboration architecture. (Hickey *et al*., 2023, pp.2). Naturally, working in networks involves the risk of not meeting objectives, to avoid that collaboration cannot be done without elements of trust and control, the latter *must be carried out through the governance structure designed for the collaboration*. See Figure 3.

Figure 3
Potential architecture of two organizations joint venture network



Source: modified from Hickey *et al*., (2023)

As shown in Figure 3, the independent operations of Organization 1 and Organization 2 produce independent results for each of them. Nevertheless, when they decide to work together to have a Strategic Alliance collaboration, their common results get improved and boosted. In summary, for this potential to be accomplished it is essential that parts trust each other, and even so there always be a risk perception, but undoubtedly nothing could be done without control or governance. To bridge partner differences and facilitate cooperation, it is necessary to opt for a suitable governance structure to organize collaborative activities (Mayer & Salomon, 2006).

1.5. Governance structure of strategic alliances

The forms of governance of hybrid organizational structures are an important topic for academia and practice. As shown in Figure 3, a first aspect is that flexibility in the governance of a strategic alliance is a matter of trust. When the parties invest in trust, social capital is generated between them. To the extent that there are varying degrees of trust, strategic alliances also have varying degrees of integration. (Gorbaneff *et al*., 2008)

For Tseng (2016), *the governance structure will depend on the scope of the alliance*. This refers to the extent to which partners agree to combine multiple functions or value chain activities (e.g., R&D, manufacturing, and/or marketing) during the tenure of the collaboration. (Oxley & Sampson, 2004; Varadarajan & Cunningham, 1995).

Strategic alliances are complex forms of cooperation and frequently require of many bilateral agreements among the integrating parts which are increasingly necessary to support innovative activities. So, the challenge of policy analysts and managers is to find the right balance of competition and cooperation and the appropriate institutional structures for that purpose (Teece, 1992).

Notably, firm boundaries are extremely difficult to define when there are complex alliance structures in place. Teece (1992, pp.7) underlines that it is needed operation and strategical coordination to develop, commercialize or transfer technology to society.

Sang-Mi and Moon-Goo (2019), proposed that capacity for managing alliance can be a source of superior performance for innovation outcomes of strategic alliances. Analyzing private level alliances, recent research has suggested that firms' capabilities for managing alliances differs significantly across firms and that this can be a crucial factor in explaining competitive advantage (Ireland, Hitt, & Vaidyanath, 2002)

In this work we propose that in both, strategic alliances that are carried out between private sector firms or between public sector institutions, the fundamental regulatory elements to carry out their good administration

are the operational guidelines and regulations approved by the authorities and interested parties to carry out the operation of intermediate organizations created with the alliances to promote their results and meet their objectives.

2. Methodology

In this section we present the case of a health sector strategic alliance between a Mexican public university and a governmental general hospital, and the main minimum regulations and norms required for improving its performance.

2.1. Case Study: The UIDT of the UNAM at the General Hospital "Eduardo Liceaga" (HGMEL) in Mexico City

In September 2011, Abdo-Francis *et al.,* (2011) argued that political, generational changes, technological explosion, and globalization had profoundly impacted the medical-patient relationship and promoted an increase in chronic degenerative diseases that force the Mexican Hospitals of the National Health Network to face new challenges, quality being the most important of them. Besides, the complex current situation in which the problems of pathologies associated with malnutrition and poverty persisted in Mexico, in conjunction with the sicknesses that afflict rich and developed countries, gives this challenge very particular characteristics. As a response, Abdo-Francis *et al.,* (2011) proposed the need to establish Strategic Alliances for enhancing the quality of the Mexican General Hospital medical services.

Part of this open vision to the establishment of strategic alliances, was the signing on February 29, 2012 of a Specific Collaboration Agreement between the HGMEL and the Institute of Applied Sciences and Technology of the National Autonomous University of Mexico (UNAM) for the development of frontier technologies in the medical field. So, the objective of the strategic alliance between the ICAT´s UNAM and the HGMEL was to establish a research and technological development unit (UIDT, from Spanish) to house the hospital's medical scientists and the ICAT-UNAM physics, electronics, computer science and mechatronics specialists who would form multidisciplinary work teams to carry out technological development projects whose results could be safely tested with the hospital's patients. The projects developed by the UIDT work team focused on new materials, devices, equipment, software, diagnostic procedures, therapeutic procedures and support for professional practice and clinical teaching related to pathologies and diseases of interest to the hospital that affect the health of the Mexican people.

Yazdani *et al.,* (2020) point out that adequate knowledge management facilitates institutions to enhance the capacity to collect information and knowledge and apply it to problem-solving and decision making. The UIDT´s objective was to collect and integrate medical and physics and engineering knowledge assets to produce medical technologies to solve problems for diagnostics or treatment of sicknesses at the hospital level.

The validity of the original Agreement was established for 24 months. Since then, different extensions were made extending the validity of the Agreement until March 2024 through the signing of three Modifying Agreements. It is important to note that on March 22, 2018, CCADET became the Institute of Applied Sciences and Technology (ICAT). The last agreement was signed on February 22, 2019, with a validity of 5 (five) years, so the validity of the Specific Agreement expired on February 22, 2024.

Currently, the UIDT-UNAM-HGMEL has been in existence for twelve years, it has evolved, and over the years the ICAT´s academic members have developed a series of projects with some successful results. Two free technology transfers have also been carried out from ICAT-UNAM to HGMEL. Furthermore, in process and negotiation is the signing of a Specific Agreement for the establishment of a Simulation Laboratory for teaching Surgery and a couple of agreements to establish the legal bases for a couple more technology licensees.

Today, on behalf of the Hospital, the UIDT has three researchers. Although various academics have participated over the years on behalf of ICAT UNAM, developing various projects, we can mention that they apply most of their time and projects to the UIDT.

Finally, in March 2022 a new director of the ICAT was appointed and in 2024 a new director took office at the HGMEL. Due to all these changes, it is important to update the normativity and the guidelines and work procedures, and it is also very important to establish new regulations for the projects developed in the UIDT of the ICAT in the HGMEL to consolidate their growth and development.

Since the mission of the UIDT is the development of new medical technologies for clinical diagnosis and treatment for diseases of interest to the hospital. The scope not only includes the development of prototypes, but also the intellectual protection of the technology and its transfer from the university to the hospital.

According to Rothaermel (2001), in exploitation and exploration alliances there are complementary assets between the allied institutions. The focus of the new alliance is to promote the maturation of the UIDT so that it continues the development of research, teaching, and innovation to obtain new proprietary technologies that can be used in the HGMEL and eventually transferred to private hospitals or firms for its marketing.

2.2. Regulatory framework of the new strategic alliance

On May 6, 2016, the Law on Transparency, Access to Public Information and Accountability of Mexico City was published in the Official Gazette of Mexico City. Immediately afterwards, on May 9, 2016, the Federal Law on Transparency and Access to Public Information was published in the Official Gazette, the last reform of which was published in DOF 05-20-2021 and its text is in force.

On July 2, 2019, by presidential decree, the Federal Republican Austerity Law was issued. This law establishes the way in which the savings system must be applied and fulfilled in the agencies, such as the powers of the Union, the autonomous bodies, and the various federal authorities of the Republic, regardless of the legal nature they have. (DOF: 11/19/2019). This political-social movement has been characterized by austerity and the fight against corruption in all entities and dependencies of the public sector.

The Secretariat of the Comptroller General was transformed into the Secretariat of Public Service, incorporating into its attributes the substantive functions of promoting honesty as a guiding principle in the exercise of public office and to combat acts of corruption.

The Laws provide that government institutions must monitor the correct application of the resources that the federal government assigns to the public entities, seeking to solve problems of high economic and/or social impact. In the case of the ICAT´s UIDT in the HGMEL, it is very clear that the application of resources must be carried out seeking solutions to the health problems of the Mexican people.

Due to the regulatory framework, during the current administration, the operation of public institutions such as UNAM and HGMEL have been heavily supervised by audits of the federal government and the city government, as well as by internal audits, so it is It is very important to establish adequate governance mechanisms for the UIDT.

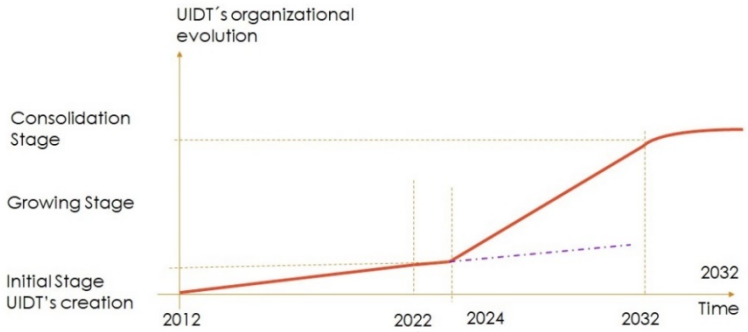
2.3. Transformation from a first learning phase to a second maturation phase

Operation and governance during the Exploratory and Learning Phase

In the first twelve years of life at UIDT, three academics were hired from ICAT-UNAM and three researchers from HGMEL researchers and academic technicians for its operation. During some time, operational coordination was carried out by a team formed by the person in charge on the part of UNAM and the Director of Research on the part of the Hospital. They did not count with normative or regulatory instruments and the operation was carried out by agreements that were taken in periodic meetings that were realized every two months on average. To

those meetings were invited from time to time, some officials from the entities, from areas such as linkage, infrastructure control or ICAT researchers or external participants invited according to the interdisciplinary project to discuss.

Figure 4
UIDT´s evolutionary stages



Source: own design

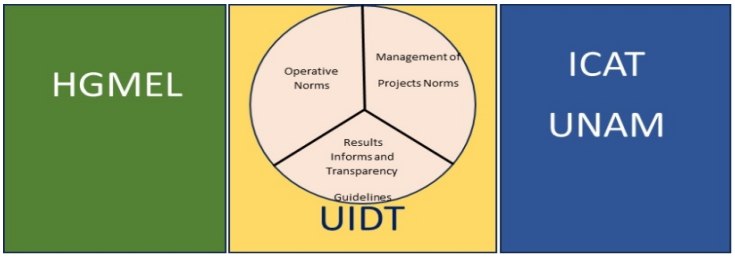
Figure 4 shows the plan to carry on three stages in the evolution of the UIDT: the creation, the growing and the consolidation. It can be said that the UIDT´s first phase was exploratory. Along these years, the projects, their execution, and the operation of the UIDT were not regulated, but rather their entire administration, operation and governance was referred to the participating institutions without a true integration of the UIDT staff of each of the parties. If the UIDT wants to grow and consolidate, the first thing required is to define its governance and direction strategy.

Therefore, nowadays the signing of a new agreement and the establishment of an adequate governance scheme must regulate the process of change to a second stage of maturation and growing of the UIDT. For this purpose, we assume the approach of Foletto *et al*., (2014) the universities in Latin America for governance require: "transparency, equity, accountability, compliance with laws and ethics.

3. Results: proposal of governance for the UIDT´ s second phase

Figure 5 shows the governance framework proposed to conduct the UIDT´s transition from the initial stage to a growing and maturation second stage. For this transition, it is necessary to stablish three types of regulations: operative, for projects development and management and finally for informing the results with total financing transparency.

Figure 5
Governance framework for the UIDT´s Strategic Alliance



Source: own design

3.1. Supervision and regulation Mechanisms to supervise and manage UIDT´s Projects

The Strategic Alliance between UNAM/ICAT and the HGMEL must comply with the valid regulatory framework. In other words, for properly conducting the UIDT, having complete finance transparency and guaranteeing the right of access to public information in management through the dissemination of timely, verifiable, intelligible, relevant, and integral information. The projects of the UIDT, preferably will be those who at least comply with the aspects described in this guideline. The suggested governance standards and documents are shown in following section. For space limitations, it is only shown the suggested index of the regulations and finally a more detailed example of projects development guidelines is presented.

A. Project Management Regulations

1.1 Definition of an interdisciplinary UIDT's project

- 1.1.1 Flow diagram.
- 1.1.2 Procedures for project approval
- 1.1.3 Medical protocolization
- 1.1.4 Ethical Committees
- 1.1.5 Board of Directors
- 1.1.6 Technical Committee
- 1.1.7 External advisors

1.2 Technology projects management

- 1.2.1 Responsible for technology management
- 1.2.2 Functions of the Technology manager: responsibilities, authority range
- 1.2.3 Projects Books (working documents, minutes, reports, etc.)
- 1.2.4 Intellectual Property
- 1.2.5 Technology Valuation
- 1.2.6 Licensing and Technology Transfer
- 1.2.7 Social and economic impact measurement
- 1.2.8 Specific Agreements development and negotiation.

B. UIDT´s Operating Regulations

2.1 Legal Framework (UNAM-HGMEL)

2.2 Intellectual Capital

- 2.2.1 Researchers
- 2.2.2 Academics

2.3 Permanent working group

2.4 Integration and collaboration of interdisciplinary work teams

2.5 Boards of Directors and Government Team

2.6 Infrastructure

C. Guidelines for Annual Reports and transparency

3.1 Legal framework

3.2 Technology Results

3.3 Basic Research results

3.4 Final and midyear reports

3.5 Board of Directors Annual Meeting

3.6 Results Dissemination to Health Sector, ICAT´s academic community and UNAM´s Coordination of Scientific Research.

Finally, as an example we will show and emphasize the aspects related to research and technological development projects.

3.2. Characteristics and regulation of UIDT Projects

1. The main objective of a UIDT´s project, must be to develop some technology, equipment, product, or technological system, composed of hardware, software or both that contributes to solving a problem of diagnosis, treatment, research or monitoring and surveillance of diseases of the Mexican people that are of interest for the HGMEL and for the ICAT/UNAM.

2. The identification of health problems of interest to the Hospital, corresponds to the medical doctors who work in the different services of the Hospital. In such a way, in each UIDT project there must be a medical manager (MM) assigned to the HGMEL.

3. The project will be multidisciplinary, to carry it out there will be at least one ICAT academic who will be the technical manager (TM) of its development. The TM will define the academic development team.

4. Other academics from different ICAT academic groups or from other UNAM´s Research and Development Institutes, may participate in the development of the project, its incorporation will be coordinated by the TM of the project.

5. As part of the development team, the participation of bachelor's, master's or doctoral students will be privileged, whether in the areas of medicine, physics, engineering, design, among others. Students will be able to carry out their social service or their bachelor's, master's, or doctoral theses. The TM and the MM may also define if the project under development requires the participation of postdoctoral researchers or National Counsil of Humanities, Science and Technology (CONAHCYT) chairs.

6. Academics from other UNAM entities, such as faculties, research centers or institutes or from other hospitals or public sector institutions, may also participate in the development of the project. The TM and MM will propose to the HGMEL and ICAT/UNAM authorities, who will give a letter of authorization that will be attached to the project Book.

7. The team made up of the TM and the MM will define the needs for equipment, materials, consumables, reagents, and infrastructure that will be required to carry out the project. Likewise, they will define the contributions that each of the parties will make to carry it out.

8. If required, the team of managers will collaborate in the search for financial resources to carry out the project, either by submitting proposals to different calls from government development institutions of the federal government and/or the government of Mexico City or looking for possible financing from other sources.

9. The project must have a validity of one or two years, according to what the TM and the MM deem prudent.

10. The TM, in collaboration with the MM, will develop an estimated schedule to carry out the project, including the actions to be developed by each of the parties, the deliverables and the respective times.

11. With the purpose of carrying out better governance and control, a Technical Council (TC) will be established made up of the Research Director of the HGMEL and the Academic Secretary and/or the Secretary of Linkage and Technological Management of the ICAT.

12. To register a project, it will be necessary to fill out an application with a pre-prepared format in which a detailed description of the project will be given, identifying the work team, the required infrastructure,

the time required, the scope and the expected results. The TM will approve it and schedule its presentation to the Directors of the entities and the Board of Directors of the UIDT.

13. Approved projects will receive a folio number and a space will be opened in the UIDT´s Project Book. This information will be delivered to the Technology Manager to begin management work.

14. Given that the projects have the purpose of developing technology for the diagnosis and/or treatment of diseases of interest to the hospital, they will sometimes have to receive approval from the Medical and Medical Ethics Committees. The TM, together with the MM and the technology manager, will carry out the respective approval requests and present them to the described Committees. Likewise, they will monitor the different steps and actions that are necessary to achieve the respective approvals.

15. At the beginning or end of each year, the responsible team will present the progress of their projects to the Board of Directors and to the heads of the management of both institutions.

16. The validity of the project may be renewed annually or for similar periods if the development team (TM and MM) submit their request to the Board of Directors and have the approval of the directors of both institutions.

17. An agreement must be made on the percentage of intellectual property that will correspond to each of the institutions, on the creations, inventions or technological results obtained annually in the projects carried out at the UIDT. The parties must decide which inventions should be protected and the way in which intellectual property work will be carried out, such as drafting patents, utility models, industrial designs, software, etc.

18. The parties must agree on the way in which the work will be carried out to obtain intellectual property titles and for their administration. Initially, this may be carried out by the technology transfer offices of each of the parties. Over time and depending on the results obtained, intellectual property management capabilities could be installed internally at the UIDT.

19. The UNAM may license free of charge to the Hospital some of the prototypes that are the result of the development projects for use in one or more of the hospital's medical services.

20. If there is interest from an external company or organization to produce and commercialize one or some technologies developed at the UIDT, technology transfer agreements may be developed and negotiated, in which the cost of the transfer, the percentage of royalties, the area or region of exploitation and the intellectual property titles that are transferred. Likewise, the percentages of institutional participation and the responsibilities of the parties will be defined.

21. Annually or every six months, a report will be prepared on the progress and results of the scientific and technological development projects, highlighting the aspects of economic and/or social impact, addressed to the Board of Directors and to the interested parties and members of the communities of both institutions.

4. Conclusion

A strategic alliance allows two organizations to adapt to radical technological changes and tremendous market dynamics. Through this mechanism, the parties have access to markets, technologies, experts, patients, supplies, information, among many other possibilities that the parties that agree to work in an alliance do not originally

have. Rothaermel (2001, 2001b) calls these complementary assets. For Teece (1998) the greatest value is obtained when through alliances you have access to the knowledge assets that other organizations have.

It is a way to enhance your capabilities and achieve joint results that otherwise could not be achieved or would be very expensive to achieve. In the case of the UIDT of the ICAT at the HGMEL, the hospital has access to the human resources and research and development infrastructure of the ICAT, while the institute has access to the problems raised by the doctors assigned to the different services of the hospital. and the patients and the digital information, statistics, imaging, and the hospital's medical infrastructure, as well as the advice and supervision of the specialist doctors.

The first era in the organizational evolution of the UIDT was one of exploration and learning and took a little more than twelve years. In it, important results were achieved in terms of the development and licensing of technologies. Today, several other technologies such as simulation and diagnostic systems are under development, which are very promising, in the opinion of users. Notably, one of the characteristics of this first phase of organizational evolution is that the governance of this organization was managed in a not very orthodox empirical manner, without its own rules or guidelines.

The parties have decided to continue with their link and enter a growth phase for the UIDT, therefore, to potentiate its operations in a planned manner, it is required that within a period of ten more years of operations the organization can reach its consolidation. It is considered that one of the key aspects essential to achieving these results by promoting organizational growth is to change the governance and administration structure, by establishing rules, guidelines and regulatory documents that allow directing the efforts of the interested parties to achieve better and more efficient results in favor of the health of the Mexican people. In this work, a reference framework for governance in the growth and maturation phase of the UIDT was presented and proposed, an intermediate organization that is the object of the technological alliance between two public institutions, the National Autonomous University of Mexico, and the General Hospital of Mexico.

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