HIDS

Hub Internacional para o Desenvolvimento Sustentável

Final Report

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International Hub for Sustainable Development

Business Plan

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Sociedade Portuguesa de Inovação

IASP International Association of Science Parks and Areas of Innovation

IDOM

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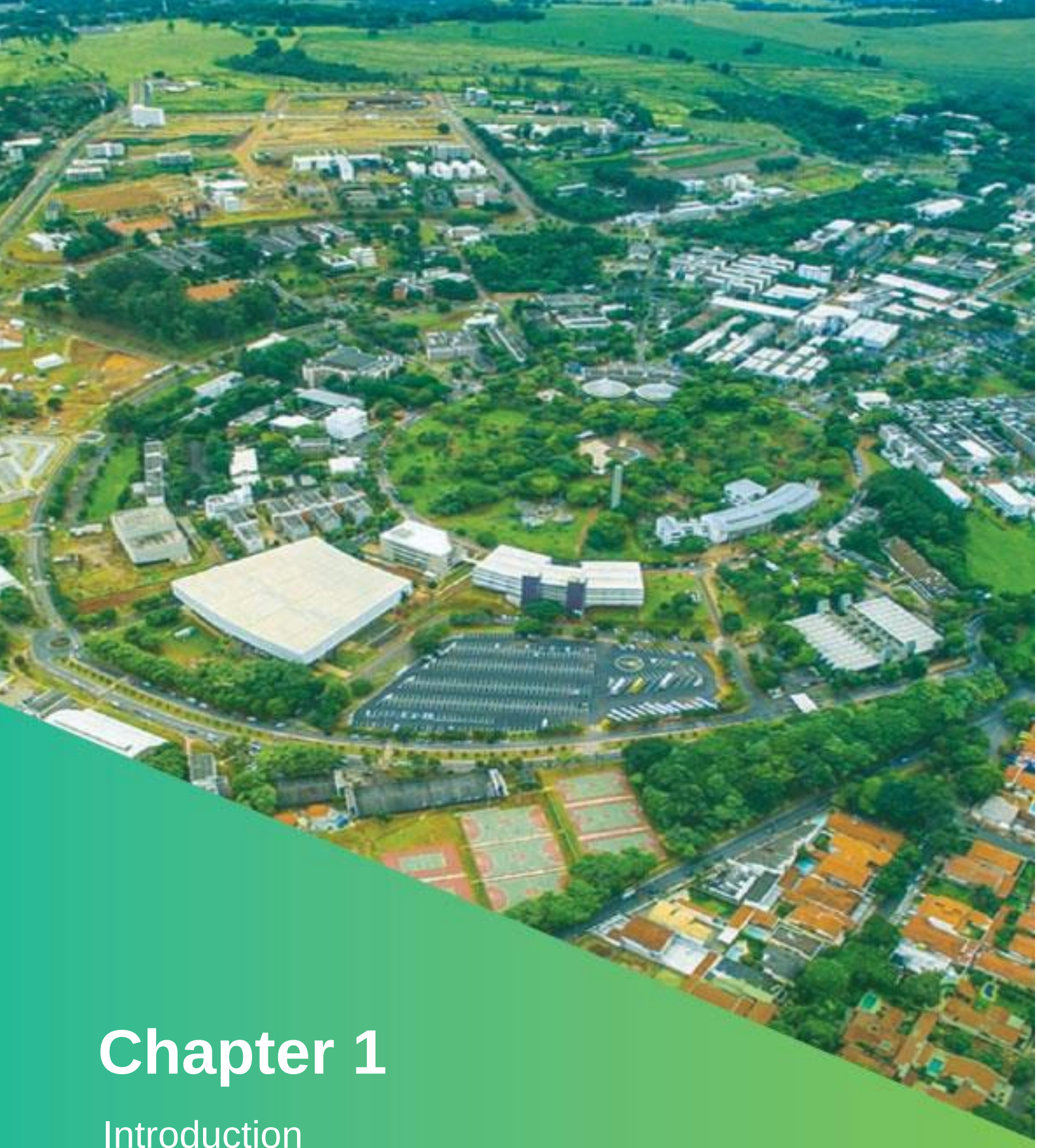


Chapter 1

Introduction

1. Introduction

The International HUB for Sustainable Development (HIDS, in the Portuguese acronym) has been conceived to create in Campinas a third-generation innovation area where economic and social values are generated by sustainable development principles. HIDS is a result of the joint efforts among institutions that are committed towards providing concrete contributions to the promotion of the UN Agenda 2030 with its 17 Sustainable Development Goals, through the mobilization of their resources, capacities and expertise. HIDS origin is associated with the recognition of the strategic value of an area called Ciatec II- the High Technology Pole by the city of Campinas. Ciatec II is home to several institutions and companies dedicated to research and innovation that closely interact with each other. Acknowledging the regional, national and international importance of this initiative, the Inter-American Development Bank (IDB) funded the development of a Master Plan for HIDS, of which this Final Report is part. Following the conclusions gathered in the analysis of HIDS innovation ecosystem and the benchmarking report, this document presents the strategic framework and business model.

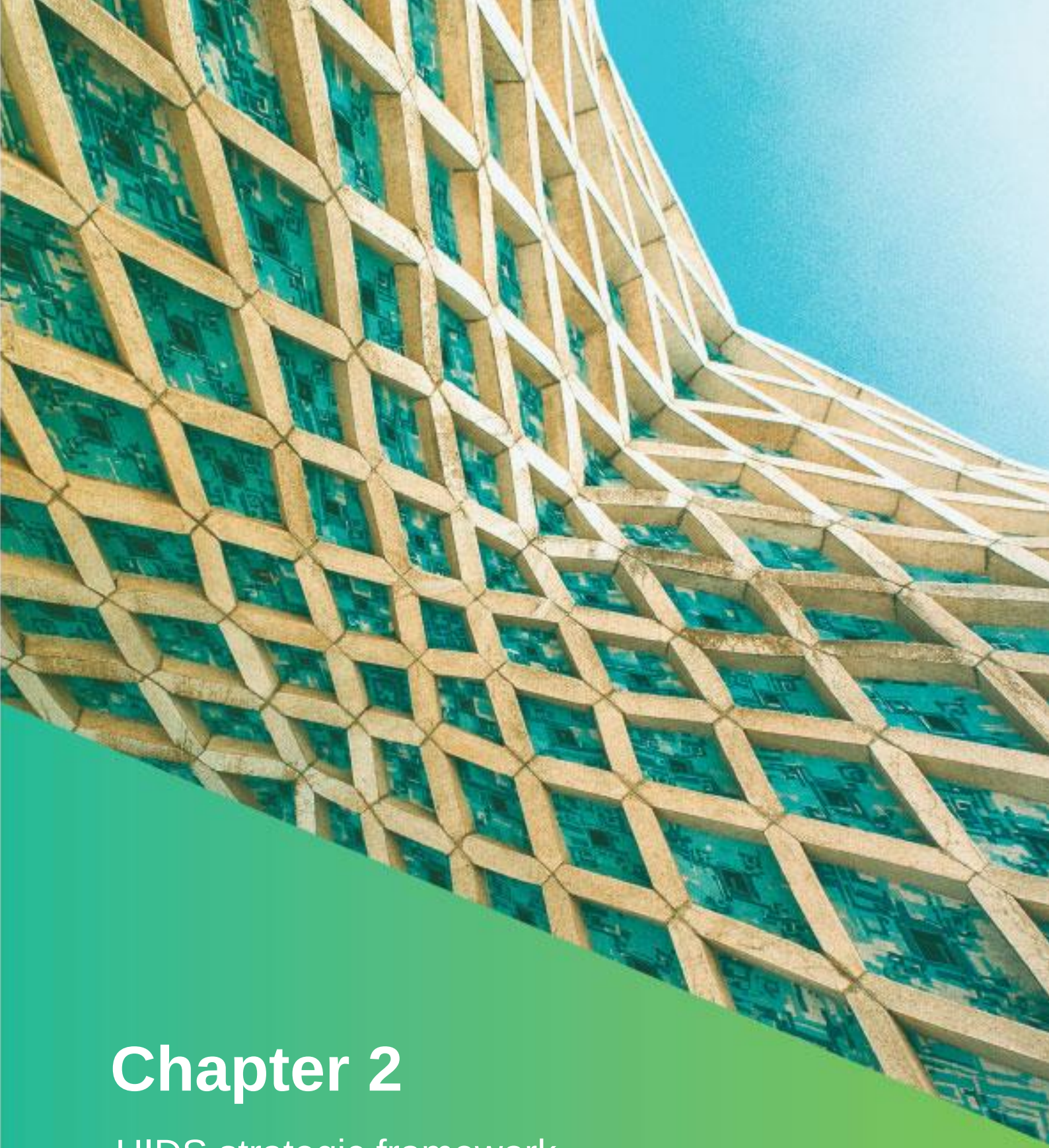
HIDs aims at being a relevant agent in the transition to a sustainable livelihood, by joining national and international efforts to produce knowledge, innovative technologies and education in order to mitigate and overcome current social, economic and environmental fragilities and imbalances. In this sense, HIDS is being developed to be an international model of a smart and sustainable space, and a free zone of knowledge where the cooperation among stakeholders from different sectors and their connection with the rest of the world are supported and cultivated. At the same time, HIDS aims at creating a development model boosting innovative and sustainable development in Campinas, as well as forging local-global connections, seeking to generate positive economic and social impacts in its territory.

To support the conceptualization and concretization of the strategic framework for the fulfillment of these ambitions, a Master Plan is being prepared through different but interconnected components: Physical-Spatial Design, Legal Strategy, Heritage, Sustainable Assessment, Communication, Governance, and the Business Model, being the latter the component into which this document is integrated,. The goal of this component is to build a favorable environment for both companies and investments. Thus, here are defined and presented the strategic framework on which the development of HIDS should be based, and the business model containing the conceptual structure that supports the viability and long-term sustainability of the Hub. HIDS strategic alignment process has taken into account the perspective of all members of its Founding Advisory Council, which is composed of the São Paulo State Government, Campinas City Hall, Unicamp, PUC Campinas, FACAMP, CPGD, Eldorado, CNPEM, Embrapa, TRB, CARIBA, Cargill and CPFL Energia. Therefore, this business model results from a mixed method approach where participatory mechanisms were enhanced.

The development of the business model was done following a methodology based upon a set of concepts and approaches which have been duly deployed in relevant stages and tasks. Among

them are the collection and analysis of key documents related to HIDS; the study of the innovation ecosystem at the municipal, state and federal levels; the conduction of interviews with relevant stakeholders (Annex A); the implementation of workshops; the application of a SWOT and PESTEL analysis; and a benchmarking of innovation and sustainable development Hubs (Annex B). Moreover, efforts have been made to include in this document the perspectives from the local society, which are present in the data already organized by HIDS; in the demand survey; the products and knowledge generated by the working groups from HIDS Masterplan; and the socioeconomical data, available in the literature regarding Campinas' innovation ecosystem. All these tasks have given valuable inputs to the identification of the most relevant gaps and distinctive factors of HIDS, to build its vision, mission, values and strategic goals of the project as well as to define the value proposition, where the primary benefits offered by HIDS to multiple stakeholders are identified. Together, this information was essential to define the key services, activities and facilities that will be offered by HIDS, as well as the governance and management model of the project. Thus, HIDS business plan is focused on fostering sustainability, resource sharing, and knowledge exchange within its ecosystem.

This document is divided into five chapters, the first one serving as an introduction tool to the project. The second chapter presents HIDS strategic framework, including its vision, mission, values and the strategic goals of the Hub. The third chapter defines the scope of the HIDS business model, presenting and describing the competitiveness factors, the five areas of specialization for HIDS, and the key services, activities, amenities and facilities of the Hub. This chapter also presents the governance model, the financial aspects of the project, the partnerships, the alliances and the value creation CANVAS. The fourth chapter contains the operational plan, where the roadmap and implementation process are described. The document is concluded with HIDS financial plan. All aspects that are presented in this report have been discussed and validated with HIDS stakeholders over the process that has led to this Final Report.



Chapter 2

HIDS strategic framework

2. HIDS strategic framework

The foundations of HIDS long-term strategy are defined by a clear vision and mission, and it is materialized in its values and strategic goals. These will form the base of a broad and ambitious framework in which HIDS strategic actions will be developed in response to specific contexts and priorities. The different components of this strategic framework have been discussed and validated in meetings with the HIDS Coordination Team and its Founding Advisory Council.

Figure 1 – HIDS strategic framework

HIDS origin is associated with the recognition of the city of Campinas of the strategic value of the area adjacent to Unicamp – Ciatec II, and its designation as a Strategic Development Pole. Unicamp has acquired a piece of land of 1.4 million m² in this area, which hosts a farm named Fazenda Argentina. Ciatec II covers around 10 million m² and it is home to several institutions and companies dedicated to research and innovation that interact closely with each other, as illustrated in the figure below.

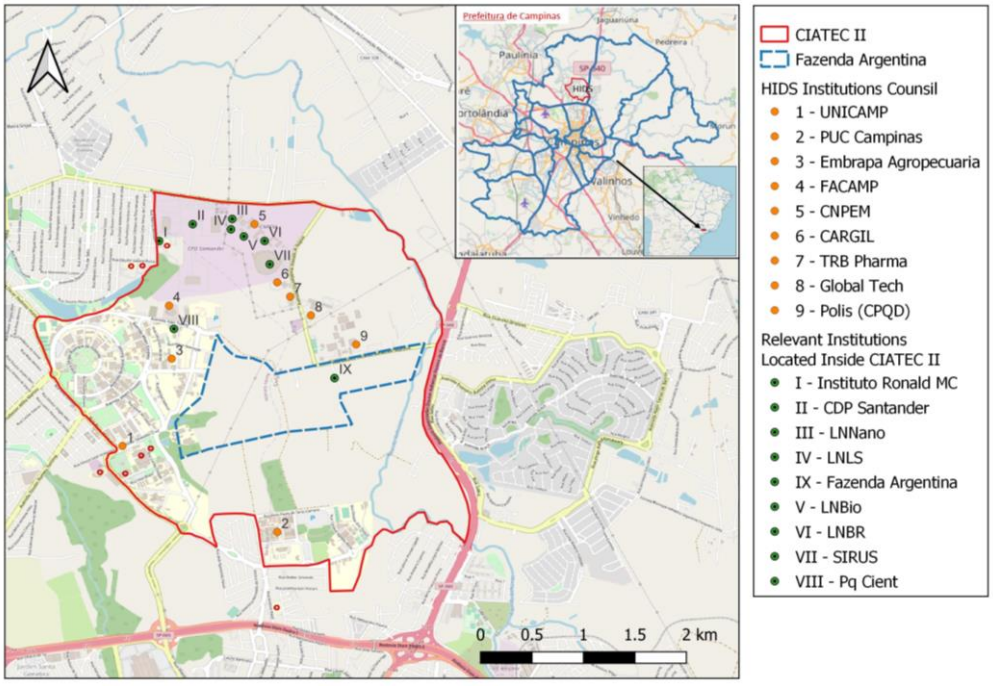


Figure 2 – Map of HIDS and associated institutions

2.1 Vision

HIDS is anchored in a vision that is coherent with the proposition of building a structure that combines and articulates actions, through partnerships and cooperation between institutions that have complementary competences and common interests regarding sustainable development. By having this vision incorporated in its present implementation and future developments, HIDS will act as an epicenter of an innovative and technological ecosystem where actions with direct and indirect impacts on social, economic and environmental axes will flourish. Therefore, the vision of HIDS is :

> To be a global reference in the implementation of the Sustainable Development Goals (SDGs)

More specifically, the Vision is clarified by the following elements:

"To be a global reference…" HIDS is ideally positioned to be a global reference in the provision of the innovation-based solutions, scientific knowledge and human resources to the transition towards a more sustainable development. Bringing together the ambitions of the stakeholders, the favorable economic and social conditions and the competitiveness factors of the territory, HIDS will be a global reference and a driving force for the evolution of more sustainable and resilient relations between human activities and the environment. From the richness of its territory and the knowledge background of its institutions, HIDS will contribute to the creation of the right answers to global issues.

"…in the implementation of Sustainable Development Goals (SDG)." These goals are the heart of 2030 Agenda for Sustainable Development, which provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. Together, these 17 goals and the 169 targets agreed by all United Nations Member States in 2015 aim at achieving a better and more sustainable future for all[1]. The main ambition of HIDS is to create the knowledge, the experience and the solutions to achieve the targets of this Agenda at the local and global scale. This implies that everything developed directly and indirectly (capacities, resources, planning, and operations) in this project effectively contributes to achieving the SDGs, thus becoming a national and global example in this matter.

[1] https://sdgs.un.org/goals

2.2 Mission

The mission defines the reason for HIDS existence and its purpose. This must be shared among the stakeholders and guide the actions of everyone who is involved in this ambitious project. Considering the conditions that have led to the creation of HIDS, the economic, social, and geographical characteristics of the territory in which it is being developed, and the ambitions of the institutions that are part of the Founding Advisory Council, its mission is

> To contribute to global sustainability, through the urban, economic and social development of Campinas

The mission has been proposed in order to put sustainability in the center of all the activities carried out there, in addition to promoting a brand that is synonymous with sustainable innovation. Concretely, in the mission is divided into two integrated targets:

"To contribute to global sustainability…" focuses on devising ways to deliver direct, specific, measurable, and tangible contributions to the Sustainable Development Goals. HIDS will contribute to the sustainable development process, bringing national and international efforts to build knowledge, innovative technologies, and education of future generations, while reducing and overcoming social, economic, and environmental fragilities of contemporary society. This great aspiration seeks to place the project as an inspiring example, making HIDS a living laboratory at the service of the SDGs, where its sustainable strategies will radiate knowledge.

"…through the urban, economic and social development of Campinas." will generate global impacts from the local reality, highlighting the leadership of Campinas as a suitable territory with a flexible environment that allows the creation of living laboratories for the development of its thematic areas. The defined mission aims at highlighting the characteristics of Campinas, a territory with multiple capacities, especially from the educational point of view. In this sense, HIDS is anchored in the existing experiences and achievements of Campinas. Therefore, this target is threefold:

- To be a leader in the following areas: energy, health, agri-food, sustainable urbanism and a transversal area which is information and communications technologies.
- To attract and retain talent to the city.
- To be a living urban laboratory and a world reference.

2.3 Values

The definition of HIDS values is of great significance to place the project and its actions in the world. The formulation of these values clarifies the framework in which HIDS will be developed, strengthening the links among its community´s members.

Figure 3 – HIDS values

- **SUSTAINABILITY** – The core part of HIDS value proposition is sustainability, present in its vision and mission. The whole strategic framework, implementation, resource management, and added value should be oriented towards sustainability. Hence, this implies the importance of sustainability in all its domains: environmental, economic, social and territorial. More than applying sustainable principles to its operations and decision-making processes, HIDS should act as a promoter of sustainability in its community and territory, being at the forefront of the transition to a sustainable future.
- **INNOVATION –** Innovation must be incorporated into HIDS strategy as an efficient and direct contributor to the sustainable development as a path to global sustainability through the implementation of the SDGs. Innovation is an essential factor in economic development, enabling increased competitiveness and the generation of new knowledge. Along with sustainability, innovation is the also a fundamental value of the Hub . It is of utmost importance that HIDS act both as an active producer and a facilitator of innovative actions, capable of transforming the environmental, urban, economic, and social reality of Campinas. It includes innovation to face social challenges; innovation to optimize the scientific-technological capacities of Campinas; and innovation to create new business opportunities, employment and income from the existing academic knowledge and capabilities.

SUSTAINABLE INNOVATION AND INNOVATION SUSTAINABILITY

These two values, together, should be the cornerstones of HIDS strategy, concentrating all its efforts and resources. Combined, they lead to two fundamental aspects that should guide the operation of HIDS (from the shorter to the longer term): sustainable innovation and innovation sustainability.

On the one hand, sustainable innovation stands for the need that all knowledge, research, technology and innovation developed by or within HIDS addresses the creation of economic, environmental and social value in a long-term perspective.

Innovation sustainability, on the other hand, addresses another perspective of the sustainability concept – not development-based, but economic-based. It translates a concern that the innovation promoted and generated by HIDS should be financially sustainable, and economically efficient, ensuring its maintenance over time, and its capacity of attracting sustainable and innovative businesses initiatives. Moreover, the outputs, impacts, effects of innovation, services, activities, and facilities of the Hub should last over time and ensure the economic and financial autonomy of HIDS.

- **INCLUSION** – HIDS foster inclusiveness, presenting itself as a space where equal opportunities are provided to all, without discrimination, and the social and economic benefits are fairly distributed among the community members. This is a way of guaranteeing a greater social mobility inside its influence area and to combat persistent forms of discrimination. Specifically, “leave no one behind”, one of the main principles of the 2030 Agenda for Sustainable Development and its Sustainable Development Goals, is a basilar value for HIDS. Thus, a diverse mix of representative stakeholders should be engaged in its implementation, through a quadruple helix network approach, in which academia, the public sector, the private sector and the civil society are interlinked. The effective participation of these actors ensures that the value proposition of HIDS is adapted to the real needs and capacities of its territory and associated communities.
- **COOPERATION –** HIDS will be a space where innovation is a product of an interactive process in which different groups of actors contribute with their knowledge capabilities and visions. As a Living Laboratory and space of innovation, HIDS anchors its implementation and the success of its strategy in the development of collaborative networks among the associated stakeholders. The model proposed by HIDS is based on open and collaborative processes (crowd-sourced) in which tasks are carried out by a set of stakeholders interacting in a dynamic context for solving problems. Thus, HIDS places itself as a platform of circulation of information and knowledge among different sectors, promoting a close cooperation between researchers, citizens, policy makers, business and third sector organizations as a way of finding effective solutions to common social, economic and environmental problems.

- **CREATIVITY** – Together with innovation, creativity is an increasingly important source of competitive advantage. In this sense, HIDS must present itself as a space of creativity that is aimed at solving local and global significant problems through the usage of its territory, infrastructures, services and activities. The Hub will provide a favorable environment towards creativity that encourages the creation and growth of new ideas. The importance of this value is given by the need of developing disruptive processes that challenge the existing understandings and interpretations, while creating new solutions to the persistent economic, environmental and social problems.

- **ENTREPRENEURSHIP** – This value is highly connected to the affirmation of HIDS as a space of cooperation and innovation. Together with the advances made in the fields of science and technology capacities, HIDS must be capable of transforming this knowledge into new business opportunities, new companies (mainly technology-based ones), new products, services and innovative solutions. These are the basic conditions for the promotion of economic growth as a path to gainful employment. In this sense, HIDS should contribute to bring closer the interaction among stakeholders, to improve entrepreneurial skills, to ease the implementation of the new ideas and technics by providing the necessary material and immaterial resources.

- **EQUITY** – Ensuring equity and promoting the access of knowledge and information to all without any discrimination is a value that should be shared by all HIDS actors. Following the Responsible research and innovation approach, as it is proposed in the European context[2], HIDS will actively combat economic, gender and racial inequalities, reducing imbalances and barriers between and within groups. Equity gaps should be addressed by the promotion of an open culture, concomitantly intensified by open science practices and participatory processes, as well as the implementation of science education programs. HIDS will be guided by the principles of open science, which is the process of opening the access to content and information produced, as well as the knowledge, data and tools, seen that sharing is essential to ensure equal access and conditions to achieve success.

- **CONNECTIVITY WITH NATURE** - Sustainable innovation implies being oriented to and from nature. Thus, the contribution to the implementation of the SDGs and to global sustainability shall rely on innovative solutions based on Campinas' natural capital. In this context, HIDS wants to be a leader in the innovation with nature as a way of achieving more sustainable and resilient societies. Accordantly, solutions inspired and supported by nature will be fostered, through locally adapted solutions which are cost-effective and resource-efficient.

[2] https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation

2.4 Strategic goals

HIDS strategic goals (SG) are defined for the short-term (2 years – to coincide with the timeframe of the operational plan), for the medium-term (5 years) and for the long-term (10 years). Together with the vision and the mission, these strategic goals provide insights for the future direction of HIDS. The nine strategic goals are divided into five main areas, considering their main contributions:

- **HIDS and its implementation:** the achievement of the SG 1 and SG 2 will allow the material and immaterial implementation of HIDS and its operationalization;
- **HIDS and its community:** SG3 defines the base that will guarantee the link between the HIDS and society, through the recognition of its economic and social values and the relevance of the project to the development of the region;
- **HIDS and the territory:** considering the ambition of being a living lab, and an international model of smart and sustainable settlement, it will be necessary to explore mixed land use of HIDS territory (SG 4) and to use this space to test models of urban resilience (SG 5);
- **HIDS and the technological and economic production:** the achievement of the SG 6 and SG 7 is essential to position HIDS as a platform of extensive interaction of innovation actors capable of enhancing regional competitiveness and contributing to local economic development through the production of applied technology and interdisciplinary knowledge;
- **HIDS and its role in the world:** the SGs 8 and 9 aim at guaranteeing the consolidation of HIDS as a Free Zone of Knowledge, and an attractive locus for the exchange of knowledge with the world.

These goals are deeply linked with the intervention area of the Hub, namely the sustainable development, joined to the contribution to the SDGs. As a whole, HIDS will contribute to the achievement to the SDG agenda by generating the knowledge, the innovation and technologies that will help our society transition to a greener and more sustainable future. Concretely, HIDS strategic objectives are directly associated to specific Sustainable Development Goals as it is illustrated in the Figure 4, and described in detail in each objective.

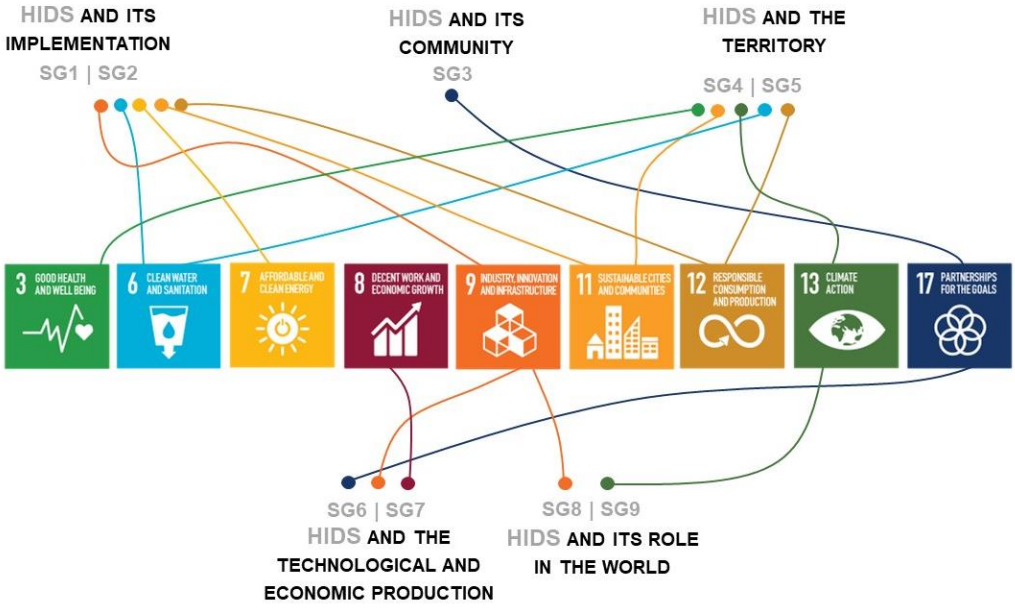


Figure 4 - Association between HIDS Strategic Goals and the Sustainable Development Goals

2.4.1 HIDS and its implementation

Strategic Goal 1: Complete the masterplan and its different components

The elaboration of the master plan must take into consideration the applicability and convergence of its directives in relation to the Sustainable Development Goals. Although this is a short-term strategic objective it has different levels of progression and that they might be revised in the medium or long-term.

The Inter-American Development Bank (IDB) has financed the development of the Master Plan through a technical cooperation (BRT1430) in order to support the implementation and the construction of the HIDS. The Master Plan is being constructed by seven interdependent workgroups, working under the coordination of the General Coordination Team which is in charge of the development of the following different but complementary components:

- Physical-Spatial Design: this workgroup is responsible for developing the physical and spatial design of HIDS. This component is being developed by three coordinated work fronts: The Korea Research Institute for Human Settlements, a team made up of professors from the Architecture and Urbanism courses at Unicamp and PUC-Campinas, and a local urban planning entity which acts as interface between the Brazilian team and KRIHS;
- Legal Model: this component defines the normative models capable of institutionalizing HIDS as an entity that can act autonomously. This workgroup is responsible for establishing the legal framework of financial schemes associated with urban development of HIDS area.

- Business Model: It corresponds to this document. Here it is defined and presented the strategic framework on which the development of HIDS should be based and the business model with the conceptual structure that supports the viability and long-term sustainability of the Hub. This component started with the analysis of the HIDS innovation ecosystem and it is defining here the Strategic Framework and Business Model for HIDS;
- Heritage: this component is responsible for presenting a baseline of biodiversity and ecosystem services that exist the territory. The workgroup is formed by people representing different areas of expertise, from the Biological and Geological Sciences to Archaeology, History, Cultural and Human Rights. The tasks that are being developed aim at providing the necessary information related to these areas for the establishment of the physical-spatial project of the HIDS.
- Communication: this component is responsible for developing the communication strategy for HIDS. It will seek to promote the importance of the initiative in order to raise public awareness, knowledge and understanding, spur their interest and support, and to reach consensus. The main product expected from this workgroup is to develop a Communication Plan for HIDS.
- Sustainability Assessment: the goal of this component is to develop a methodology (model) for the sustainability assessment of all activities to be developed at HIDS and to provide the sustainability assessment of all activities planned for HIDS under this project, using the methodology proposed for this assessment;
- Governance: this component is responsible for ensuring rhythm and assertiveness to the project's objectives from its conceptualization stage, until its proper operation.

Strategic Goal 2: Ensure the material and immaterial implementation of HIDS and its full operation from a convergent strategic vision

Because HIDS is an ambitious project that involves an extensive territory as it will cover the area that contains the region of Ciatec II, PUC-Campinas and Unicamp with several institutions and stakeholders, its full operation requires the mobilization of different efforts and the integrated planning of different areas over time. The implementation of HIDS master plan and its different components is fundamental for the successful operationalization of this project. In this context, the achievement of this strategic goal sets the importance of guaranteeing that HIDS has the material and immaterial conditions to be a structure capable of generating social and economic benefits based on the SDG opportunities, stimulating research and knowledge transfer and innovation processes, also being the suitable space to test sustainable urban models and practices. Likewise, although this should be considered a short-term goal, as the

kick-off of the implementation of HIDS will be done within the next 2 years, while its full operationalization will be achieved in the long-term.

The material conditions represent the necessary infrastructure for HIDS to develop its activities, including not only buildings and constructions that will accommodate the services provided by the Hub, but also the mixed-used infrastructure that will support its activities. They include internal mobility network, public areas, public services such as education and health, waste management infrastructures, water and energy management, housing, cultural facilities and the retail and important services for the city's daily-life functioning. Also, the workforce that will be needed to accomplish HIDS strategy is part of this material implementation.

The immaterial implementation of HIDS is related to the corporate identity with which the project will present itself to society, and associated to it, the brand of the project that will be created over time. The strategic framework that is being presented here is the base of this identity. This immaterial implementation will guarantee the project consolidation as a Free Zone of Knowledge, capable of placing itself as an attractive locus for the exchange of knowledge with the world and a Living Laboratory for the application of state-of-the-art methodologies and technologies. The brand that will be consolidated by HIDS itself and also by the related institutions and community should be associated with the central concepts of the project: sustainable development, knowledge, innovation and technology, and resilient and intelligent human settlements. Being associated to HIDS will guarantee a quality seal that conveys advanced knowledge and innovation. Moreover, HIDS must act as a provider of a public good that consists in the transference of knowledge to the population and the application of science and innovation to the daily routine of the inhabitants of its influence area.

The zone in which HIDS will be materialized is the land of Fazenda Argentina, an area of 1.4 million m^2, complemented by the Ciatec II region - the High Technology Pole located in an area of 8.8 million m^2. Thus, the necessary infrastructure is already in place to comply with the material creation of the project. Harmonizing the perspective of different stakeholders shall lead to new infrastructure for services, industry and housing that ought to be resilient, based on new technologies and innovation, which are at the core of Sustainable Development action. The convergence of different actors and systems is important to minimize the negative externalities resulted by processes and interactions amongst them. The material implementation of the project will be associated to the following SDGs: SDG 6 (Clean water and Sanitation)[3], SDG 7 (Affordable and Clean Energy)[4], SDG 9 (Industry, Innovation and Infrastructure)[5], SDG 11 (Sustainable Cities and Communities)[6], and SDG 12 (Responsible Consumption and Production)[7].

[3] https://sdgs.un.org/goals/goal6
[4] https://sdgs.un.org/goals/goal7
[5] https://sdgs.un.org/goals/goal9
[6] https://sdgs.un.org/goals/goal11
[7] https://sdgs.un.org/goals/goal12

2.4.2 HIDS and its community

Strategic Goal 3: Strengthen the sense of belonging of civil society to HIDS

The SG3 is highly dependent on the achievement of the SG2, as the connection between HIDS and its community relies, to some extent, on its brand and on the ideas and images that are associated with it. It also relies on the fact that the engagement of civil society to the project is fundamental for the success of HIDS and it must be materialized in effective interactions and in the active participation of different stakeholders, government entities, private sector and civil society at the local, reginal and national level. To strengthen the sense of belonging of civil society to HIDS it is necessary to assert the utility of this project and to clarify the economic and social value of its impacts. This is a short-term goal, considering that all the components that are being developed in the master plan are being developed under participatory logics, guaranteeing that HIDS strategy has a strong community base. Still, this SG should guide the actions of HIDS in the medium and long term.

Stimulating the collective appropriation of HIDS and creating the feeling of belonging and identity requires a permanent work in three different fields. First, the recognition of HIDS brand and the engagement of different audiences depends on the effective communication of key messages to specific stakeholders, using appropriate communication media and dissemination methods, including presentations, online media, workshops, social media, video, e-brochures, among others. Second, to make civil society an active agent of the project through civic engagement strategies, such as services and activities focused on the interaction between HIDS and the community (events open to civil society, museums, cultural and sportive equipment to be used by all, among others), as well as through the promotion of the access to education and knowledge for all. Third, to promote the community-based innovation, through actions that promote civil society participation in the innovation process and the sharing of the results and its benefits– this interconnection between the knowledge produced by HIDS, the needs, and ambitions of the community guarantees the utility of the project and its maintenance in time.

This goal is aligned with SDG 17 (Partnership for Goals)[11] considering that the sense of belonging leads to organizational commitment and engagement, giving the sentiment of accountability and leveraging the participation and cooperation towards a successful implementation of the scope of HIDS[12].

[11] https://sdgs.un.org/goals/goal17
[12] https://link.springer.com/content/pdf/10.1007/s43621-021-00029-8.pdf

2.4.3 HIDS and its territory

Strategic Goal 4: Diversify and optimize land use and occupation

Ciatec II has a strategic location to take advantage of already established vocations in the region, and to implement a mixed-use of the land in which the production of innovation and technology is integrated with residential, commercial, ecological, and cultural functions of the territory. The achievement of SG 4 is basilar for HIDS to be connected to the Metropolitan Region of Campinas and it is considered an accessible part of the city. Moreover, the optimization of the land use and occupation is fundamental for the sustainability of the project, as it should have the necessary conditions to be an attractive space where economic activities will take place with the attraction of companies. Considering that the sustainable development is the backbone of the project, and following the most advanced examples of sustainable urbanism around the world, the urban development of HIDS must be knowledge-based and in accordance to the restoration and preservation of its protected natural areas. It should privilege nature-based solutions, passive thermal strategies and the use of renewable energy, including the services and activities which are not provided directly by HIDS. This is a goal to be achieved in the medium term, as it is dependent on the strategic and legal definition of the project and its kick-off, whilst it is fundamental that the diversification and optimization of land use and occupation start to give results within the next 5 years.

The diversified occupation of land is congruent with the project´s ambition of being a “living laboratory”, where not only will specialized institutions focus on research and innovation, but they would convey and apply main findings into the everyday life of inhabitants. In order to do so, proper design, implementation, monitoring, evaluation and adaptation processes are crucial for the success of the Hub. It is essential to point out that the planning initiated for the construction considers different land uses, from housing, services and public spaces.

The optimization of land occupation needs to rely on new information technologies to generate indicators and territorial information that are able to guide public policy and urban planning. This means to promote sustainability at all levels, complementarity between actors, seeking harmonization and diversification of social standards within the project. Innovation should not be only focused on infrastructure, but include smart options for political governance and institutional organization of the land occupation, reflecting its innovative character to the entirety of the Hub.

The coexistence of multiple stakeholders, considering that the Hub incorporates residential, commercial, leisure and scientific functions, demands a sustainable structure that promotes cohesion. In this sense, the project must be attentive to the negative externalities of different process of interaction, concerning matters such as waste management and affordability of the livelihood, aligned with SDG 11.

Strategic Goal 5: Experiment and demonstrate models of urban resilience

HIDS aims at being a living laboratory that will test innovative ways of coordinating different actors of the social, economic and environmental ecosystems. This SG is directly related with this goal of being a space to experiment and demonstrate new models of urban resilience, which is essential to prepare and adapt our societies for the future. Although the creation of the conditions to HIDS be a living laboratory will be created in the mid-term, efforts must be done to maintain this function in a future horizon.

HIDS is being designed to act as a living lab, with the intention of becoming an international model of smart and sustainable district. To do so, the best global practices of cities that planned their urban spaces based on sustainable principles will be used. In this logic, it can contemplate a circular or/and doughnut economy principles and practices[13] in compliance with SDGs 11 and 12.

DOUGHNUT ECONOMY

The doughnut economy is a concept developed by Kate Raworth which proposes an economic mindset that fits in the 21st century and is based on the idea that there is a level below which the economy and economic development should not fall in order to guarantee the human well-being, and also one above which the economy should not rise, to not put in risk the resources of the planet and the living ecosystems. Several cities are applying these principles to their strategies and in 2020 Amsterdam launched the first City Doughnut strategy.

Through the promotion of adequate, safe and affordable housing, transportation, and sustainable urbanization, the project can guarantee social and economic resilience for households and equitable access to workers. Moreover, by focusing in the sustainable management of natural resources in the entire ecosystem of HIDS, scientific and technological capacities can be used for the sound management of waste of all factors of production and consumption within the Hub. Indirectly, the sound management of waste plays a role in diminishing pollution and hence, helping improve Health and Well Being (SDG3)[14] and better water quality (SDG 6)[15] . By fostering changes based on new socio-economic relations enabled by new technologies, HIDS can take action for the mitigation of climate change impacts (SDG 13) issued from the urban areas expansion and democratize the access to public services and resources.

[13] https://assets.amsterdam.nl/publish/pages/867635/amsterdam-city-doughnut.pdf
[14] https://sdgs.un.org/goals/goal3
[15]https://sustainabledevelopment.un.org/content/documents/1963Chemicals%20and%20Waste%20Management.pdf

Considering that the current scenario is mainly related to climate change, HIDS must plan in the long-term to incorporate smart city capacities to be adaptable and resilient to the challenges that the possible scenarios of change might bring. This situation calls for policies that put forward sustainability and resilience, avoiding further natural capital and biodiversity loss, and establishing an equilibrium between the planet´s capacities of regeneration and human demand.

Resilience and sustainability practices shall be aligned with the Sustainable Development Agenda by proposing a different model that promotes social well-being, food security, conservation of biodiversity and natural resources, etc., while closing the inequality gap.

2.4.4 HIDS and the technological and economic production

Strategic Goal 6: Stimulate public-private cooperation

HIDS should be an active agent searching for formulas and public-private partnerships to overcome complex problems associated to economic prosperity and sustainable development. In terms of occupation planning, HIDS should be seen as an opportunity to establish new parameters of public-private management, which will have a direct impact in the occupation of HIDS territory. This is considered a medium-term goal, as the public-private articulation should be fomented since the beginning of the project and should follow the development of HIDS, set to demonstrate results within a 5-year period.

Within this framework, HIDS can take part in the collaborative advantage, building (a) Connections, through networking and relationships building; (b) Complementarity, bringing resources together; (c) System Transformation, harmonizing stakeholders resources and instruments; (d) Standards, creating collective legitimacy and knowledge; (e) Innovation, by combining thinking approaches; (f) Holism, by implementing cross cutting approaches; (g) Shared learning, enhancing collective capacity building; (h) Synergy; and (i) Critical Mass, collectively bringing weight to the action[16]. Developing this objective is a short-term goal, considering that HIDS is born in communion between public entities such as Unicamp, Campinas' city hall, and private organizations that financially support the project.

In alignment with **SDG 17**, HIDS seeks to be built upon public-private cooperation through three types of partnership, (a) Leverage/Exchange, seen that research outputs can be used by industries and governance actors when implementing infrastructures and other symbiotic processes amongst stakeholders; (b) Combine/Integrate, given that resources can be complementary through a cross-sector action and; (c) Transform, being that ultimate type of partnership, pursuing systemic change through innovation, depending on the negotiation of the different stakeholders that take part in the project. Public-Private collaboration will be essential when promoting **SDG 9** during the implementation of the project, whether for sustainable

[16]https://sustainabledevelopment.un.org/content/documents/2564Partnerships_for_the_SDGs_Maximising_Value_Guidebook_Final.pdf

financing purposes, or in sustainable industrialization and resilient infrastructure construction. Furthermore, it will be essential when conveying innovation and new technology from research and educational centers to businesses.

HIDS internal policy objectives also define how private companies collaborate with public and social actors to carry out social improvement initiatives, including the notions of Corporate Social Responsibility and Public-Private Partnerships for Development—considering the implications of the impact of such partnerships in the generation of HIDS. Also, as a living laboratory, HIDS will gain shared experiences that can be replicated and projected into the future in a complex ecosystem that advocates for the well-being of its inhabitants and meets the objectives of sustainable development.

Strategic Goal 7: Attract anchor organizations

Anchor institutions are important for capacity building, the creation of added-value and innovation. They can be well established firms, such as multinational enterprises, as well as public or nonprofit large organizations, such as colleges and universities, hospitals and health-care facilities, museums, and arts centers. They are important nucleus for innovation ecosystems and can be considered determinant drivers of economic growth. This is done through their spending and investment, jobs creation, and their ability to generate ideas, information, and talent, and their presence can act as an incentive for innovative enterprises to set up in HIDS[17]. The development of a clear strategic framework and the HIDS brand positioning are key for the achievement of this goal. Although the contacts, partnerships and collaborations that can attract anchor organizations to HIDS should start in the implementation phase of the project, this can be considered a medium-term goal, to be achieved in the next 5 years.

It is especially important to attract companies that are a reference in energy, health, agri-food, sustainable urbanization and ICTs, which are the thematic areas defined in this business plan. HIDS should take advantage of the extensive experience of Campinas in attracting anchor institutions. In concrete, inside Ciatec II there are already very important institutions that act as nucleus to generate innovation dynamics. It is the example of Sirius, the only accelerator of particles in Latin America, with a similar one only built in Sweden. Thus, it represents a relevant project for Campinas and for Brazil.

Considering that anchor institutions are not likely to leave the place, economic growth and job creation shall be sustainable through time and in accordance to the vision of the project itself. Hence, it is in accordance with SDG 8 (Decent Work and Economic Growth)[18], especially in the targets of work creation and technological upgrade and innovation.

[17] https://cles.org.uk/publications/community-wealth-building-through-anchor-institutions/
[18] https://sdgs.un.org/goals/goal8

2.4.5 HIDS and its role in the world

Strategic Goal 8: Irradiate knowledge and technology to other national and international urban contexts

After its full operationalization, HIDS will be a Hub that generates innovation and technology, and a space of knowledge production and circulation, focused on future and present generations, their livelihood and the planet´s conditions of survival. With this approach, HIDS will be consolidated as an attractive locus for the exchange of knowledge with the world, irradiating its innovative solutions to other national and international contexts. HIDS aspires to be more than a place to generate research activities and knowledge, as it is being developed with the intention of being a space of experiment, an urban settlement prepared to accommodate sustainable human activities and where the SDGs are put in motion generating social and economic advantages for communities. The achievement of this goal is dependent on the success of the HIDS strategy and on the capacities that this project will generate. In this context, although HIDS has the right conditions to be placed as a space of eradiation of knowledge, this should be considered a long-term goal, as it will take significant time, effort, and planning to be achieved.

To affirm HIDS as a space of knowledge irradiation, it should be able to develop the right partnerships and alliances at both national and international levels. This will help HIDS to build joint initiatives that will benefit the Hub, promoting sustainability and reinforcing the competitiveness of Brazil at an international level, and strengthening the cooperation by fostering strategic synergies. Also, HIDS should be committed with high quality standards in the scientific research and with the applicability of the knowledge and its transference to similar institutions, especially to society as a whole and to its own community. In this context, HIDS should embrace the principles of sharing and opening the process cycle of knowledge production and communication. It is particularly important that HIDS stands out as a vanguard space of generation of knowledge and technology in the thematic areas that were considered as priorities: energy, health, agri-food, sustainable urbanism and ICTs as transversal area.

Considering the focus of the HIDS action is the sustainable developing, its role as an irradiator of knowledge and technology will contribute to strength the resilience and implement strategies that promote climate change mitigation through innovation and human and institutional capacity building. In this context, the SG 8 is directly related with SDG 13 (Climate Action)[19]. The project will have a role in leading the path to better national and international practices and public policies.

[19] https://sdgs.un.org/goals/goal13

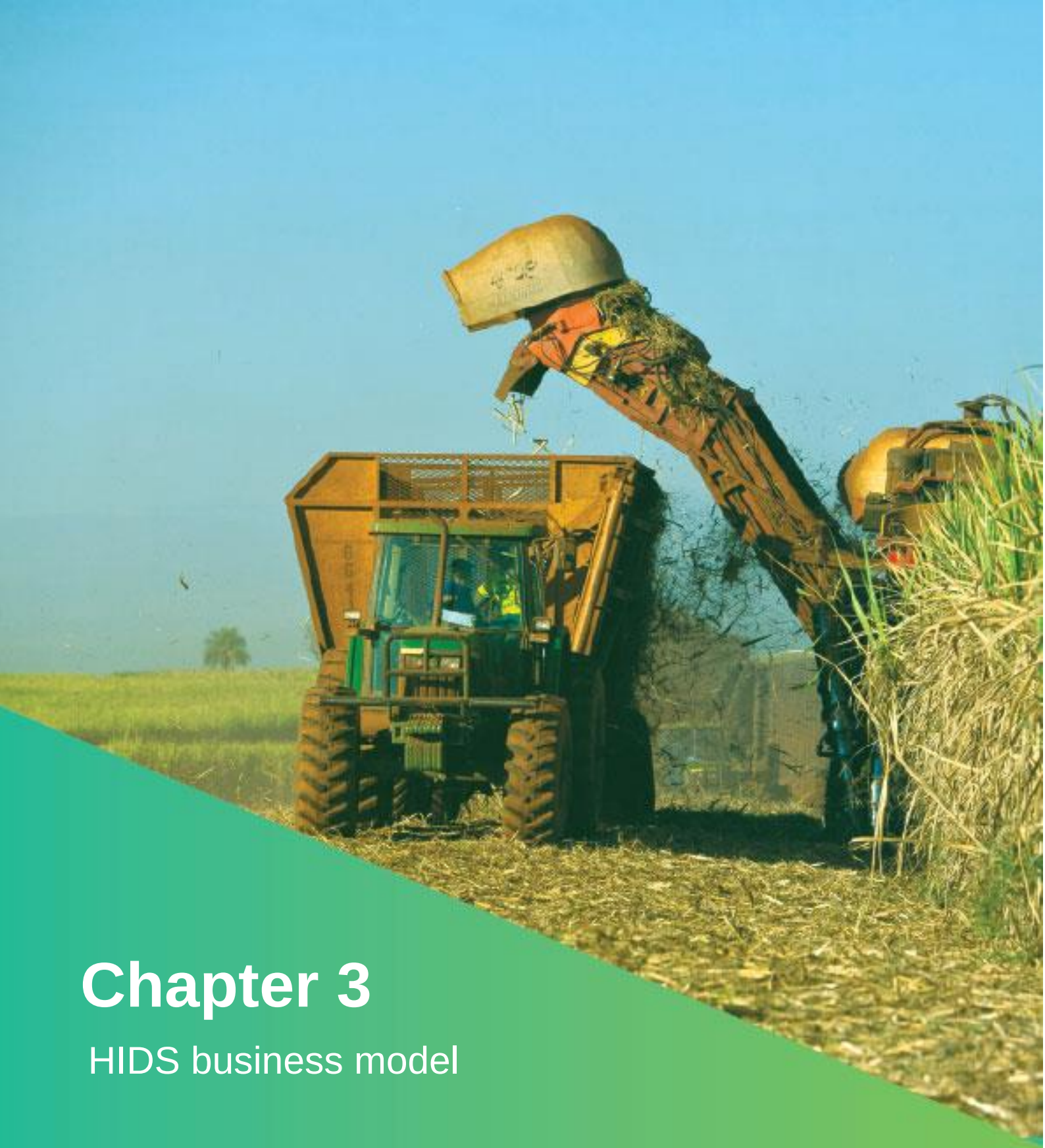
Strategic Goal 9: Position HIDS at the global forefront of excellence in sustainable innovation

The strategic framework that is described here establishes the basic ground of a sustainable and smart urban model district, structured to be a living lab for sustainable development. In this context, HIDS will act as a place that sets the standard for sustainable development among Brazilian human settlements, being an international example of mobilization of human and economic resources, efforts and expertise for the achievement of the 17 SDGs. This approach will allow the creation of economic opportunities associated with sustainable development, such as clean energy and lower urbanization impact. In this context, it is especially important to generate density and a diverse and active urban environment, capable of attracting innovative firms and creative researchers[20]. This is a SG focused on the long-term, considering that it is necessary to have HIDS materialized to properly demonstrate its scope, how it can be replicated, and used as an example to follow.

The impact and results produced by HIDS will be felt in other territorial contexts and the solutions tested here should have the mechanisms to be transferred to other places and be used by other projects. In this context, HIDS aims at being a clear contributor to the generation of cutting-edge knowledge and innovative solutions that are relevant not only for the Campinas' context but also for other places around the world. It will contribute to sustainable development, aggregating national and international efforts to produce knowledge, innovative technologies, and education for future generations, mitigating and overcoming the social and economic negative effects. In other words, it will work on innovative solutions for society's significant challenges.

Apart of aiding other urban structures in advancing climate change mitigation though public policy and infrastructure innovation, HIDS will also promote SDGs 9 and 13 through the cooperation with other science and technology institutes, sharing experiences, results and furthering global research on the matter.

[20] https://www.mdpi.com/2071-1050/13/23/13365/htm



Chapter 3

HIDS business model

3. HIDS business model

HIDS is composed of a set of institutions and companies with different goals and business models. They share the territory of HIDS and can, from the study of their ways of operation and strategies, develop collective synergies that qualify HIDS in its entirety. In this context, HIDS will have an essential agglutinating role, facilitating, combining and articulating skills and resources from distinct sources in order to increase the scale and the weight of its services, constituting its own business framework. After defining HIDS strategic framework where the vision, mission, values and strategic goals were presented, the aim of this section is to expose the business model to be followed.

Therefore, this section aims at describing this framework, by presenting the competitiveness factors of HIDS, the thematic areas in which this Hub will be focused, and the services and activities to be implemented and facilitated by HIDS. Moreover, the governance model will be presented, as well as the funding mechanisms that may be available to contribute to HIDS structures, activities and long-term sustainability, and also the partnerships and alliances that already exist or need to be developed in order to HIDS can achieve its goals. In the final section a value creation CANVAS is presented

3.1 Competitiveness factors

Campinas, also known as the Silicon Valley of Brazil, is the ideal place to catalyze sustainable development throughout the region based on key components: human and social capital, innovation, and spatial dynamics.

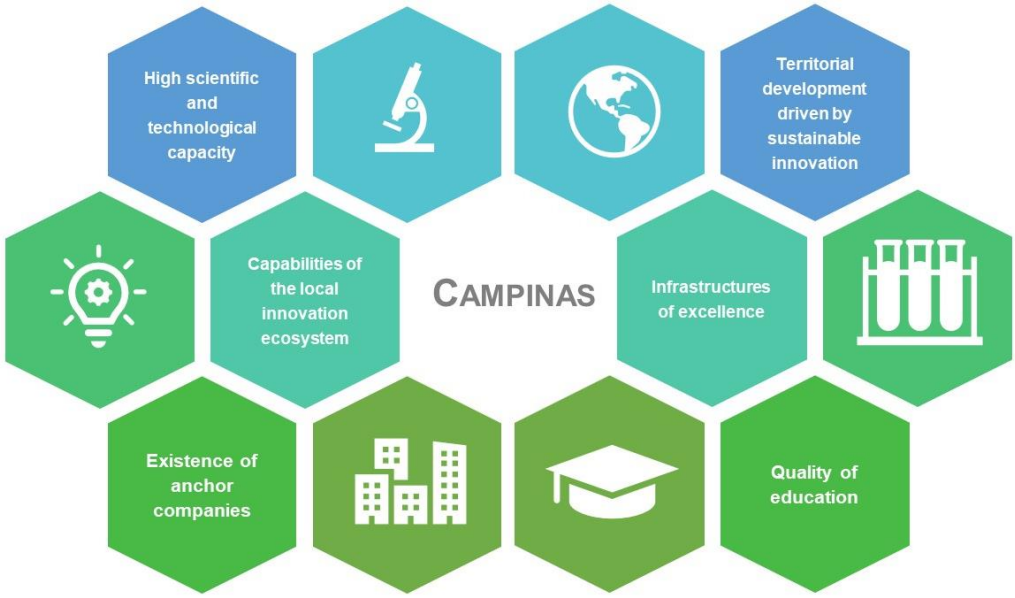


Figure 5 – The competitiveness factors of Campinas

The influence area of HIDS – the Metropolitan Area of Campinas - has strengthened its position as reference of competitive environment, with resources and capabilities that are in line with the global trends in innovation and sustainable development. This context makes this an ideal place for generating an inclusive economic development and to the creation of new opportunities in different sectors. In the following points the competitive advantages of the HIDS are exposed separately, although they are intrinsically interconnected.

High scientific and technological capacity

Campinas is a well-known scientific and technological Hub. The institutions of Higher Education and Research and Development Centres located in the region are major contributors to the scientific knowledge and technological capacity that is produced locally. It can be stated through innovation indicators from 2018[21], which validate that the region has 5,700 research groups, 3,307 researchers and 17,343 masters and doctors. This quantitative data certifies the existence of 1,611 institutions that have scientific activities, placing Campinas as an outstanding scientific and technological production centre at the national and international levels. Amongst these institutions, it is worth highlighting the role of Unicamp, an internationally acknowledged university, as the most relevant one, offering excellence in services of teaching and research.

Furthermore, Unicamp has created Inova Unicamp Innovation Agency (Inova), which became the first technology transfer office to be established in a Brazilian university. Institutions such as CPqD - Center for Research and Development in Telecommunications, Instituto Eldorado, Fitec - Technological Innovations, CNPEM - National Center for Research in Energy and Materials, Wernher Von Braun Labs for Advanced Research, and Embrapa - Brazilian Agricultural Research Corporation, among others are responsible for positioning Campinas as a development enclave and where a great amount of research, development and innovation is produced. These institutions are also responsible for generating products, services and solutions with high applicability to society. Among these, there are the technologies that have been developed on energy and food safety, which are developed by the IAC, integrated solutions for the detection of electronic fraud of the CPqD, the programs of professional training for the ICT market of Instituto Eldorado, among others. The Research and Development and technological innovation activities are financed by Federal and State public institutions from all areas of knowledge but it counts also with important investments made by private companies.

As mentioned before, Campinas hosts, since 2019, Sirius, a fourth-generation synchrotron. It is a high relevant project for Campinas and for Brazil, considering that there is only another similar infrastructure in the world, based in Sweden. Sirius will generate synchrotron light, a source of electromagnetic radiation, of such intense brightness that it can reveal the structures of organic

[21] https://regiaocampinas.org.br/indicadores/inovacao/

and inorganic material such as proteins, viruses, rocks, plants and metallic alloys, all in high resolution[22].

Capabilities of the local innovation ecosystem

Campinas is a melting pot for new ideas and opportunities with a variety of different institutions based there, what makes its local innovation ecosystem robust. There are some existing innovation organizations based in Campinas, which are essential to support the creation of new companies, reduce risks and to enhance incubated or accelerated business models Ventures. Some examples are as follows: INCAMP - Technology-Based Companies Incubator at Unicamp, Vértice, and the Mackenzie Company Incubator, in addition to the accelerators, Venture HUB, Baitas, and Unitas. Campinas also counts with the presence of Scientific and Technological Parks, such as CPqD Technology Polis; the CTI-Tec; the Techno Park Campinas; Unicamp's Scientific and Technological Park brings together more than 120 installed companies[35], the vast majority of which are technology-based companies, enabling the development of innovative products and processes.

Moreover, several organizations that do not fit into the previous groups are present at the Campinas Innovation Ecosystem, which aims at supporting entrepreneurship and local innovation. These can be exemplified by SEBRAE – Campinas (Brazilian Support Service for Micro and Small Businesses), Campinas Tech Community, Innovative Campinas Forum Foundation (FFCi), CIESP - Campinas (Industries Center of the State of São Paulo), and the Municipal Council of Science, Technology and Innovation.

These resources are fundamental for the circulation of knowledge and technological capacities between the academia and the productive sector, making Campinas a national reference in the generation of patents. In 2018 Unicamp broke the record in Brazil in the registration of patents in the Instituto Nacional de Propriedade Intelectual [23], with a total of new 71 registrations. In the same year, this institution had 1027 active patent families and 115 existing intellectual property rights[24].

Existence of anchor companies

Campinas is a dynamic productive space, open to innovation and capable of absorbing the technological development generated by HIDS. Since the installation of IBM in 1971, Campinas has attracted trained and specialized suppliers, as well as service providers. Nowadays, the relevance of the productive ecosystem of Campinas is attested by the numbers presented by IBGE data[36]: in 2019 there were 51.008 active companies and organizations based in the city, what makes Campinas the 10th city at the national level in terms of number of companies, and

[22] https://en.mercopress.com/2019/09/26/brazil-scientists-racing-to-finish-a-particle-accelerator-fourth-generation-synchrotron-sirius
[23] https://www.inova.unicamp.br/2019/04/unicamp-bate-recorde-de-patentes-concedidas-pelo-inpi/
[24] https://www.inova.unicamp.br/wp-content/uploads/2019/04/RELAT%C3%93RIO-DE-ATIVIDADES-2018.pdf

the 2nd at the state level. Furthermore, there is a strong presence of large companies, such as Bosch and Pirelli, world leaders in the production of car components; Samsung, one of the world's largest producers of electronic devices; Raízen and CPFL Energia, important references in the production of energy. The pharmaceutical sector is also present with companies such as Rhodia and Medley, among others. This highlights the capabilities of Campinas' ecosystem, showing the potential of its business fabric to both produce and consume innovation, science, and technology.

In 2018 Ecolab, a global leader in water, hygiene and infection prevention solutions and services, inaugurated its new Customer Experience Center (CEC) and Research, Development and Engineering Center in Campinas. The aim of this center is to provide solid support for Ecolab's growth in Brazil, bringing together specialized technical expertise, state-of-the-art technology and agile delivery of solutions that ensure safety, operational efficiency and environmental conservation. Also, one of the biggest tech Companies in the world, Microsoft, opened in 2017 an Innovation Centre in Campinas, in partnership with the Eldorado Institute.

There are other national and international companies present in the Metropolitan Area of Campinas, such as Bayer, Braskem, Dell, Eaton, General Eletric, Goodyear, Honda, HP, IBM, Iveco, Magnetti Marelli, Mercedes Benz, Motorola, Scania, Syngenta, Tetra Pak, Toyota, Unilever and Volkswagen.

Territorial development driven by sustainable innovation

Over the last years Campinas has made important advances in the area of climate change and the transition to a more sustainable and resilient territory, engaging many sectors, mobilizing the existent innovation capacity, and channeling efforts associate the development to sustainability. The importance that these themes have received in this territory are manifested by the plans and strategies the local authorities have developed, by the initiatives that have been undertaken and by the international recognitions that Campinas have received over the last years.

Regarding the action plans and mitigating actions, Campinas launched the Green Municipal Plan in 2016 (Plano Municipal Verde[25]), becoming one of the only cities in Brazil to publish this kind of document and make an inventory of the green areas. According to this plan, Campinas had 87 square meters of green areas per inhabitant, quite above to what is recommended by the United Nations and other environmental organizations. The specific objectives of this plan were to establish and ensure the quality, quantity and distribution of green areas in Campinas, to ensure their social functions in the case of parks and woods, and their ecological functions concerning riparian forests of rivers and springs, forest fragments and ecological corridors of fauna, the improvement of ecosystems and quality of life of the population. In 2014, Campinas launched a Cycle Plan which aimed at inserting the use of bicycles in the mobility habits of its inhabitants. Currently the municipality has 78 km of cycle lanes.

[25] https://www.campinas.sp.gov.br/governo/meio-ambiente/plano_municipal_verde.php

In addition, it was published the Action Plan for the Implementation of the Connectivity Area Metropolitan Region[26]. The 20 municipalities that are part of this metropolitan area committed themselves to coordinate actions and exchange technical knowledge in order to recover and conserve the fauna and flora. This action plan proposes a new paradigm for regional management of biodiversity and ecosystem services.

In 2014 Campinas joined the Sustainable Cities Program[27], a platform that supports the municipalization of the Sustainable Development Goals (SDGs) and the implementation of the 2030 Agenda at the local level in Brazil. Campinas was rewarded in the areas of Common Natural Goods and Health in 2016 by this program.

The establishment of programs for green infrastructure implementation (such as parks and wildlife passages), creation of environmental education centers, and agroforestry implementation, amongst others, resulted in Campinas UN certification for resilient cities.[28]

Infrastructures of excellence

Campinas has been one of the smartest cities in Brazil for the past years, according to the Urban Systems annual ranking. It ranks 8th nationally when considering overall indicators of the ranking, being at the top of indicators such as Economy (7th), Entrepreneurship (9th), Mobility (11th) and Information Technology (12th)[29]. In 2019, Campinas was considered the smartest and most connected city in Brazil in 2019, according to the result of the fifth edition of the Connected Smart Cities Ranking[30], being the first time that a city that is not a capital city led the list.

More specifically, the Metropolitan Region of Campinas (RMC) encompasses a big industrial pole, accounting for 3% of the national GDP[31]. Furthermore, Campinas has historically been a strategic location for transportation, throughout the 19th century for railway services and since the last century for highway infrastructures, concentrating the region´s road links[32]. The Anhanguera-Bandeirantes highway axis towards the Metropolitan Region of São Paulo (RMSP) and Dom Pedro I highway (towards Vale do Paraíba) are responsible to connect the MRC with other important economic centers. In addition, the Viracopos airport completes the multi-modal transportation system.

[26] https://www.campinas.sp.gov.br/arquivos/meio-ambiente/rmc-proposta-conectividade.pdf
[27] https://www.cidadessustentaveis.org.br/inicial/home
[28] https://cities4forests.com/cities/campinas/
[29] https://app.powerbi.com/view?r=eyJrIjoiMWJjYTgzZGUtNGZkOC00YmM1LTljMDgtODU1ZmQ4NDlmNTRiIiwidCI6IjA0ZTcxZThlLTUwZDMtNDU1ZC04ODAzLWM3ZGI4ODhkNjRiYiJ9&embedImagePlaceholder=true&pageName=ReportSection
[30] https://connectedsmartcities.com.br/#evento
[31] https://americadosul.iclei.org/wp-content/uploads/sites/78/2021/04/71-ly-plano-de-acao-campinas-digital.pdf
[32] https://americadosul.iclei.org/wp-content/uploads/sites/78/2021/04/71-ly-plano-de-acao-campinas-digital.pdf

Quality of education

Campinas accounts for 15% of Brazilian scientific production[33]. In 2018 the Metropolitan Region of Campinas had 38 Higher Education Institutions (IES) registered in the MEC[34]. The good performance of the higher education institutions placed in Campinas gives the city an excellent quality of human capital. According to data from 2018, Campinas had 7,169 workers with a master degree and 4.206 with the PhD.

Moreover, the city hosts one of the most important Brazilian universities, namely Unicamp. It had 37.670 students enrolled in their 65 undergraduate and 158 postgraduate courses, 83 master degrees, 72 PhD courses and 3 specialization courses in 2019[36], a part of 1,782 active professors., It is important to highlight the prestigious position that Unicamp has in international higher education rankings. For the year of 2021, Unicamp was considered the 2nd best university in Brazil by Quacquarelli Symonds (QS) Top Universities Ranking[37] and the Times Higher Education ranking[38], and in 4th by the Shanghai[39] one. Regionally, it is the 7th best university in Latin America according to QS, having the spotlight in areas such as dentistry and Food Science & Technology.

This contributes to the consolidation of Campinas as a national center for the production of scientific knowledge. Other expressive universities present in the territory are PUC-Campinas, Mackenzie, FACAMP and UNIP, examples of the municipality's capacity to train specialized labor force. UC-Campinas is the first private educational Institution in São Paulo and the third in Brazil with the highest number of 5-star courses in the "Faculdade 2020 Guide" ranking and one of the best evaluated educational centers according to QS. In addition, the Institution is among the highest percentages of researchers benefiting from scholarships, data provided by CAPES (Coordination for the Improvement of Higher Education Personnel). PUC - Campinas has an academic community of almost 20,000 people, including graduation and post-graduation students, professors, and researchers. Campinas has also several research institutes responsible for generating specific knowledge within the Innovation Ecosystem.

3.2 Thematic areas

This section covers the five areas of specialization for HIDS. They were defined taking into account their link to the SDGs[40], their implementation, the endogenous potential (current and

[33] https://resiliente.campinas.sp.gov.br/sites/resiliente.campinas.sp.gov.br/files/resilience_plan_-_campinas_-_2017-2020_ingles.pdf
[34]https://regiaocampinas.org.br/ensino-superior/
[36] https://www.aeplan.unicamp.br/anuario/2020/anuario2020.pdf
[37] https://www.topuniversities.com/universities/universidade-estadual-de-campinas-unicamp
[38] https://www.timeshighereducation.com/world-university-rankings/university-campinas
[39] https://www.shanghairanking.com/institution/university-of-campinas
[40] For better understanding, see the targets of SDGs presented in Annex C.

future) of the territory of Campinas, and the capacity (current and potential) to generate knowledge and innovation in the local ecosystem. It was also discussed and validated by the General Coordination Team and Founding Advisory Council. For each sector, indicators were brought up that justify the relevance of the area in the context of Campinas, both from an economic and technological point of view.

Campinas is one of the richest cities in Brazil, especially considering that it is not a capital. According to the last data available in the Brazilian Institute of Geography and Statistics (IBGE)[41], from 2018, the city has the third largest GDP in the State of São Paulo (placed after São Paulo and Osasco) and, it scores 11th in the Brazilian rank, accounting for R$ 61397262.53. In addition, considering the weight of industrial activity, it ranks 7th in the State of São Paulo and 18th in Brazil, while its part in the public administration, defense, education, public health and social security places the city in the 3rd position in São Paulo and 18th in Brazil.

3.2.1 Energy

The use of fossil fuel sourced energy is one of the greatest problems to be addressed today, seen that the energy sector is responsible for 60% of greenhouse gas emissions, and thus, it plays an important role in climate change. Furthermore, the lack of energy supplies and transformation systems is an obstacle to human and economic development[42]. According to the United Nations Economic Commission for Europe (UNECE, 2019)[43], the energy sector is undergoing a major change that transforms its paradigms and standards. The report highlights the decarbonization process that the energy sector has been going through, in which it gains more relevance on government agendas, as they are more concerned about the negative consequences observed in society and the economy, due to climate change. The traditional energy sector, after years of using fossil fuels, is expected to have a growing demand for clean electricity.

The study points out that the new trends for the production of clean energy directly affect the historical patterns of production and consumption of societies, which demand a global adaptation, supported by studies and new technologies for the sector. The shift has been integrated in international and national policy agendas, as well as in the private sector, where investments have been redirected to clean energy projects. Ensuring a future with a high level quality of life will result from the growing concern for the environment and the preservation of natural resources, expanding the search for new alternatives that make their maintenance

41 https://cidades.ibge.gov.br/brasil/sp/campinas/pesquisa/38/47001?tipo=ranking&ano=2018&localidade1=0&indicador=46997

42 https://www.unep.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-7

43 UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE (UNECE), Towards sustainable renewable energy investment and deployment (Advance Version), p.9. (https://unece.org/info/Sustainable-Energy/Renewable-Energy/pub/3107)

viable. The need to encourage innovation mechanisms regarding clean energy is perceived, seeking to transform the energy system at a regional and national level. In this sense, there are several types of energy transitions, which encompass the joint efforts and investments in complementary areas that concern research in renewable energies, such as: storage, distribution, energy efficiency, smart grids, recharge infrastructure, and management of demand.

In Latin America and the Caribbean, 26 million people (4%) do not have access to electricity, and at least 15% of the population use biomass from non-sustainable resources. In a macro perspective, the share of fossil fuel in the energy matrix is close to 75%, 44% in electricity generation and 90% in transportation[44]. Conversely, Brazil has great opportunities in the matter compared to the region standards. The country follows European and North America standards in access to electricity with a 100% percent of the population covered, and the same goes for access to clean cooking, reaching 96% of the population. Concerning participation of Renewable Energy in the total energy consumption, Brazil excels, being over global average with 47% of its mix being composed of renewable sources. Nevertheless, Brazil struggles with energy efficiency (3.9 MJ), which although higher than the average in Latin America (3.4 MJ), it is still below all other regions and at a global scale (4.8 MJ)[45].

Against this backdrop, Campinas stands out in the national scenario in the energy area, being considered a pole of technology development. Examples of institutions and companies responsible for building this ecosystem by carrying out in-depth studies in the biomass, solar energy, electric cars, biodiesel and pre-salt sectors[46] are: Sugarcane Technology Center (CTC); State University of Campinas (Unicamp); Agronomic Institute of Campinas (IAC); National Biorenewables Laboratory (LNBR); CPFL Energia and Braskem.

In addition, Usina Tanquinho can be highlighted as an example of good practice initiatives in the region of Campinas. This is the first to use photovoltaic panels in São Paulo, as well as being the largest plant with these characteristics in Brazil. Inaugurated in November 2012, its facilities are used by CPFL Energia with the objective of researching the various technologies of

[44] https://www.cepal.org/sites/default/files/static/files/sdg7_c1900693_press.pdf
[45] https://trackingsdg7.esmap.org/time
[46] https://cnpem.br/campinas-vira-polo-de-pesquisa-em-energia-limpa/

photovoltaic panels and wind solar cogeneration, becoming a research Hub for the region. Tanquinho has facilities that occupy an area of approximately 13,700 m² in the city of Campinas, with the capacity to produce 1.6 GW/h per year, which corresponds to energy capable of supplying more than 600 homes with a regular consumption of 200 KW/ h per month. These values are equivalent to the power to light, on average, 70% of the houses in Campinas.[47] In this way, the plant is positioned as a landmark in the state, making it remarkable at the heart of investigations into new technologies to boost solar energy in the country.[48]

National Biorenewables Laboratory (LNBR) is one of the four national laboratories of the National Center for Research in Energy and Materials (CNPEM), located in Campinas, and it is a private non-profit institution financed by the Ministry of Science, Technology and Innovation (MCTI). Among its challenges is the objective of using biodiversity and biomass to encourage the transition from a production structure based on fossil fuels to a biological and renewable base. The main impact of this change is the reduction of greenhouse gas emissions, enabling the responsible use of natural resources and the preservation of the environment. Among other projects, this institution is dedicated to the development of microorganisms and enzymes that establish new models of industrial production, generating wealth and jobs, while reducing environmental impacts.

Energy is a cross-cutting issue that revolves around the entirety of the Sustainable Development Goals[49] Aligning with the SDG 7 (Clean and Affordable Energy), HIDS can contribute to its targets and indirectly promote sustainability and resilience to other city functions and society needs. By ensuring energy research technology, the Hub can upgrade the technology and expand the infrastructure used by energy systems, which shall impact the affordability and access to energy services, improve energy efficiency and promote the use of renewable energy sources[50].

As stated above, the thematic area of Energy will impact indirectly other areas. Improving energy efficiency and affordability is aligned with SD1 (No poverty), seen that it shall lead to decreased expenditure of households with the service, and contributing to its usage for productive activities:

- It can increase agricultural productivity, striking SDG 2 (No hunger);
- Clean energy shall have an impact on basic end-uses, such as cooking and lighting, a part of making energy more reliable in health-care facilities, complying with SDG 3 (Good Health and Well-being);
- By promoting the energy-oriented research and educational programmes, and relying on the electricity for the implementation of ICTs for learning purposes, it contributes to SDG 4 (Quality Education);

[47] https://www.cpt.com.br/noticias/maior-usina-de-energia-solar-e-inaugurada-em-campinas
[48] https://cpflsolucoes.com.br/cases/usina-solar-de-tanquinho/
[49] https://www.un.org/sites/un2.un.org/files/2021-twg_3-exesummarie-062321.pdf
[50] https://sdgs.un.org/goals/goal7

- Electricity has an impact on improving sanitation facilities and access to quality water services, as proposed by SDG 6 (Clean Water and Sanitation);
- By reskilling fossil-fuel sector employees, the energy sector can further employment rate, aligning with SDG 8 (Decent work and economic growth);
- Productivity can be furthered through energy efficiency increase, coping with SDG 9 (Industry, Innovation and Infrastructure);
- By increasing the percentage of clean transportation and reducing emissions via improvements on energy efficiency in building, it complies with SDG 11;
- Reducing energy consumption in economic sectors has an impact on SDG 12 (Responsible consumption and production);
- Reducing GHG emissions from the energy sector and shot-lived climate pollutants strikes SDG 13 goals (Climate Change)

3.2.2 Health

The city of Campinas has historically been advanced in terms of health when compared to the national average. Before the creation of the Brazilian Integrated Health System (SUS), the city had already developed Communitarian Medicine Projects in the 1970´s, departing from an initiative by the Communitarian Medicine Learning Laboratory of the Faculty of Medicine of Unicamp, which was later taken over by the municipality. By the 1980´s, there were 25 unities of local health centers under municipal responsibility, almost 10 years before the creation of SUS.

The region of Campinas has become one of the main centers of high technology, innovation and scientific development, some related to the health field. In this context, the promotion of

scientific, productive and technological areas that aim at developing the health sector has been gaining more and more space and attention. It encompasses factors such as growth in personnel training, scientific and technological development in the health area, the production of equipment and medicines, information and communication technology, as well as the high offer related to general healthcare.

Nowadays, the city of Campinas works as a regional center for medicine, health and well-being for a wide range of regions in the inland of São Paulo. While The city of Campinas has 1.17 million inhabitants, it is the regional reference for around 3.5 million people in the offer of

services and products, showing the complexity of its organization, structure that guarantees the access to public health services and actions[51].

Campinas stands out in São Paulo state and in the national context, mainly due to the privileges and highlights that foster and provide competitiveness for this sector, consisting of[52]:

- Large concentration of higher-level institutions that produce knowledge.
- Presence of renowned public and private organizations dedicated to research and high technology.
- Five technology parks accredited by the State government: namely the Technological Park of Campinas (at the State University of Campinas), the CPqD Technological Park, the Renato Archer Information Technology Center Technological Park, the Campinas Techno Park, and CIATEC – Campinas Technological Park (the latter having a provisory credential)[53].
- A significant number of companies employing highly specialized and postgraduate labor.
- Support of a good urban, transport and logistical infrastructure that connects the region to large urban centers, including at the international level.

The tests for vaccines and research carried out in the city related to the Sars-CoV-2 virus are examples of the relevance and activeness of Campinas in the Brazilian scientific scenario. For instance, Unicamp has participated in the research and clinical studies of Coronavac, a vaccine produced by the Chinese pharmaceutical company Sinovac in partnership with the Butantan Institute[54]. In addition, PUC-Campinas´s Hospital was also actively involved in part of the tests on volunteers with the Janssen vaccine[55].

Furthermore, the Sirius particle accelerator has served as support for researches related to the pandemic, obtaining 3D images of essential protein structures which were used to advance in studies regarding the life cycle of the coronavirus[56]. It has also contributed to the solution of technological challenges, such as new drugs and treatment for diseases[57].

HIDS project has the ambition to improve the role of the region in public health, especially in cancer treatments, seen that it is expected to be the main cause of death in Brazil by 2029. The proposal is duo: first, as a living laboratory, it will be able to aid in the prevention and prediction of cancer risk factors by analyzing the evolution of a great number of patients. It can be

[51] https://saude.campinas.sp.gov.br/biblioteca/plano_municipal/2018-2021/Plano_Municipal_de_Saude_Campinas_2018_2021_PAS_2018_v_1.0.pdf
[52] https://ipads.org.br/wp-content/uploads/2020/11/sade-campinas.pdf
[53] https://www.desenvolvimentoeconomico.sp.gov.br/programas/parques-tecnologicos/
[54] https://hc.unicamp.br/newsite_noticia_116_estudos-clinicos-para-testes-da-coronavac-no-hc-sera-ampliado-para-mais-500-voluntarios/
[55] https://www.janssen.com/brasil/teste-de-fase-3-da-vacina-da-janssen-contra-covid-19-no-brasil
[56] https://novo.campinas.sp.gov.br/noticia/40525
[57] https://www.lnls.cnpem.br/sirius-en/

expanded by leading the Hub to being an example of preventative health[58]; Second it is expected for HIDS to host a laboratory for the construction of cancer treatment and diagnosis equipment, , as proposed by the researchers of the Chronology and Cosmic Rays department (DRCC) of the Physics Institute of Unicamp. By integrating technology and innovation, the infrastructure can rely on a proton therapy, which is a cancer treatment with fewer collateral effects. In the view of DRCC, there could be a laboratory dedicated to the development of cyclotrons for the confection of radioisotopes for cancer diagnosis and a proton accelerator for the treatment. According to the researchers of the department, this would lead to better expertise of the researchers and also job creation and talent attraction.

Directly aligned with SDG3 (Good Health & Well-being), the thematic area of "Health" within HIDS scope shall contribute through its activities by increasing research and technology in the area, as well as attracting financial assistance and promoting training to the field-related workers[59]. This shall lead to a better management of the well-being of the population, but it depends on other factors encompassed by the scope of other SDGs, such as investment in innovation for health and water, air, waste and agricultural management[60]. Considering the ambition of the project, it would also further SDG 8 (Decent work and economic growth), SDG 9 (industry, innovation and infrastructure) and SDG 17 (Partnerships for the goals), seen that it would instigate public-private partnerships to achieve the target goals[61].

3.2.3 Agri-food

It is expected that around 70% of the world´s population will be living in cities by 2050, a critical situation considering that 70% of all food supplies are already consumed by urban dwellers, and the number is constantly on rise[62]. In Latin America, agriculture and food systems are vital to the present and future of the region, whether for rural or urban populations. By improving both in terms of profitability, sustainability and inclusivity, the impact on the region development is considerable, leading to a better food consumption and less indirect costs for the population, such as the lack of quality water and soil misuse.

To rethink food production methods is important for economic, social and environmental changes. For instance, by investing in the transformation of food systems and agriculture, countries can profit about 15 times the initial investment, creating business opportunities and new jobs[63]. Even though the main areas of production are located in rural perimeters, the expansion of food systems and agriculture to cities can contribute to a more resilient environment by diminishing food and nutrition insecurity.[64]

[58] http://www.hids.unicamp.br/um-laboratorio-vivo-na-area-de-saude-no-hids/
[59] https://sdgs.un.org/goals/goal3
[60] https://gh.bmj.com/content/bmjgh/5/9/e002859.full.pdf
[61] http://www.hids.unicamp.br/laboratorios-vivos/laboratorios-vivos-conversando-com-a-unicamp/
[62] https://www.fao.org/news/story/en/item/1329868/icode/
[63] https://www.fao.org/3/cb4415es/cb4415es.pdf
[64] https://www.fao.org/news/story/en/item/1329868/icode/

The socioeconomic development was responsible for changes in Brazil contributing to emerge new production parameters and patterns of food consumption. New needs and demands arise, which stimulate research and bring new technologies resulting whether in enhanced agricultural production, enabling the creation of differentiated processes that optimize and accelerate productivity in the field, or in research that results in the genetic improvement of food.

The city of Campinas has the basis for developing new opportunities for the agri-food sector, seen that it is the center of agriculture and farming activities in the country, being the Brazilian biggest pole of technical knowledge and innovation in the field[65]. Many institutes located in region are focusing their efforts on developing research in the agri-food sector, such as the Food Technology Institute (ITAL). This initiative has an important position with regard to the development of processes, products and packaging in the food sector. In this sense, the Institute of Food Technology (ITAL) concentrates its activities in three macro areas: Science and Quality, Technology and Packaging, obtaining its results through projects, analyses, events, technical-scientific publications, graduate programs and training.[66]

Patents are also prominent factors in the city of Campinas. The Agronomic Institute (IAC) of the Department of Agriculture and Supply of the State of São Paulo, in joint ownership with the State University of Campinas (Unicamp, obtained in 2020 the most recent patent in the area of essential oil and extract vegetable for use in dental composition, entitled "Nanoemulsion of Lychnophora pinaster and its use"[67].

Furthermore, it is important to emphasize that the rural area of Campinas exceeds 50% of the total territory of the municipality, amongst which 17.53% of the land is used for agriculture and 25.17% for farming[68]. Each region has different visibilities in their productive specialties, which are[69]:

- Amarais region: production of vegetables and sugar cane.

[65] https://www.agricultura.sp.gov.br/noticias/regiao-de-campinas-e-o-centro-do-conhecimento-agropecuario-do-pais-diz-arnaldo-jardim
[66] https://regiaocampinas.org.br/instituto-de-tecnologia-de-alimentos/
[67] https://agricultura.sp.gov.br/noticias/iac-celebra-131-anos-de-conquistas-com-tres-novas-patentes/
[68] https://americadosul.iclei.org/wp-content/uploads/sites/78/2021/04/60-ly-plano-de-acao-campinas-digital-3.pdf
[69] https://www.campinas.sp.gov.br/arquivos/desenvolvimento-economico/guia_investimentos_pt.pdf

- Pedra Branca, Agrarian Reform, Saltinho and Descampado regions: export of its production of guava, fig, kincan orange, star fruit, acerola, grape, fig, banana, passion fruit and peach.
- Regions of Friburgo and Fogueteiro: highlighting the agricultural activity, in the production of vegetables, grapes, passion fruit, mango, coffee, sweet corn and common corn, beans, potatoes, pigs, and confined beef cattle.
- Chácara Aveiros: production of vegetables and figs.
- Anhumas region: production of passion fruit, chayote, persimmon and vegetables. In addition to the activity carried out by Tozan Farm, which produces a line of organic and Japanese products such as sake (the only factory in South America), soy sauce, miso and rice vinegar, in addition to coffee.
- Barão Geraldo Region: production of vegetables, lemon, avocado, horticultural and ornamentals.

Hence, it is possible to affirm that Campinas has a large agricultural apparatus aimed at the most varied food sectors. The region also presents a vast scientific and technological development, as well as making room for several institutions that promote and boost the agri-food sector.

In this sense, it is important that the multifunctional perspective of agriculture is addressed, seeking to implement sustainable bases that allow solutions to socio-environmental and economic problems, such as the conservation of natural resources, the rural exodus, and food security. By furthering research on alternatives and applying good practices, HIDS has the opportunity to implement a strategy focused on the four pillars framework proposed by the Barilla Center for corporate SDG alignment.

The Four Pillar Framework for Corporate SDG alignment is a proposition created by the Barilla Center based on the consultation of diverse stakeholders, which identifies the four dimensions of all business activities that holistically and indivisibly impact society and the planet. They are (1) Beneficial Products and Strategies; (2) Sustainable Business Operations and Internal Processes; (3) Sustainable Supply and Value Chains; (4) Good Corporate Citizenship[70].

By integrating strategies and innovative alternatives that promote beneficial products in agri-food, the thematic area aligns with SDG 3 (Good Health and Well-being); The second pillar concerns the sustainable business operations and processes, which refers to the impacts that the production has on resources use, such as water, energy and land, and internalizing externalities, which are related to SDG 6, SDG 7, SDG 12 and SDG 13; The third pillar focus on

[70] https://www.barillacfn.com/media/pdf/Executive_Summary_2020.pdf

the sustainable supply value chains and the responsibility of all stakeholders, while de fourth englobes the good corporate citizenship, hence touching the need for partnerships (SDG 17)[71].

Moreover, by strengthening the link between rural and urban planning, furthering food security and the correct management of resources, the sector can further SDG 11 by making cities more inclusive, resilient and sustainable[72], while indirectly contributing to SDG 1 and 2 revolving around the importance of food security in cities and human development in slums[73].

3.2.4 Sustainable urbanization

Over the last decades, cities and urban centers have become the main habitat of humankind, being the promoters of global wealth and innovation. According to United Nations, 55% of the world's population lives in urban areas, a proportion that is expected to reach 68% by 2050[74]. Rapid urbanization has led to negative impacts in livelihood and natural life, contributing to climate change by being responsible for almost 70% of GHG emissions[75]. In this context, planning and preparing cities to manage and reduce their contribution to rapid sprawl, pollution, environmental degradation, and unsustainable production and consumption patterns, is essential to promote sustainable development.

Campinas is the second most important metropolitan area of São Paulo, with more than 3.3 million inhabitants and being currently in evident growth[76], leading to a dichotomy between the socioeconomic aspects and environmental ones. The second main metropolis in the state of São Paulo, the metropolitan region of Campinas is currently expanding, benefiting from the positive externalities of this growth process and, at the same time, suffering from the inherent risks and vulnerabilities. The expansion of the urban fabric, the improvement of the quality of life, sustainable mobility, the expansion and efficiency of public services are some of the issues that arise as a result of this process. The territory harbors multiple fauna and flora species that are in danger, as well as varied ecosystems.. In this context, HIDS must position itself as a catalyst for innovative solutions for sustainable development.

[71] https://www.barillacfn.com/media/pdf/Executive_Summary_2020.pdf
[72] https://agrifood.net/sustainable-development-goals/goal-2-implementation
[73] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4242851/
[74] https://population.un.org/wup/Publications/Files/WUP2018-Report.pdf
[75] https://www.un.org/en/chronicle/article/addressing-sustainable-urbanization-challenge
[76] https://americadosul.iclei.org/wp-content/uploads/sites/78/2021/04/71-ly-plano-de-acao-campinas-digital.pdf

The city and its metropolitan region have already taken action in order to lead to greener urbanization, seeing that it is part of the Cities 600 (cities that will drive two-thirds of global growth), which can be stated in the Resilience Plan (2017-2020)[78]. By identifying possible risks and vulnerabilities, the plan presented possible actions to mitigate negative effects.

Moreover, the city created programs to ensure the positive coexistence of the natural habitat and the expansion of urban life. The Campinas´ Green Areas and Conservation Units System ensure green public areas that improve quality of life, while helping protect local biodiversity[79]. This kind of action has been furthered by the recent Action Plan for the Connectivity Area, in which public institutions acknowledge the need of a new paradigm for biodiversity and ecosystem management, articulating with the different municipalities that compose the Metropolitan region (RMC).

By understanding that the disconnection and fragmentation of natural landscapes make these spaces more vulnerable, the RMC is implementing natural connections between the areas with most environmental relevance. In this project, it is proposed actions related to the construction of linear parks, ecological corridors, urban afforestation and a governance plan guarantees a successful implementation of the strategy[80].

In this context, HIDS has the opportunity to propeller existing actions and collaborate with the stakeholders that are already engaged in them. In corroboration with its mission, the Hub can add innovation and technology to improve local knowledge production in the matter, and come up with new propositions to disseminate the sustainable urbanization in Campinas.

[78] https://resiliente.campinas.sp.gov.br/sites/resiliente.campinas.sp.gov.br/files/resilience_plan_-_campinas_-_2017-2020_ingles.pdf
[79] https://cities4forests.com/cities/campinas/
[80] https://americadosul.iclei.org/wp-content/uploads/sites/78/2021/04/71-ly-plano-de-acao-campinas-digital.pdf

Cities are considered the arena where the battle to achieve SDGs will be whether won or lost. Therefore, sustainable urbanization through SDG 11 (Sustainable cities and communities) is directly linked to the matter, while relating to other SDGs as well. To urbanize sustainably means that all should have equal rights to economic resources and basic services (SDG1); building resilient infrastructures to support economic development and human wellbeing (SDG 9), including access to safe and drinkable water as well as adequate sanitation and hygiene facilities (SDG 6); Through innovation, technology and resilient infrastructure, sustainable cities improve energy efficiency (SDG 7), reduce waste generation in production and consumption (SDG 12) and strengthen the capacities to adapt to climate change hazards[81].

Thus, this thematic area shall put HIDS in the forefront of references in terms of sustainable development goals achievement.

3.2.5 Information and Communications Technologies (ICT)

There are many technological trends emerging at the global stage, with a series of technologies that stand out internationally that are related to industry 4.0 and have great prospects for growth and adoption in the upcoming years. Their disruptive potential consolidates them as key factors for the development of the ICT sector on a global scale, so that their applications tend to transversally enhance the international production system, generating new technological paradigms.

Among the identified trends, the 5G technology can be highlighted. It offers a high connection capacity, high data transfer rates and low latency, being substantially more efficient than 4G technologies. It allows the promotion of other technologies that previously had restrictions due to connectivity, as is the case of the Internet of Things, which foresees the production and subsequent connection of millions of devices to the Internet in the coming years.

In this context, Campinas makes efforts to be present in the development of new technologies, being a prominent pole on the national scene. The Center for Research and Development in Telecommunications (CPQD) is an institution that encourages these activities. In October 2021, the Connectivity Laboratory Complex was inaugurated in the city of Campinas, aiming at the development of technological innovations. In the search of becoming a reference in 5G research and applications in Brazil, in Open-RAN (Open Radio Access Networks) and in cybersecurity analyses, the Complex develops functional tests and tests for equipment certification, ensuring excellence in products, the well-being and safety of the population. Soon, its results will be able to meet the new technological demands of the market, helping Campinas establish itself as a technological center of reference in this field.[82]

[81] https://www.urbanagendaplatform.org/new-urban-agenda-localize
[82] https://www.cpqd.com.br/noticias/cpqd-antecipa-o-futuro-e-inaugura-o-complexo-laboratorial-de-conectividade/

Another identified global trend in the area of ICT is the blockchain. It consists of a type of Distributed Ledger Technology (DLT), with a shared, immutable database, permanently located online and capable of digitally representing everything that can be digitized, such as rights, properties and assets. Technology has the property of being decentralized, in order to promote autonomy in the various interactions made possible.

Among its competitive advantages, above all, its reliability and protection against hacker attacks and misuse by system administrators stand out, with the information being treated by immutable and encrypted technology. In an urban scope, the opportunity for Smart cities is enormous, both for the present and for the future. Increased transparency, connectivity and information sharing would facilitate policy making, enhancing citizen participation.

Campinas is positioned to encourage the development of this technology, through companies headquartered in its metropolitan area, presenting research results and incentives for events on this topic, as it is the case of the Campinas Tech Community, which consists of main research institutions, service providers, large companies and other players interested in innovation. Among its objectives is the collaboration to improve the entrepreneurial environment in the region by supporting initiatives around the technological area.[83] Events such as the ExpoBlockchain forum are stimulated by the association, which in its second edition in 2019, aimed at presenting blockchain technology to businessmen, investors, and researchers, while articulating business opportunities between Brazil and European and Asian countries.[84]

Campinas counts with a Smart City Strategic Plan (PECCI),built from one of the strategic guidelines of the Strategic Plan for Science, Technology and Innovation, with a ten-year term since 2015.It is financially supported by the Municipal Council of Science, Technology and Innovation of Campinas (CMCTI), chaired by the Municipal Secretariat for Economic, Social and Tourism Development (SMDEST) of the Municipality of Campinas. The basic guidelines of PECCI are based on the objective of transforming Campinas into a smart, human and sustainable city. For that, the plan was consolidated with the current

[83] https://regiaocampinas.org.br/campinas-tech/
[84] https://campinas.tech/blockchain-tecnologia-une-seguranca-e-agilidade-em-transacoes/

diagnosis of the city, based on the mapping of the main IT systems existing in the City Hall, the (ICT) infrastructure of the city and the respective services made available to the citizen.[85]

In conclusion, the technological aspects and incentives for digitizing the territory of Campinas are marked by advances in the blockchain areas, artificial intelligence, among others areas. It targets results and provides applicability for the development of sustainable innovative solutions in all sectors identified as strategic areas, namely health, energy, agri-food and sustainable urbanization.

The presence of ICTs is important for the overall achievement of the Sustainable Development Goals, as they work as catalytic drivers. They accelerate human progress, fostering innovation throughout the process. By placing the ICTs in the main thematic areas of the Hub, it shall facilitate the convergence between the strategy of its constitution and the Agenda 21.

ICTs development and promotion within the scope of HIDS can directly contribute to improve inclusive innovation and better education in the educational institutions that are part of the Hub (SDG 4 and SDG 1), transform public services into being more accessible (SDG 11 and SGD 1), and foster inclusive financing (SDG 1). Furthermore, it plays a role in offering opportunities in the agri-food sector related to food security through productivity enhancement, and resources management and monitoring (SDG 2 and SDG 6, SDG 7 and SDG 11). It helps improve health systems (SDG 3), it is used in building resilient infrastructures and fostering innovation (SDG 9), and it promotes partnerships amongst different stakeholders, locally, nationally and internationally (SDG 17)[86].

3.3 Services, activities, amenities and facilities

The definition of HIDS´ services and activities shall take into consideration its thematic areas of expertise, its scientific and technological capacities, and the articulation between actors interested in promoting sustainable and territorial development. Such features were initially analyzed in relation to the demands and opportunities of the Campinas innovation ecosystem, as well as through the comparative study proposed by the Benchmarking report. It encompasses the analysis of other innovation areas at the international level, and it has contributed to refine the understanding of the HIDS´ value proposal through the application of the Strategigram tool, which was developed by IASP, consequently enabling knowledge generation about its profile and strategic opportunities.

Taking this scope into consideration, three workshops were conducted based on the scope of HIDS´ strategic framework, in order to collect inputs from the Masterplan representative entities and the impressions from the HIDS´ Founding Advisory Board. These workshops led to the

[85] https://www.campinas.sp.gov.br/arquivos/desenvolvimento-economico/pecc-2019-2029.pdf
[86]https://unctad.org/system/files/non-official-document/cstd2016_p06_DoreenBogdan_ITU_en.pdf

validation and definition of services and activities to be delivered and facilitated by the Hub, considering its strategic goals, key skills and capabilities, and its value proposition.

It is worth mentioning that in relation to HIDS services and activities, two distinct groups were identified, which are composed by a) services provided directly by HIDS, that depend on its own legal, financial and human resources; b) services provided by HIDS stakeholders, where HIDS role is mainly focused on mobilization, articulation, or the provision of strategic guidelines, as these services will impact its territory.

As a result of this process, it is possible to point out the following solutions which are resumed in the following figure and described in the sections below.

		Services & Activities
Provided by HIDS	Technology and innovation: transference, diffusion and validation	• Scientific resource sharing • Technology validation and demonstration • Technology and knowledge transfer
	Training and entrepreneurship	• Education, qualification & requalification • Support to innovative entrepreneurship • Incubation and acceleration
	Scientific dissemination, exploitation and collaboration promotion	• Applied research, technical assistance and consulting • Analytical knowledge production • Community driven services • Strategic and future planning
	Prospection of investments & financial resources	• Fundraising and financing • Softlanding & internationalization
	Institutional relations and community engagement	• Communication and branding • Events, co-creating and netweaving
Provided by HIDS stakeholders	Services	• Real Estate development • Commercial and Industrial production
	Amenities and facilities	• Squares, parks and green areas • Cycling & walking lanes • Housing • Schools • Public transport • Markets, shops, restaurants and cafes • Hospital and health clinics • Other services of general interest • Sports courts, recreation spaces, gyms • Hotels

Figure 6 – Services, activities, amenities and facilities

3.3.1 HIDS services and activities

Technology and innovation: transference, diffusion and validation

Scientific resource sharing

By taking into consideration its aggregating role, HIDS proposes to organize infrastructures, laboratories, scientific equipment, and human resources for shared use between the organizations that integrate the Hub, also mediating it towards the provision for companies and institutions interested in developing scientific activities in HIDS territory. Scientific resource sharing leads not only to direct savings, reducing the investments and risks required for the activity's performance, and thus, decreasing barriers for scientific and technological production, but it can also contribute to the diversification of services available, as the resources from different partners can be combined towards common goals. In addition, it promotes deeper relations amongst the participating organizations, enhancing knowledge sharing and cooperation.

HIDS will ease mediation of physical, technical and human resources, fostering the identification and promotion of partnerships between its members. In order to provide the proper structure for these relations, there is a need to establish specific agreements between HIDS members, enabling the provision of joint services and allowing joint remuneration, considering different terms and conditions of collaboration.

As examples of scientific resources to be shared, the following can be highlighted:

- The Clinical Analysis Laboratory (LAC) of PUC-Campinas Hospital: it conducts clinical studies in the most diverse areas of medicine, such as: oncology, infectiology, gastroenterology, genetics, and neurology, among others[87].
- CNPEM laboratory complex: 33 installations with high-tech equipment, among which the National Synchrotron Light Laboratory stands out. Responsible for the Sirius operation, it is the largest and most complex scientific infrastructure ever built in the country, and one of the most advanced synchrotron light sources in the world[88].
- CPQP laboratories: They are focused on research in the areas of usability, colorimetry, studies, and applications in radio frequency identification, computations, terminals, wireless networks, optical networks, metallic networks, protection and electromagnetic compatibility, energy systems, materials and metrology[89].

[87] https://www.hospitalpuc-campinas.com.br/pesquisas-clinicas/#tab-id-5
[88] https://www.lnls.cnpem.br/sobre/
[89] https://www.cpqd.com.br/servicos-laboratoriais/laboratorios/#

- Embrapa Territorial laboratories: they comprise the Geospatial Research and Innovation, Image Reception and Processing, Spectroradiometry and Field Sample laboratories[90].
- Unicamp laboratory complex: It is an extensive laboratory complex that encompasses several areas of study, such as: petroleum, environment and sanitation, biochemistry, food chemistry, optics, soils, materials, etc.
- Instituto Eldorado laboratories: It has a broad structure dedicated to laboratory tests in the areas of industry 4.0, oil & gas; 5G, automotive; agribusiness; health; and energy[91].
- Research & development staff: the HR of HIDS members could be mobilized to perform joint-R&D activities on demand, allowing staff collaboration across institutions, and with potential external private and public clients.

Technology validation and demonstration

Since its idealization, HIDS has incorporated the proposition of characterizing itself as a living laboratory, where it will be possible to test new products, services, and technologies through the dynamic interaction between its users and the processes of research and development. It shall result in collaboration for creation, prototyping, validation and test of new solutions applied to real contexts.[92]

Considering the aforementioned, the services associated to the HIDS´ technological validation and demonstration seek to englobe the whole process, from technologic corroboration in laboratory until prototyping, including its testing and demonstration in controlled or partially controlled environments, as well as in a real context, such as HIDS territory.

HIDS will be responsible for promoting and enhancing the provision of technological validation and demonstration services that are already offered by the research, science and innovation institutions present in its Founding Advisory Council, which can be exemplified by the aforementioned laboratories.

Fundamentally, the availability of testbeds and fablabs (fabrication laboratories) are also present in this framework, in which the structures already present in HIDS territory can be used

TESTBEDS & FABLABS

Testbeds: are defined as suitable platforms for test conducting of specific technologies in controlled environments.

Fablabs: are prototyping centers, counting with technologies and equipment that are appropriate for speeding and facilitating the prototype development process in a larger and more flexible scale.

[90] https://www.embrapa.br/territorial/laboratorios
[91] https://www.eldorado.org.br/solucoes/testes-de-laboratorio/#
[92] Living Labs as Open-Innovation Networks; Leminen et al, 2012

to develop technologies associated with its thematic areas, such as Maker Lab – FACAMP[93]; Fablab – PUC Campinas and the Plasma Maker Space – Unicamp [94].

Such services, infrastructures and equipment are directly in conformity with technology readiness levels (TRLs[95]) 4–technology validated in lab; 5–technology validated in a relevant environment and 6–technology demonstrated in a relevant environment. Thus, allowing the validation and demonstration of new technologies developed by the members of HIDS, its clients or partners.

Technology and knowledge transfer

Considering the international articulation directives planned by HIDS, structures and procedures will be necessary to allow the safe and effective dissemination of knowledge and technology produced by HIDS, transferring the results of its technological development to other enterprises and organizations.

Inversely, the tropicalization of foreign technology and knowledge can be incorporated into HIDS and other enterprises and organizations, adapting it to the Brazilian reality. In this context, intellectual property protection becomes a key factor to guarantee the due value appropriation for enterprises, people, and knowledge and technology institutions. These services can be offered through the creation of an institutional patent and technology transfer office, which foresees the agglutination of Unicamp´s Technology Transfer Office (TTO) and other universities and technology centers located within HIDS territory.

Another relevant initiative is the promotion of a competence and knowledge centers network, which can synthetize scientific and technologic knowledge into evidences and data, based upon an interdisciplinary approach, in order to provide public policy orientation. On the one hand, knowledge centers represent a virtual organization that is capable of promoting collaboration and interaction regarding the produced knowledge, seeking to “inform policy-makers in a transparent, tailored and concise manner about the status and findings of the latest scientific evidence” [96], presenting itself as a knowledge repository. On the other hand, competence centers have their expertise directed to analytical tools, which are adapted to being used extensively by policy areas. They offer courses for the usage of such tools, as well as their services to public institutions that are interested in the application of new knowledge for public management enhancement.

[93] https://www.facamp.com.br/engenharias-e-a-pratica-profissional/
[94] https://sites.google.com/unicamp.br/plasma/
[95]www.nasa.gov/directorates/heo/scan/engineering/technology/technology_readiness_level
[96] https://ec.europa.eu/jrc/en/knowledge

Training and entrepreneurship

Education, qualification & requalification

Through the transformational role of HIDS and the distinct educational capacities of the organizations that are part of it, the Hub will continuously provide a diverse educational offer - from a thematic and educational point of view.

The training offer is of high relevance for the dissemination of knowledge associated with sustainable development. It includes vocational courses, short term certified courses, specialization courses, technological courses, MBAs, master's degrees, doctorates, post-docs, apprenticeships, continuous training, adult training (including recognition, validation and certification of skills) etc., being these fundamentally associated between ISCED (International Standard Classification of Education) levels 4-Post-secondary non-tertiary education to 8-Doctoral or equivalent level.

The offer of training, qualification and requalification will take into special consideration the needs of reskilling and upskilling, resulted from the processes of green transition and digital transition. They seek to promote, mainly at the local level, the optimization and development of new skills, facilitating the integration and adaptation of the population of the city of Campinas to the new technologies to be developed and disseminated by HIDS. In order to enhance the educational services line, there is the possibility of creating HIDS own qualification center to enable the establishment of long-term qualification programs and partnerships.

Support innovative entrepreneurship

The provision of a one-stop shop to support entrepreneurs linked to HIDS is recognized as a relevant service, in order to contribute to the creation and economic viability of innovative technology-based companies at a local level, with an emphasis on startups and spin-offs. The support provided by HIDS, and directed at the different stages of development of companies, such as ideation, training, traction, validation and scale, can add to the capacities of the local entrepreneurship support organizations, to the point where it facilitates the incorporation of HIDS holistic sustainability guidelines into the activities of local companies.

Mentoring services can also be offered, where experts with extensive business experience will help guide the development of other entrepreneurs. The creation of environments and initiatives that promote peer-to-peer learning can be highlighted for its high impact potential, by enabling the exchange of experiences, the creation of support networks and potentializing co-creation. Moreover, common use spaces that allow coworking present themselves as structures capable of contributing to this context.

The added value offered by the Hub will generate the union of such services and activities with the favorable environment for entrepreneurship and innovation, consequently allowing the various actors interested in HIDS key thematic areas to constitute a Knowledge and Innovation

Community (KIC[97]). The KIC is an extremely relevant asset, as it may contribute to the attraction of anchor companies to the territory of HIDS, which would be interested in investing in new companies created there, applying the technologies and knowledge generated in their own companies. As a result, it would encourage the generation of spin-offs and enable the financing of spaces or initiatives framed within the support services for innovative entrepreneurship.

KNOWLEDGE AND INNOVATION COMMUNITY

KICs are communities focused on the development of knowledge and innovation in specific areas. Formed by entrepreneurs, researchers and developers, these communities define themselves as a space (physical or digital), which allows the proactive iteration of its members, facilitating training practices and peer-to-peer learning, consequently resulting in the development of new products, services and ventures.

Incubation and acceleration

According to the benchmarking analysis led by IASP, it was identified in HIDS profile, through Strategigram, a strong orientation towards research. In this sense, it is necessary to mobilize efforts to make available services that allow overcoming the path of the innovation value chain known as the "valley of death". This stage is defined as the gap between scientific results and the production and commercialization of new products and services, generally corresponding to TRL 4, 5 and 6.

Given this demand, it is understood that it is up to HIDS to offer services and infrastructure to support the development of companies linked to sustainable development, amongst which incubation and acceleration stand out.

More specifically, the activities developed by incubation and acceleration services can be exemplified as training, knowledge sharing, structure sharing, access to funding, access to markets, etc. It is worth pointing out that the companies to be incubated/accelerated must have, as a value proposition, significant contributions to social, environmental, and economic well-being, based on the concept of responsive innovation. This will result in a new generation of startups, scaleups, and spinoffs that consider the direct and indirect impacts of their technologies, products, and services.

The cooperation with local innovation ecosystem actors, who have extensive expertise in incubation and acceleration processes, is essential for the effective development of such services, which can be mobilized and potentialized by HIDS. As examples, it's worth mentioning Incamp - Unicamp Technology-Based Business Incubator[98]; Baita - business accelerator present at Unicamp's Technological Park[99], as well as PUC Campinas and CPQD[100]

[97] https://eit.europa.eu/what-are-eit-knowledge-and-innovation-communities-kics
[98] https://parque.inova.unicamp.br/portfolio/incamp/
[99] https://www.baita.ac/
[100] www.cpqd.com.br/noticias/programa-embrapii-para-startups-cpqd-se-habilita-para-o-ciclo-2/

acceleration programs, respectively in partnership with the accelerators Venture Hub[101] and E-volve[102].

The capabilities of HIDS regarding themes aligned to the SDGs can be reaffirmed through the creation of an incubator/accelerator exclusively dedicated to sustainability and greentechs, in order to promote the reduction of environmental impacts in the initiatives developed there, and directly influence the local innovation ecosystem towards sustainability. This action can be facilitated by the mediation of the resources, and expertise already available in its members.

Scientific dissemination, exploitation and collaboration promotion

Applied research, technical assistance and consulting

The expertise of professors, researchers, policy makers and other actors linked to HIDS, can be converted into consultancy services, technical advice and applied research in various areas linked to sustainability, such as: urban planning, sustainable urbanism, spatial planning, architecture and engineering; sustainable infrastructures, ESG practices (environmental, social, and governance), environment, social and territorial cohesion, etc.

Such services would work, at first, applied to the context of Campinas (in a logic of experimentation) while in a second moment, they would be expanded to other contexts in view of the disseminating role of HIDS (and its logic of irradiation), instigating the transfer of the knowledge developed and aggregated at local level to other organizations at national and international levels.

The constitution of an internal consulting structure to HIDS would make it possible to raise funds through its participation in biddings and calls focused on sustainable development. For instance, it is possible to distinguish calls developed by institutions such as the Interamerican Development Bank, the World Bank and the United Nations, or through the provision of private services to interested companies and organizations. Such services can be aligned with the creation of HIDS own projects office, bringing together a diversified offer of solutions for public and private stakeholders.

Analytical knowledge production

HIDS should capitalize on the knowledge and research produced by its various academic members regarding sustainable development, articulating the work and output of research lines and groups into useful services with impact and visibility.

To this end, it is possible to contemplate the development of a think tank (or observatory) focused on the monitoring and follow-up of the SDGs and their targets, at local, state and eventually national levels. This initiative will enable the analysis and development of technologies and methodologies to measure social, economic and environmental impacts

[101] https://ventureHub.se/
[102] https://e-volve.in/

aligned to the SDGs, aggregating its progress to national and international institutions and initiatives with similar objectives, such as the SDGs Brazil Platform[103], and the SDGs Brazil Network[104].

The availability of sustainability assessment services for public or private institutions are equally important, being these associated with the areas of expertise of HIDS, or more generally, with methodologies and indicators for evaluation of sustainable development.

Community driven services

The promotion of science, technology and sustainable development to be performed by HIDS can occur by various means, and should take into comprehensive consideration the diverse profiles of people who will be interacting with its space. For this, it is proposed the structuring of services and support structures directed to the community, consequently generating a locally positive influence on the population's interest in issues related to science and technology, and its integration within HIDS activities.

As examples of such services, it is possible to point out the organization of initiatives such as school tours, contests, awareness actions, etc., which explore the sustainability capabilities of HIDS. In turn, the structures aligned to this type of service can be exemplified by the creation of facilities such as a sustainability museum, allowing the interaction of the local population with HIDS space.

A citizen service desk can be created to facilitate interaction with the local population. As For instance, it can help the management of job vacancies and CVs in order to help companies find workers and vice versa, contributing to the attraction and retention of talents, as considered in HIDS objectives. The service desk would also include making information available to the population of Campinas, as well as mechanisms for incorporating and structuring partnerships with initiatives from local actors outside the HIDS (such as schools, local associations, and non-governmental institutions).

Strategic and future planning (Foresight)

Taking into account its expertise in 5 thematic areas (information and communication technologies, energy, agri-food, sustainable urbanization, and health), HIDS can provide modelling, training, projection studies, and implementation of co-creation methodologies for the anticipatory exploration of the future, offering as a service, the collection of data and identification of trends that can support public policies and private sector initiatives. The methodology, known as strategic foresight, allows organizations to anticipate scenarios and orient their activities to various future possibilities, making them more resilient and prepared for adverse conditions.

[103] https://odsbrasil.gov.br/
[104] https://www.redeodsbrasil.org/

In this context, it is possible that strategic agendas for research and innovation are developed in view of the thematic areas of HIDS, (and others, identified later), so that such agendas guide the research work of the HIDS ecosystem (groups, lines and resources), also contributing to its influence at the national level.

Prospection of investments & financial resources

Fundraising and financing

The attraction of public and private financial resources for the structures, services, and equipment of HIDS will be a continuous activity, which makes the promotion of its fundraising capacity essential. Consequently, the transposition of such expertise to companies and institutions present in its territory will allow easier access to knowledge, processes, and methodologies for accessing capital, which directly implies advantages and benefits for the development of its ecosystem. To this end, services, structures, processes, and activities that allow attracting financial resources to HIDS territory in the form of investment, grant, loan, equity, etc. from different sources, such as public bodies, business angels, venture capital, etc. are necessary solutions.

More specifically, this service may include the creation of a HIDS project office, which centralizes the administrative and bureaucratic procedures of its participation in collaborative projects and service provision. Acting as a kind of "foundation" of HIDS, the project office would carry out activities related to the training of stakeholders for competitive submission of applications for funding and resources; the organization of business and investment rounds, including pitching sessions between entrepreneurs, spinoffs and startups of the ecosystem with potential investors; the creation and strengthening of a private investors' network, gathering private equity, venture capital, and business angels of the Campinas region, thus fomenting business proposals and investment offers at local level aligned with the sustainable development guidelines foreseen by HIDS.

Softlanding & internationalization

The softlanding services foresee the availability of support studies for the installation of international companies locally, enabling the reduction of risks and costs associated with their internationalization process, as well as facilitating the development of new businesses, access to partners, technologies and markets. In the context of HIDS, such service can be constituted by the identification of the appropriate location for the foreign company to set up its headquarters within the innovation ecosystem of Campinas, as well as by the technical, legal, administrative or secretarial support (technical and legal orientations, obtaining the necessary licenses and certificates, etc.), or by the organization of integration mechanisms of the companies with the local ecosystem.

Likewise, the inverse process, that is, the internationalization of companies created in the HIDS environment, can be facilitated through HIDS services, relying on its institutional partnerships and expertise.

Institutional relations and community engagement

Communication and Branding

A strong HIDS brand will enable the association of its values to products and services originated in its territory, adding the concepts of sustainability, innovation, inclusion, etc. to their activities, in a way that such concepts may be recognized not only at the local level, but also nationally/internationally. In this sense, HIDS brand would be "extended" to companies and organizations present in its area.

When considering the trend of digitization of brands, and the current communication situation of companies, it is understood that efforts to develop brands and concepts that are attractive to the public should be carried out by HIDS, thus capitalizing the opportunities generated by its internal demand for communication, marketing, design, branding, etc. Therefore, it is possible to contemplate the development of HIDS own communication agency.

In addition to providing services to potential partners and customers, the agency would act directly supporting the communication strategy of HIDS itself, fostering engagement with key stakeholders, hence contributing to its visibility, investment attraction, and identity cohesion of its territory with the local population.

Events, co-creation and netweaving

The organization of events aligned with sustainable development and HIDS thematic areas, which are not necessarily only technical-scientific but also business or cultural related, will allow HIDS to enhance its production and dissemination of knowledge, its entrepreneurial activities, and the quality of life of the local population. Therefore, these services and activities will increase HIDS impact and visibility, as well as the interaction and connection between its stakeholders and other national and international actors.

The organization of technical-scientific events, such as seminars, congresses, colloquiums and forums, can be highlighted. It is worth mentioning the possibility of holding an annual international conference of great impact, which will attract international sustainability references to HIDS, in line with its objective of becoming a world reference in SDGs.

Business events include fostering interaction between academia and the public and private sectors, such as matchmaking actions, business rounds, exhibitions and product launching. It is important to reinforce the organization of regular events by and for companies, directly involving them and including small and medium enterprises as well, in order to create its entrepreneurial community and promote business opportunities.

In relation to cultural events, it is understood that HIDS can develop cultural promotion actions, which are exemplified by artistic exhibitions, cultural festivals and interventions, which are in line with its sustainability guidelines.

The creation, development and maintenance of platforms (material and immaterial) for collaboration between actors in the innovation value chain, aiming at promoting co-creation and open innovation processes is defined as an activity capable of strengthening HIDS scientific, technological, and economic capabilities. For this, it is possible to incorporate initiatives, such as the launch of innovation challenges or hackathons, the promotion of netweaving (which is the training and provision of spaces that encourage less utilitarian and more humanistic interaction) or the creation of channels that facilitate interaction between people and organizations, and consequently the exchange of knowledge with a focus on developing solutions of collective interest.

3.3.2 Services and activities carried out by HIDS stakeholders

Real Estate Development

The improvements associated with the development of HIDS at the local level will be diverse. Its proposal includes the incorporation of state-of-the-art technologies to optimize public services, creation of leisure spaces, sustainable structures, model mobility, synergistic interaction with the local fauna and flora, etc. thus resulting in significant improvements to the quality of life of the local population and consequently becoming attractive to real estate projects.

Taking these facts into account, several opportunities for real estate promotion will be made possible, among which the development of residential and business infrastructure stands out, which will be necessary to "emulate" the activities of a city within HIDS territory. In this context, the local demand for essential services, such as convenience stores, schools, restaurants, hotels, health clinics, culture, etc. will be substantially increased, and for this, it will be necessary to create an infrastructure capable of housing both people and companies whose productive activities will be directly or indirectly associated with HIDS.

A wide range of new corporate businesses will emerge and will be interested in allocating themselves in HIDS territory, hence generating demands for specific spaces, such as large buildings, conference centers, virtual offices, etc. Although HIDS may not be directly involved in providing such services, it can contribute to facilitating the allocation of companies in such spaces, developing, for example, a platform that indicates the real estate opportunities available in its area.

Commercial and industrial production

This category of service is exclusively oriented towards activities carried out by HIDS stakeholders, in particular small industrial companies, and small and medium-sized service companies. To this end, the production of strategic goods, services and equipment aligned with

the Hub's thematic areas (such as digital biodiversity monitoring equipment, sensors, health gadgets, etc.) can be incorporated into its spatial scope.
The selection of such products would take into account a perspective of structuring the local value chain, and/or integration of global value chains, thus being able, for example, to minimize the dependence on foreign technology regarding strategic sectors, or to develop products with high impact for local sustainability.

Amenities and Facilities

HIDS proposition is to be a model area of innovation and sustainable urbanism, based on the concept of a 15-minutes city[105], which refers to the presence of areas of work, leisure, and study in its territory. It seeks to reduce the need for displacement of people who use its space, saving time, enhancing the quality of life of its inhabitants, and consequently contributing to retaining talent in the Campinas Innovation Ecosystem.

Considering this context, the amenities and facilities describe the infrastructures, equipment and services related to quality-of-life improvements to be installed in its territory. In this sense, the following can be highlighted:

Squares, parks and green areas

Green coverage is a key factor in HIDS proposal to configure itself as a model of sustainable urbanism. Its territory has several areas of natural vegetation, environmental reserve, and springs, which must be preserved taking into account its ecological and social relevance. To this end, it is expected that its territorial development effectively contemplates the sustainability of local fauna and flora, contributing to the balance of its ecosystem, as defined by the works of the physical and spatial design component of its Masterplan[106].

In addition to the preservation of existing areas, the creation of green spaces, which allow social usage, will be contemplated in HIDS development, with different levels of access, that is, from squares with total public access, to private spaces. In this way, all installations must necessarily be organized to guarantee the presence of vegetation coverage and minimized environmental impact, aligning them with HIDS sustainability proposition, and directly influencing the quality of life of the local population.

Cycling & walking lanes

Regarding mobility, HIDS will organize its territory in accordance with the guidelines contemplated by the National Policy on Urban Mobility[107], foreseeing in its development the prioritization of pedestrians and cyclists, as opposed to motorized vehicles, thus requiring adequate planning to facilitate such forms of displacement. In relation to the cycle paths, it is expected that the sections will be properly connected in HIDS territory, as well as in its adjacent

[105] https://www.dezeen.com/2021/10/26/15-minute-city-carlos-moreno-obel-award/
[106] www.hids.unicamp.br/master-plan/projeto-fisico-espacial/
[107] L12587 (planalto.gov.br)

areas. Preliminary studies of the future cycling network can be found in the document "Reading the Territory"[108], which demonstrate the future potential of a properly connected and integrated area.

In relation to walking lanes, the creation of different types of green lines is foreseen, which mix the walkway with sustainable urban drainage systems, leisure activities, ecological corridors, and appropriate afforestation, so that the displacement of people is positively integrated with the local fauna[109].

Housing

The territorial development of HIDS will necessarily contemplate the creation of different housing spaces, with different levels of affordability, in order to promote convenience for everyone to live close to their workplace. For such, real estate development opportunities will be created, which will be integrated with study, work, commerce and leisure structures, and aligned with HIDS values. In this sense, sustainable and inclusive housing models will originate in its space. It is also possible to develop social housing, which will allow students, or people with lesser monetary capacity to live in HIDS territory.

Schools

The presence of schools within HIDS directly contributes to the incorporation of its values in the formation of young people, as well as facilitating their interaction with experiences aimed at promoting science and technology. The retention of talent at the local level is also encouraged as people who work in its territory seek quality schools for their children.

Currently, public and private schools are already present in HIDS area (Sérgio Porto; School Sabis). It should be noted that with the development of HIDS, people will settle in its territory, and, therefore, the demand for education services would tend to increase. In this sense, attention should be paid to evaluate such demand, in order to consider the development of new schools, both public and private. This fact must include not only environmental sustainability guidelines, but also social and economic ones, taking into account the different consumption capacities of the people who will occupy its territory.

Public transport

In relation to public transport, it is worth considering both the internal displacement within the territory of HIDS, and its connectivity with other points in Campinas and region. From an internal point of view, there is currently a public bus displacement model within Unicamp, which counts with an electric bus unit associated with the Sustainable Campus project[110], envisioning low carbon displacement development initiatives. It is understood that by the creation of HIDS,

[108] www.hids.unicamp.br/master-plan/projeto-fisico-espacial/
[109] https://www.mdpi.com/2071-1050/13/23/13365
[110] www.campus-sustentavel.unicamp.br

this proposal can be leveraged through the development and incorporation of new technologies, enabling full electric conversion of HIDS public transport vehicles.

Regarding external connectivity, it is worth considering the integration of HIDS with lines already contemplated in the Urban Mobility Plan of the Municipality of Campinas (PMUC) [111], as well as new transport lines, in order to facilitate the movement of people from the local territory to HIDS. Connection Hubs could therefore be created to improve this integration with external lines.

Markets, shops, restaurants and cafes

Taking into account the proposed mixed use of land in the surroundings of the Fazenda Argentina, it is important to consider the presence of small businesses, which integrated with other services, such as housing and equipment, can meet local demands for consumer products. It is expected that such businesses, mostly small, such as markets, stationers, bakeries, restaurants, etc. will be distributed throughout the territory taking into account the transport and mobility lanes, facilitating their access by the local population and thus avoiding their concentration in large blocks. It is also worth bearing in mind the need for such structures to be aligned with the HIDS values, in order to be able to effectively incorporate sustainable practices, promoting, for example, the proper management of water and energy resources, as well as their solid waste.

Hospital and health clinics

The demand for local health tends to grow with the development of HIDS, which will consequently attract people for its territory, and therefore expand the number of people who live there. To this end, although the Hospital das Clínicas of Unicamp [112] already exists, the development of new hospital facilities is being considered[113]. By taking this into account, it is worth contemplating the need for holistic sustainability practices to be incorporated during its construction and future activities. Health clinics, in turn, tend to be installed in spaces with mixed land use, allowing the provision of private health services, consequently expanding the local treatments supply, inhibiting the need for displacement by people residing in HIDS territory and its surroundings.

Other services of general interest

The provision of general basic services to the local population in HIDS territory is planned, consisting of both private and public services. This fact will contemplate the multiplicity of spaces proposed by HIDS, allowing the installation of such services, and therefore promoting business opportunities and minimizing the need of displacement to external areas, in order to fulfill the 15-minute city concept. As examples of these services, the following can be listed: Post offices; Banks; Notary offices; Public offices; Policy stations; etc.

[111] www.emdec.com.br/eficiente/sites/portalemdec/pt-br/site.php?secao=mobilidade-urbana
[112] https://hc.unicamp.br/
[113] https://www.unicamp.br/unicamp/noticias/2021/09/23/unicamp-sedia-reuniao-com-prefeitos-para-debater-hospital-metropolitano

Sports courts, recreation spaces, gyms

It is understood that the facilities for sports and physical activities to be built in the territory of HIDS, will allow leisure activities to be carried out locally. To this end, they must not only have a low environmental impact, but they can also act synergistically for the environmental management of the territory, including, for instance, water drainage properties. It is worth highlighting that such facilities should serve audiences of different ages, such as playgrounds for children, or equipment for the elderly.

Hotels

The relevance of hotel offer stands out since HIDS has the proposal of articulating actors at national and international levels, working as a center of attraction for visitors, both for business and for research-oriented activities.

Among its diverse attraction features, it is possible to distinguish the scientific and technological equipment, events, research partnerships, and business tourism. To this end, it should be taken into account that opportunities for expansion of local hotel structures are present, and it is also necessary to consider the different audiences that will be attracted to HIDS territory, in order to make available a wide range of options in terms of value and types of service, such as long-term stays, or spaces adapted for business meetings.

3.3.3 Territorial dimension of HIDS

It is important to mention that the area in which HIDS is being developed, Ciatec II, is owned by different agents, public and private entities, and individuals. Most of them support the creation of this hub, but others are interested in maximizing their economic benefits. HIDS value proposition should take into consideration all existing interests. Moreover, the territorial definition and the urban design of HIDS must respond to the following challenges: this area should be connected with its surroundings and with the city of Campinas, fostering the usage of its resources by the local population; it should provide the infrastructures needed to the creation of an internal mobility network for increasing the connectivity of the area; to provide the necessary mixed-use infrastructure to support the hub's activities; and considering that sustainability is the key facet of this project, all the urban development should privilege nature-based solutions, as the usage of renewable energy and the preservation of the natural values of the area, including its fauna and flora. In this context the occupation of the territory must be in accordance to the values that HIDS intends to pursue.

Through the definition of the territorial dimension of HIDS, it is possible develop a spatial proposition of the hub, as it is illustrated in Figure 7. This was done by taking into consideration all the services, activities, amenities and facilities here described, the characteristics of the land and the nature of the ownership, the already existing infrastructures, the capacities of the institutions and companies that are based in CIATEC II, and the strategic framework of the project here presented. Furthermore, this proposition is a result of parallel meetings that were

undertaken over the last months with the teams that are developing the other components of the project, specifically with the physical and spatial project.

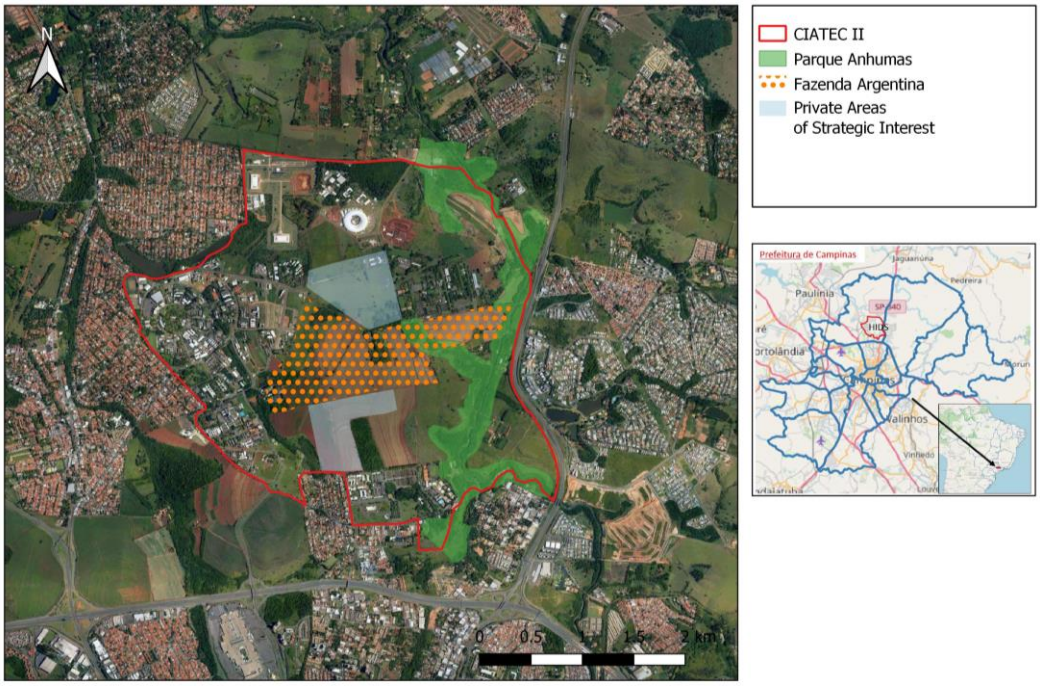


Figure 7 – Territorial dimension of HIDS

In this figure are illustrated the areas that can be considered structural spaces for HIDS. In orange it is illustrated the Fazenda Argentina, the area that was acquired by Unicamp in 2013 adjacent to the campus of the University. During this process, the State Government declared the area of Fazenda Argentina of public utility for expropriation purposes through the Decree 58.978 of March 18th 2013[114]. As it was a friendly expropriation, negotiations were held directly between Unicamp and the former owners. Having the status of public utility, activities that could take place here are restricted to those which serve public interests, even when they are undertaken by private parties[115]. For this reason, the services, activities, amenities and facilities that will be provided by HIDS, and which imply the construction of new buildings should take place here, although supported by those services and activities carried out by other stakeholders in the surrounding areas. Considering the profitable nature of these activities, it's worth noticing that from a territorial planning perspective, they should take place in the areas that are identified in grey, which are private areas of strategic interest for HIDS development, as they are located in HIDS geographical center, in an equidistant distance from the existing facilities and institutions[116]. These areas are then considered especially appropriate for the installation of activities related to the real estate development, commercial and industrial

[114] https://www.al.sp.gov.br/repositorio/legislacao/decreto/2013/decreto-58978-18.03.2013.html
[115] https://edisciplinas.usp.br/pluginfile.php/4654599/mod_resource/content/1/Desapropria%C3%A7%C3%A3o%20em%20favor%20de%20particular.pdf
[116] https://www.mdpi.com/2071-1050/13/23/13365

production, amenities and facilities, markets, shops, restaurants and cafes and other services of general interest, such as hotels.

In green is the area where a public park is being projected, understanding the need for protection of the Anhumas River. Therefore, the Anhumas Valley is located in the east part of HIDS. The fact that this park will be for public usage of Campinas' population will determine the future urban development of the east part of Fazenda Argentina, as the services and facilities related with the community engagement can be distributed here. The eastern part of this area should function as an interface for the interaction between HIDS and its community. Considering the current configuration of the space, the area between the Unicamp Campus and the building where Inova is located should focus on new infrastructures of education, research and extension, as it has a strategic location regarding the main technological centers of HIDS. Regarding public services, it's possible to arrange its facilities throughout the borders of Fazenda Argentina, ensuring proximity and interactivity with the mixed land use areas. It is worth having in perspective that the material development of HIDS should follow mixed usage principles, and efforts should be done to combine the education, research and extension infrastructures, public spaces, green areas, and housing spaces in a synergic way.

3.4 Governance

This section presents a governance model that, based on the expertise and knowledge of the project team and according to different best practices analyzed, can be considered as the most adequate for HIDS.

It's worth highlighting that this is an attempt to propose general guidelines for the governance model, which implementation is conditioned and will depend upon different factors related to HIDS legal basis and land ownership model.

In order to be aligned with the different components of HIDS masterplan that affects the governance model, the project team conducted bilateral interactions with representatives from the legal model, and physical-spatial masterplan components.

HIDS should have a governance body based on the best practices in Districts of Innovation around the world. The first thing to clarify is that governance refers to the structures established for strategic and operational decision making, as well as the reporting arrangements within them.

To understand governance, a number of questions must be answered:

- What is the legal status of the HIDS?
- Who owns the site and its various parcels of land?
- Who finances the development of the land and buildings?

- Who makes the strategic decisions?
- Who makes the operational decisions?
- What are the reporting arrangements?

In defining the appropriate governance model for HIDS, partners should take into account the following considerations:

- Ownership: who owns the land, sites, infrastructure and buildings that make up HIDS.
- Law: who decides the uses of the land? Is the Law already created?
- Control: What control does HIDS have over activities and tenants in the district
- Autonomy: the owners are managing their own land following the rules of the game.
- Market: The prices are liberalized or regulated for some profiles (incubators for entrepreneurs, residences for students).

Decisions must be made on a wide range of issues:

- Will there be an independent company or will HIDS be a division of one of the partner organizations?
- Who owns the assets in the early stages of HIDS development?
- Will there be an external board of directors with members from the partners and stakeholders or will HIDS be run by the main sponsoring organization?
- What are the key performance measures of HIDS?
- What is the balance between financial and overall economic development goals and objectives?
- To whom is the HIDS management team accountable and how regularly?

3.4.1 Governing the ecosystem

One of the characteristics for the development of innovation ecosystems like HIDS is the existence of a governance system, in other words, the coordination of the activities of the participants consisting of regulatory and normative elements, which have rules and standards that cover the interactions between the participants allowing the ecosystem to function and survive.

Governance is especially prominent in a competitive environment between networks, and it plays an essential role in the successful implementation of an innovation ecosystem. Furthermore, it affects all other elements of an ecosystem and it can even readjust them for continuity and survival. Therefore, this is an important element in the complex scenario of HIDS.

One way to understand this issue is through governance macrostructures, analyzing who is authorized to manage the activities and what are the implications of these choices. Provan and

Kenis (2008) propose three governance models: shared, with a leading organization, and through a networked administrative organization (NAO). The use of each depends on the characteristics of the participants and the environment, in addition to the stage of development in which the network is located. The effectiveness of these forms of governance is related to some key factors such as trust, the number of participants, the consensus of objectives and the need for skills at the network level, as shown in the following figure.

Forms of Governance	Confidence	Number of participants	Consensus of Goals	Necessity of Competencies at the Network Level
Shared governance	High density	Few	High	Low
Lead-Organization governance	Low density, highly centralized	Moderate	Moderately low	Moderate
Network administrative organization governance (NAO)	Moderate density, NAO monitored by members	Moderate for more	Moderately high	High

Figure 8 - Predictive factors of the effectiveness of Network Governance Forms

Source: Provan and Kenis (2008).

Due to the number of institutions, and the level of involvement, it is understood that the best strategy to develop HIDS would be with an NAO type of governance. The fact that the development process of innovation ecosystems is dynamic (and not static) can also be included in the discussion, changing in intensity over time, that is, throughout its different stages of evolution. In the Brazil framework, an OS (Organização Social – Social Organization) should be the best legal mechanism for developing the governance of HIDS.

3.4.2 Actors and interactions

It is important to consider that in each of the phases of the development of HIDS there are actors who, based on their contributions with material or human resources, shape the subsequent phases and promote or hinder evolution (PIQUE et al., 2019). The actors are in different layers and have cooperative interactions with each other, in addition to significant autonomy.

- The triple helix model (ETZKOWITZ; LEYDESDORFF, 2000) considers the dynamics of the relationships between the following actors: industry, government and university, providing an evolutionary and systemic vision of innovation. HIDS has from the inception moment the commitment of the university and the government, and should involve industries (association of companies or key corporates) that express the commitment to the project.
- Then, a fourth helix (CARAYANNIS; CAMPBELL, 2009) was included, namely the civil society, considering the way in which public reality is constructed and communicated by the media and validated by civil society. In the case of HIDS, there are two dimensions to consider, the neighbors that could be impacted by the transformation, and the new

professionals that will work (and live) in HIDS territory. It's important to point that HIDS approach is to be a platform of talent in the personal and professional dimension.

- There is also a fifth helix (CARAYANNIS; CAMPBELL, 2010) that deals with the environment. In the focus of HIDS, the Quintuple Helix is connected with the Sustainable Development Goals (SDG), and act as a demand side of the rest of the Helix. The use of the Environmental challenges (local or global) that can be a sophisticated demand for innovators and entrepreneurs, reinforce the position to use HIDS as a global Lab of SDG, provident the opportunity to learn locally and scale globally.

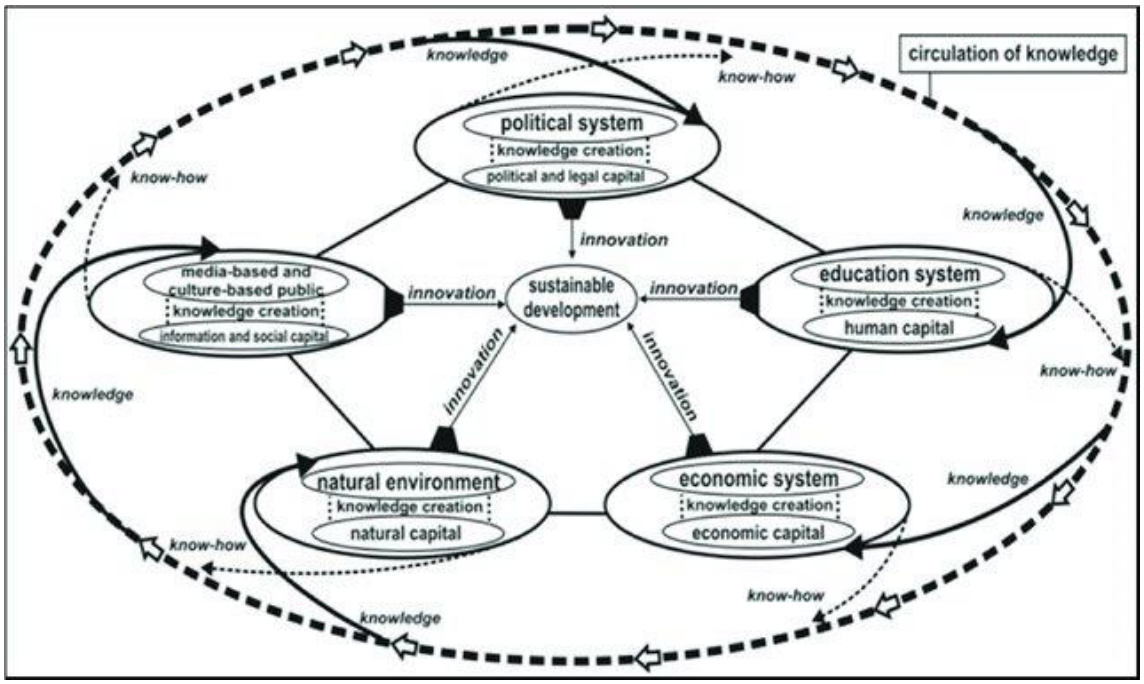


Figure 9 - Quintuple helix.

Source: Carayannis (2012)

It is known that each helix does not represent each of the actors individually, but rather the outcomes of their interactions. HIDS should orchestrate the agents and their interactions in order to align the individual and shared projects with the same vision.

3.4.3 Stages of evolution

The governance of HIDS must be ready from inception to maturity. That's the case of projects like Porto Digital in Recife, where they have been using the same governance model during 20 years, developing strategy plans for periods of time, with goals and indicators in an annual base using an OS as the tool for the Governance that has been leading the development of the Innovation District hitherto.

Rapetti, Pique, Figlioli & Berbegal-Mirabent (2022) propose a model of evolution of innovation areas in 4 phases:

- **Inception:** At Inception stage, the Area of Innovation is conceptualized. The more suitable location is defined and transformation of the existing environment into an AOI is planned. Whether something new wants to be created, or to exploit an existing space, macro measures are needed here, that allow generating information with a broad vision that makes possible to forecast and quantify growth. In the urban dimension the Government is leading the urban planning, the infrastructures, and the creation of the HIDS model involving key institutions (Universities, Government and Industry). The promotion of the location of companies with emphasis in the relocation of national companies and international companies, starting the first jobs in the district and the first professional events and promoting the district locally. HIDS has to start the promotion of the Entrepreneurial Ecosystem by the creation of startups that will be the source of venture for the clusters of innovation in the following stages. The location of educational Institutions in the district generates and develop the talent of the district. The district starts with first social and cultural events. The Governance begins with the management for leading the transformation.

- **Launch:** The Launching phase takes all the guidelines established at the Inception phase and puts them into practice. The investment in real estate and the construction and renovation of buildings start. The public and private investment in companies provides the first outcomes of economic impact. Anchor institutions adopt a leading role boosting innovation. Incubators are the platform for improving performance indicators of startups. The innovation community is also required here to help drive core competencies and, to start introducing a global perspective. The district starts to be an urban lab through innovation pilots. Specialization in degrees and professional certification continues the development of talent. HIDS should start in this phase the involvement of the local residents as workers. More cultural venues will allow more amenities in the district. The first associations of companies in the district starts. Housing and social dimension measures should be included from this instance, as a way to attract, retain talent, and to be a co-author of the unique identity that the district will have, generating commitment and a sense of belonging.

- **Growth:** After the AOI has performed well on their KPIs in the Launching phase, the next step is the Growth stage. Here the interest and effort fall on attracting new business and investment, and on boosting business clustering and networking. The office floor available in the district should be combined with the tenant demand. The real estate investment should continue here to build the buildings required for this growth. HIDS should start in this phase the involvement of the international workers. The technology will provide the competitiveness of the firms and the knowledge-based companies. The Entrepreneurial ecosystem is growing with the ventures incubated investment in startups and venture events building the clusters of innovation. New

spaces as coworking allows the professionals and freelancers to work in the district. The tech base is boosted by tech events that are diffusing the research and technology. The association of district organizations is created in the previous stage, and it strengthens its bonds here.

- **Maturity:** At the Maturity stage, maximize the ecosystem of innovation and the connection with other international hubs of innovation acquires paramount importance. The consolidation of international ties grows, knowing the number of international workers is still necessary, since it gives visibility on the measures that need to be taken. Linked to the main goal of this phase, is the measurement of companies based on knowledge and with intensive knowledge for their development. These measurements will be possible if research has been developed in previous phases and technology and innovation pilots have been created, so their activation depends on the indicators corresponding to these issues in previous instances and on the measurement of companies in general, which it is the original indicator of the Inception phase. Knowing and promoting transversal ties from horizontal and neighborhood associations (in the social sphere) remain being key information for the achievement of the objectives. In the urban dimension, in the Maturity phase the district deploys all the floor and infrastructure, and the indicators finalized depending on the fulfilment of the project. In economic development the jobs and companies are performance indicators of the success of the district and the promotion and community creation is fully activated. In the social development, the talent of the district is provided by educational institutions and promoting the inclusion.

HIDS has to be organized for managing different focus of the project during the 4 phases of the development, and the governance should be ready for every stage of the growth.

3.4.4 Roles in the governance

The dynamics of the innovation ecosystem makes these actors (universities, government and industry) assume multiple roles throughout the different stages of ecosystem construction (PIQUE et al., 2019). The role is the set of behaviors or activities carried out by the actors of the innovation ecosystem as they take the stage (DEDEHAYR et al., 2018). These roles present in the ecosystem are possibly arising naturally rather than prescribed by external governance mechanisms. HIDS has to involve all the agents in the inception moment in order to share the vision, align strategies and coordinate actions.

Considering the nature of the ecosystems, the actors may also have different levels of participation. When a role is not completed, part of a knowledge-based strategy replaces this actor and fills the gap (ETZKOWITZ; LEYDESDORFF, 2000). For this reason, knowing the list of roles is valuable for the different parties to recognize and occupy the necessary activities as the innovation ecosystem develops over time (DEDEHAYR et al., 2018). The activities

developed in HIDS should be implemented for any of the Triple Helix Agents, or for a hybridization of them in order to fulfill the needs of the ecosystem of innovation.

Pique et al. (2019) proposes a configuration based on the triple helix that demonstrates the key governance role at each stage, as shown in Figure 2. Although some of these roles seem to correspond naturally to some actors, Pique et al. (2019) affirms that the parties involved can assume roles different from the traditional ones and that it may even generate opportunities for innovation.

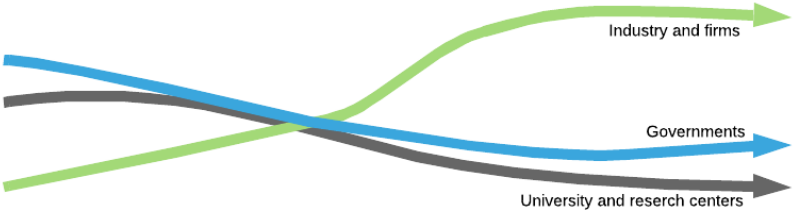
Lifecycle phases	Inception	Launching	Growth	Maturity
Triple Helix Configuration				
Key role	Government and Universities	Adding tractor companies	Assignment of leadership in business associations and clusters	Explicit leadership from companies, talent and related networks
Talent and social transformation	Promoters	Managers of AoI	Communities and networks	International networks Local social networks
Companies and economic transformation	Involvement of key Institutions:Universities, Government, and Associations of Companies	Tractor Companies. Location of research and technology centres. Incubation and landing services.	Attraction of companies. Creation of companies Clusterisation.Open innovation Management.	Growth models. Decentralisation and internationalisation. Superclusters. Megaregions. Network of networks of research and innovation.
Infrastructures and urban transformation	Planning	Utilities. Consulting. Real estate. Developers.	Investors. Real estate. Developers.	Territorial growth. Exporting the model.

Figure 10 - Key roles of governance at each stage.

Source: Based in Pique (2019) and Pique, Miralles & Berbegal-Mirabent (2019)

3.4.5 The governance model in the context of HIDS Masterplan

According to the information gathered, HIDS would be located on an 11km2 plot of land that currently has almost no urban infrastructure, 8km2 of which is bare land, and which is owned by different owners, public and private entities and individuals. Most of them support the creation of the HIDS, but some wish to dedicate their land to housing and are not convinced by the idea of creating this area of innovation.

The team working on the HIDS project has identified the need to create a legal entity, which would be a non-profit civil association. In Brazil there are three types of social organization:

- OS (Organização Social – Social Organization)
- Organizações da Sociedade Civil (OSC – Civil Society Organizations)
- Organização da Sociedade Civil de Interesse Público (OSCIP - Civil Society Organizations for Public Interest)

Of these three categories, the most appropriate for HIDS is the OS.

The OS created could be the owner of real estate assets, but the idea is that the OS manages the project activities and that the different owners of the land continue to exist. Regarding the land and its regulation, there is currently a 2018 law that would define the use and occupation of the area.

As for decisions on specific HIDS buildings, under current law they would be up to each landowner. However, the HIDS team has a different proposal, as they would like to implement an urban planning instrument called Operação Urbana Consorciada (OUC). The HIDS as the OS and using the Operação Urbana Consorciada would have shared governance and would be the managers of the activities in the area. The challenge here is to decide who would supervise the infrastructures. There are currently two possibilities: whether HIDS would be responsible for the infrastructures or the city hall will do it, and who is going to invest in the development of these infrastructures.

After evaluating the legal framework and the needs of the project, we propose HIDS as an OS, a legal person that its main characteristic is having social purposes (beyond a business organization). Once created, The OS could be the owner of specific real estate assets, yet still allowing that the other owners of the land continue to exist. Regarding the land and its regulation, there is currently a 2018 law that would define the use and occupation of the area. About the specific buildings in the area under current legislation, they would be up to the individual owner. However, HIDS could implement an urban instrument called Operação Urbana Consorciada (OUC). HIDS as OS and using the OUC would have a shared governance and would be the manager of the activities of the area.

3.4.6 Administration bodies

There will be the following Official Administration Bodies:

- General Assembly: Composed of all the members of the OS
- Board of Directors: Administration Board of the OS
- Board of Assets: Mechanism to coordinate the owner of the land and buildings
- Admission Committee: For selecting the tenants of HIDS
- Executive Team: The professionals that will manage the quotidian of the OS

GENERAL ASSEMBLY

We recommend to use the OS as the tool for involving the stakeholders of the project and managing the activities of the ecosystem of innovation. The members will be selected following the rules of the OS and will represent the Quadruple Helix (Universities, Government, Industry and Society). Following the NAO governance approach proposed for HIDS, there will be a relative openness in the admission of new members into HIDS and, therefore, to joining this General Assembly.

The General Assembly will operate following the standard and usual practices and proceedings of this type of body in other private associations in Brazil, assuming that OS will be the selected legal model (terms of ordinary and extraordinary meetings, convoking procedures, installation quorum, voting quorum, etc.). Further details on these operational aspects can only be described by the time the By-Laws are written and after the legal model is fully defined and confirmed.

BOARD OF DIRECTORS

We recommend a structure of 11 Representatives, which reflect the quadruple helix involved in HIDS operation. The proposed size, composition and configuration of the Board of Directors could and should be adjusted and adapted after the full definition of HIDS legal model.

- 3 representations from University´s side
  - 1 person in representation of the Rectors of the Universities
  - 1 person in representation of the Research and Tech Transfer
  - 1 person in representation of the Academia (Education)
- 3 representations from the Industry´s side
  - 1 person in representation of the Corporates of HIDS
  - 1 person in representation of the Start Ups of HIDS
  - 1 person in representation of the Investors of HIDS.
- 3 representations from the Government´s side
  - 1 person in representation of the Government - Higher Education
  - 1 person in representation of the Government – Research
  - 1 person in representation of the Government – Economic Development
- 1 representation from the Civil Society
  - 1 person in representation of the Social Dimension, who will be representing the neighborhood.
- 1 representation from the Ownership of the Land

- 1 person representing the Board of Assets.

BOARD OF THE ASSETS

The focus of this Board is to manage the investment, construction and management of the Common infrastructures, streets and iconic buildings. The expression of the representation in the property of the company will be related to the economic effort of the parts.

- This Board´s *raison d´être* is intrinsically linked to the possibility that HIDS owns the land and deploys infrastructures and build buildings.
- HIDS Assets will be responsible for urbanization, deploying infrastructures in coordination with utilities companies, and the construction of buildings.
- In the legal dimension, this tool shall be able to receive assets (land) and to give back a building using the own financial capabilities and debt from banks.
- Once the building is fully constructed, tenants are to pay rent. The rental income shall be used by the company to pay its debt with the bank. The Board of the Assets will have a minimum of 4 meetings every quarter of the year, primarily focused on the construction of infrastructures, and later focused on the management of the building.
- The implementation of this Board of Assets is more feasible and adequate if the implementation of the Operação Urbana Consorciada (OUC) succeeds,

ADMISSION COMMITTEE

In order to be a global reference in the implementation of SDGs, it is necessary to select the kind of companies and institutions that will take part in HIDS. For this reason, we propose an Admission Committee for selecting and asking the new tenants to commit with the vision and goals of HIDS.

- The policy of admission is key for delineating the future strategical path of HIDS. For instance, defining the market targets of the Property Services has a direct implication on the kind of knowledge, expertise, cultural style, and technology developments, among other important factors that will be brought by tenants or collaborators of HIDS. Consequently, it will condition the results perceived and position HIDS in the market.
- HIDS and all new tenants should provide value to the Universities in terms of Internships and Jobs opportunities for students, R&D Projects for the Research Groups, as well as innovation and entrepreneurial activities for the University community. For this reason, any new Tenant has to provide the list of expectations from universities and the list of value that it will provide to the ecosystem.
- Both of the aforementioned lists will serve as key information for the Admission Committee.

EXECUTIVE MANAGEMENT

It is recommended for HIDS to have a dedicated team of executive managers that could properly undertake the responsibilities and tasks necessary to trigger the operation of HIDS and the fulfilment of its strategic objectives.

The main roles of the executive managers are described below. Such description is linked not only to the key aspects of the respective profiles, but also to key performance indicators each management position should achieve when exercising its competences and responsibilities.

Main roles

CEO

The CEO is the face of HIDS in front of the tenants and in front of the Innovation Ecosystem. The CEO will be the ultimate responsible for delivering the vision and the strategy of HIDS and for the day by day management of the organization. The CEO will be the person in charge of all the strategic and operational aspects related to HIDS organization and implementation.

Key Performance Indicators:

- Number of tenants
- % of occupancy
- Number of startups
- Number of corporates
- Number of professors and students linked
- Incomes of HIDS
- Fulfil the leadership of HIDS internally and externally

Finance Manager (CFO)

The CFO is the ultimate responsible for the management and control of costs and incomes of HIDS, providing trust to the investors and reporting on the economic performance of the Business Plan.

The CFO is the person in charge of the Financial Control of the board. In terms of tax obligations, they will work with high standards of accomplishment, conducting the audits with international standards.

Key Performance Indicators:

- Achieve the incomes of HIDS
- Control the cost of the HIDS
- Control of the incomes (tenants, services…)
- Control of the payments (providers, human resources…)

- Management of the cash flow
- Accomplish all the tax obligations
- Fulfill the implementation of the budget

Property Services and Facilities Manager

This manager will be the main responsible for generating revenues from the property services, where tenants represent a major player, from SMEs to international flag companies, but also taking care of ad-hoc rental of spaces as auditoriums, or events spaces, as well as amenities services spaces as restaurants, among others.

The facilities management might be under this organization chart, so that the properties service quality is directly controlled with a proper coordination of the different facility services as telecommunications, climate, office equipment, furniture, etc.

Key Performance Indicators:

- Quality of security
- Quality of cleanliness
- Quality of utilities services (energy, telecom, water, waste)
- Quality of maintenance of offices (furniture, lighting)
- Quality of common places

Marketing & Networking & Business Development Manager

This manager is the main responsible of the marketing strategy and plan of HIDS, understood in its wider meaning. In other words, this manager is the ultimate responsible for deploying an integrated set of actions that envisages enhancing, expanding, consolidating and internationalizing HIDS brand, its attributes and its unique selling proposition. This manager is also responsible for monitoring and ensuring a smart market positioning for HIDS, while keeping track of the market targets communication and contacts and a constant analysis of the market needs and satisfaction feedback. All in all, this allows for a constant update of HIDS marketing strategy and plan, also enabling the business plan of HIDS to be constantly aligned with the market needs, requirements and demands.

Key Performance Indicators:

- Management of the audiences (internal and external)
- Management of the channels (off line and on line)
- Management of the contents and messages
- Fulfilment of the implementation of the Marketing and Communication Plan
- Management of events

Business and Innovation Services Manager

This manager will be the ultimate responsible for HIDS services portfolio - those directly provided by HIDS and those provided by its member´s network (in which HIDS have an intermediation/brokerage/coordination/assembly role). In this context, the manager will be closely working with Universities and Technology Centers, while having the ultimate goal of facilitating the access of the industry to HIDS assets.

This manager will also have as his underlying goal the promotion of collaborative and innovative projects involving companies, startups, universities and technology centers linked to HIDS context. The use of Open Innovation practices will be particularly considered by this manager in the approach undertaken to deploy these collaborative interactions and to deploy HIDS services as a whole.

Key performance indicators:

- The number of companies
- The number of projects
- The budget mobilized

Technology Transfer Manager

This manager will be the main responsible for valorizing the Universities and HIDS assets through their exploitation from an industrial perspective. It is essential that this manager and the respective staff have a former experience in industry to properly understand the culture, aims and *modus operandi* under the development of new products and processes. They must also be able to manage the challenging barriers that will arise due to the culture´s difference and modus operandi of the university tradition.

Key performance indicators:

- The number of patents
- The number of projects
- The budget mobilized.

Incubator and Accelerator Manager

This manager will be responsible for promoting and supporting Startups, whatever their main technology is. It means an experience-based knowledge, at this initial stage, of companies, the multiple dimensions of business development, and launching administration. It includes from finance to marketing, including networking to talent and teams. It is mandatory to know the Startups ecosystem, as well as the different funding mechanisms through the following growth

stages, and the expert networks that could help offering advisory or consulting support to companies.

Key performance indicators:

- The number of startups incubated
- The number of startups accelerated
- The number of jobs
- Investment
- The number of students linked with the startups
- The number of professors linked with the startups

Community Manager

This manager will be the ultimate responsible for organizing and mobilizing (both physically and digitally) the community of members and stakeholders connected to HIDS, with particular attention granted to the civil society. This manager will develop activities in order to promote the sense of belonging, to facilitate the interaction between members and stakeholders and ensure a clear and consistent communication flow with the civil society.

Key performance indicators:

- The number of activities
- The number of people engaged in the activities
- A satisfaction index (with a survey)

3.5 Financial aspects

This section details some of the key aspects related to the economic and financial operation of HIDS. It presents the general approach towards the cost and revenues structure, as well as a comprehensive list of potential funding sources and how they contribute to the implementation of HIDS strategic goals.

3.5.1 Cost and revenue structure

With regards to the costs, the most relevant expenditure streams of HIDS are those related to the support of key resources, key activities and key partners. This comprises the following categories:

- **Infrastructure costs**: encompassing investment needs to provide HIDS territory with full access to different utilities (energy, water, sanitation) and to

structure it from a mobility and accessibility perspective (such as roads, parks, cycling ways, etc.);

- **Construction and equipment costs**: this category comprises the investment cost related to infrastructure building (new buildings, laboratories, office spaces, etc.) and to the purchase and acquisition of equipment for HIDS to undertake its activities (either equipment of general interest – such as laptops for its executive managers – or specific purpose equipment – such as inputs for R&D and innovation activities, as raw materials, microscopes, 3D printing, etc.).
- **Staff costs**: comprising the payroll of internal team members, particularly the executive managers (see the Governance chapter);
- **Communication and marketing costs:** content development, digital art and social media management, forums, workshops, etc.
- **Operation and maintenance costs:** both digital (software and hardware infrastructure, online platforms, data storage servers, tools, etc.) and physical (office space, facilities management, etc.).

Considering these cost categories, it is expected the infrastructure, construction, and equipment costs to correspond to the vast majority of HIDS expenses – especially in the short and medium term (up to 2027), which coincides with the critical period for HIDS implementation and initial operation. In the longer term (2032), and as HIDS progresses towards a "cruising speed" operation, staff, operation and maintenance costs are expected to increase their weight within the overall cost structure of the hub.

Concerning the revenue structure (as per Figure 11), there are 5 major streams under consideration for HIDS: (i) membership quotas; (ii) sell of services; (iii) public funding; (iv) international funding; (v) private investment. These revenue streams assume a specific legal and governance approach towards HIDS (an OS supported by an NOA approach).

Each of these revenue streams will play a specific and important role in HIDS implementation through time. In the short and medium term (up to 2027), public funding and international funding will be of paramount importance, seen that the investment will be concentrated on infrastructure, construction, and equipment, so that HIDS could initiate its activities. HIDS will require high l investment to achieve a structure of excellence, for which the grants, loans and incentives provided by public bodies (from local to international levels) are able to respond to such needs. As HIDS starts off its activities, membership quotas and services selling will gain relative weight within its revenue structure in the medium term. Such sources of income will indicate how successful HIDS has been in delivering benefits, services and impact to its members and clients. Finally, in the longer term (within 10 years), as HIDS densifies its network of interactions, diversifies its service offer, consolidates its brand and reputation nationally and internationally, and delivers highly added value services and activities, it will be able to attract private investment as a relevant source of revenue.

HIDS	Potential revenues streams	
Type of funding	**Potential stakeholders**	**Potencial use**
Membership quotas	- Academia and research institutions - Companies - Public bodies	Operative costs, including staff costs, communication, office costs, etc.
Sell of services		Operative costs, including staff costs, communication, office costs, etc.
Public funding (loans, grants and tax incentives)	- Local/regional/national governments - Development Banks - Funding agencies - Other financial mechanisms (tax exemptions, fiscal incentives, etc.)	Infraestructure, equipment and special programmes.
International funding	- Development Banks - Cooperation agencies - Other financial mechanisms	Infraestructure, equipment and special programmes.
Private investment	- Venture Capital - Impact & Angel Investors - Foundations	Business development, technological solutions, member projects, startups and scaleups.

Figure 11 - Main type of potential revenues streams for HIDS (illustrative not limitative)

The image above summarizes the different types of revenues considered essential for HIDS business model approach. Each of them mobilizes different types of actors and financial tools, and each of them can also be oriented towards supporting different types of costs.

The following sections will provide a comprehensive identification of concrete funding mechanisms within each of the revenue streams categories.

3.5.2 Funding sources

Membership quotas

As presented in the Governance section, HIDS is likely to be incorporated as an OS (Organização Social). Thus, the hub legal personality will be of a private not for profit association. As such, HIDS will operate as a network-based organization, comprising members with voting power to take decisions on strategic and operational aspects of the hub's business development.

In this context, HIDS will deploy a membership scheme which could be relevant in terms of raising revenues to financially support the hub operation (especially of its operational costs linked to human resources, service implementation costs, office and maintenance expenses, etc.).

The membership scheme will comprise different categories of association to HIDS, reflecting distinctive levels of engagement and different prices as well. Different levels of benefit should also be foreseen, according to the type of membership.

Sell of services

Another fundamental revenue source to sustain HIDS activities is to sell services to clients, especially those provided by the hub itself, such as: training and entrepreneurship, scientific dissemination, events for networking communication & branding, among others. In this context, it will be important to specify (i) the willingness to pay potential (how much clients are willing to pay) and (ii) the service payment approach – which could involve, for example, sponsorship, freemium model, unlimited access, pay per use, subscription, success fee, etc.

The following table summarizes the mixed type of service payment approach that could be adopted, considering the different type of stakeholders involved.

Clients / Segment	Service Provided	Mechanism
HIDS members	• Technology and innovation, diffusion, and validation • Training • Scientific dissemination, exploitation, and collaboration promotion • Fundraising and financing • Events, co-creation and netweaving	Capital and in-kind contributions (to clarify by the legal model)
External companies	• Technology and innovation, diffusion, and validation • Training • Scientific dissemination, exploitation, and collaboration promotion	Freemium Sponsorship Pay-per-use or service
Academia **(universities, research institutions or individual students)**	• Technology and innovation, diffusion, and validation • Training and entrepreneurships • Scientific dissemination, exploitation, and collaboration promotion	Pay-per-use or service
Start ups	• Training and entrepreneurships • Softlanding & Internationalization	Pay-per-use or service

Public Funding

Public sources of funding – encompassing grants, loans and other financial instruments, from local, regional (state-level) and national (federal) levels of government – are one of the key revenue streams for HIDS. They are of particular importance to secure the required investment funds necessary to implement and start the operation of the hub, especially those related to equipment and infrastructure.

This subsection includes references to strategic plans and initiatives that, although they are not directly funding activities, they could be used to frame HIDS activities and ultimately mobilize funds at local, regional or national level.

Local government

Economic and Social Activation Program (PAES)
Local program for training and certifications and improvement in the business environment. PAES addresses qualification programs for entrepreneurs, vocational education and professional training, as well as modernization of management instruments, without giving up responsibility and fiscal balance, with new legislation and regulation.

Campinas Smart City Strategic Plan 2019-2029
It is sponsored by the Municipal Council of Science, Technology and Innovation of Campinas (CMCTI), and chaired by the Municipal Secretariat of Economic, Social and Tourism Development (SMDEST) of the Municipality of Campinas. The fundamental objective of PECCI is to define basic guidelines for the transformation of Campinas into a smart, humane and sustainable city.

Sustainable Cities Program
Sustainable Cities Program (PCS) is an urban sustainability agenda that incorporates social, environmental, economic, political and cultural dimensions into municipal planning. Since 2012, the PCS has worked to raise awareness and mobilize local governments to implement structuring public policies that contribute to fighting social inequality and building fairer and more sustainable cities.

Sustainable building incentive
The criteria for sustainability incentives are provided in Supplementary Law No. 49 of 20 December 2013 and Municipal Decree No. 18,705 (2015) and are applicable in the scope of municipal environmental licensing. The incentives allow the interested party to adopt sustainable practices in its undertaking work or activity and, in return, receive discounts on the licensing fee in the municipality of Campinas. Sustainability Seal awards enterprises or activity that meets a minimum number of sustainability criteria. The entrepreneur that is awarded the S Seal may, in the next project, request priority at the beginning of the licensing process analysis.

Municipal Startups Incentive

Laws No. 14.947/2014 and No. 14.920/2014 provide tax incentives to companies classified as startups on the Urban Property and Land Tax (IPTU) and reduction of the Tax on Services of Any Nature for up to three years. The Campinas City Council establishes a reduction in the rate of the Tax on Services of Any Nature (ISSQN) from 5% to 2% for companies operating in the areas of research and development, business tourism, logistics and defense and exemption from the Property Tax (IPTU) for startups.

State-level government

São Paulo System of Innovation Environments

Decree No. 60,286 of March 25th, 2014 establishes and regulates the São Paulo Innovation Environment System (SPAI). The system comprises the São Paulo Technological Park System (SPTec) and the São Paulo Technology-Based Business Incubator Network (RPITec), the São Paulo Technological Innovation Center Network (RPCITec), and the Network of São Paulo Technological Innovation Centers (RPNIT).

Smart cities program

Coordinated by the Regional Development Secretariat, in alliance with the Economic Development Secretariat, the Brazilian Micro and Small Business Support Service (SEBRAE) and the Technological Research Institute (IPT) is a public policy program that prioritizes governance based on goals and plans, joint work between the State and municipalities, reducing bureaucracy in processes and promoting problem solving through technology.

The Research and Development Foundation from the State of São Paulo (FAPESP)

The São Paulo State Research Support Foundation is one of the main agencies for the promotion of scientific and technological research in the country. With autonomy guaranteed by law, FAPESP is linked to the Ministry of Economic Development.

São Paulo Innovation Law

Complementary Law No. 1,049 of June 19th, 2008 establishes diverse measures (including financing) to encourage technological innovation, scientific and technological research, technological development, non-routine engineering, technological information and technological extension in a productive or social sphere, with a view to achieving training and industrial and internationally competitive development.

State Tax (ICMS) exemption agreements

In order to promote the use of renewable energies, some Brazilian states (including the state of São Paulo) have signed agreements to exempt ICMS from operations with equipment and components for the generation of solar and wind energy (CONVÊNIO ICMS 101/97)

Federal government

Brazilian Strategy for Digital Transformation (E-Digital)

The Digital Strategy establishes a set of 100 actions to promote the digitization of production processes and society over a four-year horizon. The goal is to create a conducive environment to transformative impacts in agriculture, commerce, education, finance, industry, and services. For this, nine thematic axes were defined. As enablers of digital transformation are network infrastructure and Internet access; Research, development and innovation; confidence in the digital environment; education and vocational training; and international dimension. As for the axes of digital transformation, they consist of a data-driven economy; a world of connected devices; new business models; and digital transformation of citizenship and government.

STARTUP BRAZIL

Initiative of the Ministry of Science, Technology and Innovations in partnership with the accelerators to support the technology-based new-born companies/ startups.

National Bank for Economic and Social Development (BNDES)

The BNDES is the main financial support mechanism in Brazil for investments in all economic sectors. The Bank allocates special resources, mostly in the form of long-term funding and shareholdings, in addition to supporting undertakings that contribute to economic and social development. Investments eligible for support including: innovation, the environment, culture and infrastructure areas. Some of the BNDES' support lines relevant for HIDS are presented below:

Social Fund aims at supporting projects in areas such as employment and income development, urban services, education, justice, the environment, rural development and others linked to regional and social development.

Funtec supports financially R&D projects in the Institutes of Technology in partnership with companies, in order to take knowledge from academia to the market, stimulating technological development and innovation of strategic interest to the country.

Inova Energy Plan is BNDES joint venture with Brazilian Electricity Regulatory Agency (Aneel) and Financial Instruments for Studies and Projects (Finep) to accelerate renewable energy and energy efficiency projects in Brazil and to boost cooperation and knowledge sharing between companies and technology institutes in the fields of smart grids and renewable energy. Inova provides support in form of grants and soft loans.

National Law for Incentives to Innovation

Law No. 10.973 of December 2nd, 2004 establishes measures (direct financial, economic and fiscal support) to encourage innovation and scientific and technological research in the productive sphere, with a view to technological training, the achievement of technological autonomy and the development of the country's national and regional productive system.

Financial Instruments for Studies and Projects (FINEP)

Finep grants reimbursable and non-reimbursable financing to Brazilian research institutions and companies. Finep's support covers all stages and dimensions of the scientific and technological development cycle: basic research, applied research, innovation and development of products, services and processes. Finep also supports the incubation of technology-based companies, the implementation of technology parks, the structuring and consolidation of research processes, the development and innovation in established companies, and the development of markets. The Finep's financing lines and programs relevant for HIDS are the following:

Innovar involves a broad, structured and transparent set of actions to stimulate new enterprises through a range of instruments, including the provision of risk capital, indirectly through venture capital funds.

Finep Sustentabilidade is carried out through reimbursable financing implements resources from the FNDCT (National Fund for Scientific and Technological Development).

Technological development support program (PADIS)

Established by Law No. 11.484 of 2017, it includes a set of tax incentives, with the aim of attracting investments in the areas of solar energy production with direct benefits to various inputs used in the production of photovoltaic panels, in the terms of the law. The companies that opt for the program must make annual investments in research and development activities and may have reductions to zero rates of PIS / COFINS (Social Security Financing Contribution), Import Tax, Tax on Industrialized Products, import of equipment and inputs listed in the Law for the production of photovoltaic panels.

Regime of special incentives for infrastructure development (REIDI)

Established by Law No. 11.488, of 2017, benefiting legal entities that have an approved project for the implementation of infrastructure in the energy sectors, among others, in the terms of the Law. With this, the exemption of the PIS / COFINS taxes on the sale or import of new equipment, machinery and instruments and the acquisition of services and construction materials used in infrastructure works.

Special Tax Regime for the Information Technology Services Export Platform (REPES)

It was created by Law No. 11.196 of 2005 with the aim of stimulating technological innovation in the country. It provides incentives to Technological Innovation companies, such as deduction from the income tax (IRPJ) and the Social Contribution on Net Profit (CSLL) calculation base for spending on research and development; and a 50% reduction in the tax on industrialized products (IPI) and on the acquisition of machinery and equipment for research and development, under the terms of the Law.

International funding

This revenue stream comprises funds made available by multilateral development banks, by international cooperation agencies, from key countries, and by specific international-oriented initiatives. Among the main products offered by this revenue stream are grants, guarantees and loans. From these products, grants are the most limited and mostly available for preparation of

projects (technical assistance) and pilot phases. Debt products from the multilateral development banks offer the best terms and conditions in the financial ecosystem.

The financial support provided by this source of revenue is important to help structure HIDS in terms of infrastructure and equipment, as well as to fund special projects linked to sustainable development, environment protection, greenhouse gases emission, among other topics.

Inter-American Development Bank (IADB)

As the regional development bank for Latin America and the Caribbean, the IDB actively supports governments and institutions in the region to achieve the Sustainable Development Goals. As of Brazil, from 2016 to 2020, the IDB has approved 51 projects valued at USD 8 billion.

The IDB Invest is a member of the IDB Group, is the division that finances companies and projects with high impact, sustainable and replicable, through a variety of financial solutions that can range from credits, co-financing or technical assistance grants, among others, with the aim of maximizing social and environmental development in the region.

Development Bank of Latin America (CAF)

CAF promotes a sustainable development model in Latin America, offering credit operations, grants and support in the technical and financial structuring of public and private sector sustainable projects. CAF also provides the Green Bond program which supports the national commitments undertaken by country members in the context of the Paris Climate Agreement, in order to address climate change mitigation and adaption challenges. Projects eligible for CAF's Green Bond program include renewable energy, waste management and energy efficiency among other areas.

International Finance Corporation (IFC)

IFC is a member of the World Bank Group, this institution issues bonds in a variety of markets, formats and currencies, including global benchmarks bonds, green and social bonds, private placements, and discount notes. IFC offers financial products that enable companies to manage risk and expand their access to foreign and domestic capital markets, and its advice helps unlock private sector investment. IFC does not lend directly to micro, small and medium enterprises or individual entrepreneurs, but several of its investment clients are financial intermediaries that lend to smaller businesses.

New Development Bank (NDB)

The General Strategy of the NDB is based on the intention to mobilize resources for infrastructure and sustainable development projects in BRICS (Brazil, Russia, India, China and South Africa) and other emerging economies and developing countries, complementing the existing efforts of multilateral and regional financial institutions for global growth and development. The Bank supports public and private projects through loans, guarantees, equity participation and other financial instruments. NDB funded projects are located within the following key areas of operation: urban development, environmental efficiency, social infrastructure, digital infrastructure, clean energy and transport infrastructure.

European Investment Bank (EIB)

The EIB provides support in European Union countries to develop and review projects, identify areas of opportunity, advise on financing options within and outside the EIB Group, facilitate networks with relevant stakeholders and knowledge sharing. It provides financing for circular economy projects with a high-risk profile, implement investment platforms to mobilize public and private investment to the projects. One of the EIB's objectives is to increase lending for innovative projects and new business models aimed at enhancing the value, use and life of materials, products and goods and at eliminating waste from production and consumption, as well as to provide advisory services on the circular economy, networking, exchange of good practice, and facilitating access to finance for companies in the European Union but also in other countries of the world.

This year the institution launched "The EIB Circular Economy Guide. Supporting the circular transition" a document for companies that wish to implement circular economy projects can consult the eligibility guidelines and selection of projects that could be supported with some of the products or services that this bank offers.

Some of the products that EIB offers to companies comprise corporate loans, growth financing for mid-cap companies; loans for project financing; corporate hybrid debt.

KfW Development Bank

The KfW Development Bank only promotes projects that do not have a negative impact on the environment, climate and social problems and reduce greenhouse gas emissions. In Brazil, KfW development bank finances projects that seek to expand renewable energy, energy efficiency, protect the environment and preserve biodiversity.

German Corporation for International Cooperation (GIZ)

GIZ offers technical assistance for relevant topics of sustainable development and promotes their implementation in the country. GIZ's priority areas of action in Brazil are: renewable energies, energy efficiency and the protection and sustainable use of tropical forests. In addition, increasing emphasis is being placed on urban development and funding opportunities for green investment areas.

GIZ Climate Policy Program Brazil (PoMuC) aims at supporting the successful implementation of selected areas of the National Policy on Climate Change and the operational approach is based on thematic axes. Some of them are: strengthen the institutional capacities of the National Climate Fund, support public and private climate finance measures, strategies and instruments, evaluate the regulatory impact of different concepts for facility-specific greenhouse gas reporting, and the knowledge management, by improving the cooperation and the flow of information between the main stakeholders in Brazilian climate policy. One of the potential impacts is to strengthen the Brazilian institutional structures, through the promotion of dialogue, systematization and sharing of information and knowledge, as well as continuous training.

SDG Finance Sector HUB (SFH)

Funded by the UN Development Program, SFH supports public and private partners by offering four flagship initiatives, SDG Impact, Integrated National Frameworks (INNFs), Insurance and Risk Facility, and Digital Financing, to seize opportunities and addressing the scaling up finance for the SDGs.

UK British Embassy

The UK Government is committed to assisting developing countries to end poverty and respond to the challenges caused by climate change. Under different programs, it provides grants for capacity building projects in priority areas, including green recovery post-COVID19, nature bases solutions and climate finance. These programs are funded by the Department for Business, Energy and Industrial Strategy (BEIS). Among concrete initiatives of relevance to HIDS one may refer to Partnering for Accelerated Climate Transitions[117] and the Future Cities initiative[118].

Low Carbon and Circular Economy Business Action Program in the Americas (LCBA)

LCBA is an EU funded program aiming at developing joint knowledge and technology transfer projects between European providers and companies based in Argentina, Brazil, Chile or Colombia that are seeking for innovative low carbon and circular economy solutions. LCBA accelerates commercial agreements providing legal, financial and environmental assistance to those eligible projects.

Innovate4climate (I4C)

I4C is an annual global conference on climate finance, climate investment and climate markets hosted by World Bank Group where international leaders from both private and public sectors discuss the shaping the global climate finance landscape.

Urban Cooperation Program (IUC & IURC)

The IUC aims at supporting cities in different regions around the globe to connect and share solutions to common problems in sustainable urban development. The program targets the achievement of political objectives both at local level and in connection with key international agreements, such as the New Urban Agenda, the Sustainable Development Goals and the Paris Agreement.

Private External Investors

Impact investors, foundations (philanthropic), venture capital & private equity funds were identified as key external funding sources for HIDS. Impact investing in the country is fairly represented and diverse, with a large number of sectors receiving money. Over 80% of these type investors declare to have aligned their investment strategy to Sustainable Development Goals (SDGs). [119]

The most common funding products from this group of stakeholders are: Debt-Equity for startups or enterprises, donations, and guarantees. It is important to notice that if this source is identified to finance HIDS operations directly the challenges will be to have and appropriate financial vehicles (e.g., trust), and governance structure.

[117] https://www.ukpact.co.uk/
[118] https://www.globalfuturecities.org/
[119] The Impact Investment Landscape in Brazil, Apen Netowrk of Developmetn Enterprenuers, LAVCA, October 2018.

SITAWI Finance for Good

It develops financial solutions for social impact and analysis of the social and environmental performance of companies and financial institutions. The Social Finance program is responsible for the development of Social Impact Bonds (SIBs) in Brazil and for the management of the Philanthropic Funds (FF) and the Social and Environmental Revolving Funds (FSR), from which donations, loans and impact investments are made to organizations and businesses that are committed to impact.

DINAMO

With a focus on reducing inequalities - SDG 10 of the UN 2030 Agenda - its impact thesis aims to contribute to the achievement of SDG 3 (health and well-being), SDG 4 (quality education, with special emphasis on productive inclusion) and SDG 11 (sustainable cities and communities).

LGT Impact – LGT Venture Philanthropy

LGT Venture Philanthropy is an independent charitable foundation that supports organizations and companies, who implement solutions that contribute directly to the achievement of the Sustainable Development Goals (SDGs).

MOV Investimentos

Founded in 2012, MOV is a Brazilian impact investing fund manager.

Performa Investimentos

Performa Investimentos is an investment management company specialized in Venture Capital and Private Equity investments in Brazil. It is focused on projects with an ESG approach, targeting SDGs at the same time.

Positive Ventures

On the premise that each investment must create an economic, social, and environmental value, the focus on those companies with impact on the social (and environmental) fabric and seek to build enterprises which are in service of society. Their portfolio mainly gathers initiatives on biotech, clean tech, fintech, health tech, ed tech and social commerce.

Provence Venture Capital

Their investment strategy focuses on sustainable growth, sustainable financial structures, scalable solutions, B2B, tech-oriented companies, and pre-series A to series B.

Rise Ventures

Invests in projects that have high growth potential, generate attractive financial returns and create positive socio-environmental transformations. Their early-growth private equity fund invests in sectors in 3 verticals: Social, Nature, and Well-being.

TriLinc

Targets projects with a meaningful financial return and positive social and economic impact, aligned with the UN's Sustainable Development Goals.

VOX Impact

VOX Capital is a pioneering investment manager that offers competitive financial solutions that value the human experience and the planet, integrating impact as a dimension of analysis beyond risk and return. Its purpose is to develop financial solutions generating abundance, equity, and positive social and environmental transformations.

WTT Ventures

It is a Latin American foundation with a mission to promote innovation as a tool to overcome social and environmental challenges.

Global Steering Group for Impact Investment (GSG)

GSG is an independent organization catalyzing impact investment and entrepreneurship to benefit people and the planet. Brazil is one of the 33 member countries, and the Brazilian Alliance for Impact Investment and Impact Businesses seeks to create a network of relationships that will bring together investors, entrepreneurs, governments and partners to develop profitable business models that solve social or environmental problems, and change the dominant paradigm for managing the needs and resources of society.

Boticário Group Foundation

Non-profit organization maintained by the Boticário Group which enables the Foundation's initiatives in biodiversity, natural reserves, innovative solutions, engagement through three lines of action: get to know and maintain natural areas in balance, seek innovative solutions and society´s engagement on importance of nature conservation for everyone's quality of life.

Institute of Corporate Citizenship (Instituto de Cidadania Empresarial, ICE)

Its purpose is to bring together entrepreneurs and investors around social innovations that could leverage their personal and philanthropic investment, their foundations and their corporate investment to promote social inclusion and reduce social poverty in the country. Its premises: Articulation and commitment of transforming leaders; I work essentially cooperative and collaborative, y; Production, systematization and dissemination of knowledge.

Brazilian Private Equity & Venture Capital Association (ABVCAP)

It is a non-profit organization that represents the private equity and venture capital industry and promotes the development of long-term investments. Their objectives are networking, development of studies and research, promotion of training programs and best practices, and integration with industry entities. To do so, they promote training programs, develop studies and research about the industry, disseminate reliable industry data, and foster good practices among our members and the companies invested in the industry.

3.6 Partnerships and alliances

The achievement of the strategic goals of HIDS and the accomplishment of its value proposition are dependent on its capacity of creating strategic partnerships with complementary institutions acting at local, regional and national levels, and its ability of integrating national or international networks dedicated to the areas of technology and innovation. The institutions and networks with which HIDS could collaborate were identified considering the convergence of their fields of work with HIDS, the relevance of their actions at national and international level, and finally, the project those institutions that have the potential for effective collaboration with HIDS. Such partnerships and alliances will be materialized through different means – including the signature of Memoranda of Understanding, development of consortia, mutual membership or association, among others. The partnerships and alliances to be established by HIDS should, on the one hand, allow the integration of this Hub in the most relevant networks in its fields of interest at the international level and, on the other hand, to position HIDS and its territory as a reference in the generation of knowledge-based solutions to the sustainable development through recognitions and certifications. These partnerships and alliances are detailed, and described below. They are divided considering its territorial coverage: national or international.

3.6.1 National

ANPROTEC: Brazilian Association of Business Incubators and Technology Parks

ANPROTEC is the national association that offers services for generating innovative enterprises and network innovation ecosystems, being a national reference for the science parks, business incubators, higher-education institutions, research centers and various governmental agencies in Brazil. Currently it brings together about 300 members. It is a highly relevant institution in the development of Brazilian business incubators and technology parks, and it has contributed to boost the country's industrial competitiveness ever since its establishment. This is done by the articulation of public policies along with the municipal, regional and federal governments; the connection of its members through a network of core knowledge, and by the promotion of an entrepreneurial and innovative culture in Brazil. ANPROTEC offers to its members the access to information, training, courses, events, publications and projects that provide knowledge and improve the performance of the institution. For its strategic value in Brazil and in Latin America, the association should be considered as a priority for HIDS to become a full member, as it will be a useful platform to strength the links of this HUBS to other Brazilian institutions.

IPT Pró Municípios

Digital platform that allows access to webinars on connectivity, mobility, waste management, public lighting and other topics related to urban development. With the support of the USP Institute for Technological Research, the tool will also make it possible to schedule technical visits and meetings to share information between public managers. Partnerships with these institutions should be considered.

BRAZILIAN AGRICULTURAL RESEARCH CORPORATION (EMBRAPA)

Linked to the Ministry of Agriculture, its objective consists on developing science and technology applied to the Brazilian agricultural sector. It has more than 9,000 employees and about 2,400 researchers working in more than 60 units across the country. Partnerships with these institutions should be considered.

3.6.2 International

IASP: The International Association of Science Parks

IASP is the worldwide network of science parks, innovation districts and other areas of innovation with members from over 77 different countries. It is a knowledge-based network that brings together existing and developing Hubs, science and technology parks, areas of innovation and innovation-based business incubators, as well as R&D institutions, universities, consultants and experts in economic regional development and technology and knowledge transfer. IASP gathers 374 members, which in turn represent a network of over 142,000 companies, most of them belonging to the innovation and knowledge economy. Itis based in Europe (Spain) and Asia (China) and its regional divisions demonstrate its global presence: they are also present in Africa, Latin America and North America. Considering the potentiality of this association regarding the international visibility, knowledge-sharing and expertise, international connections and direct links to peers around the globe, HIDS should apply to be a full member of this association.

Relai : Latin American Network of Innovation Agencies

This is an association for collective action, collaboration and exchange of experiences and knowledge among innovation agencies in the field of innovation and entrepreneurship promotion in Latin America. Relai offers a space to share the best practices in the operation and tools to better reach the beneficiaries and thus strengthen the ecosystem. Currently it has thirteen innovation agencies from Latin America, and over the last years Relai has established cooperation links such as the Regional Public Goods (RPGs) framework, whose executive organization is the Inter-American Development Bank (IDB), a formal partnership with the European Network of Innovation Agencies (TAFTIE), comprised of 31 organizations from 28 European countries and with NESTA, the United Kingdom’s foundation for innovation.

UIIN Community: Advancing University-Industry Interaction

This is an institution dedicated to supporting a global community of university and industry professionals, to advance the future of higher education institutions and their impact on society. UIIN offers services related with research development, organization of events and provision of training and consultancy services. This is an institution of special interest to HIDS as their mission is to enable and enhance university and industry engagement across education, research and societal interaction, through providing insights from research and practice, upskilling and supporting individuals and institutions, and creating a global community for

sharing best-practice. Currently this community has more than 80 organizational members and more than 500 individual members located in different parts of the world. HIDS could join UIIN community as an organizational member and get access to exclusive Business Group events and networking opportunities with universities and other businesses from all over the world.

ENoLL: European Network of Living Labs

Is an international non-profit association that aims at promoting and enhance user-driven innovation ecosystems, more precisely the Living Labs concept globally. ENoLL focuses on facilitating knowledge exchange, joint actions and project partnerships among its members, influence policies, promote living labs and enabling their implementation worldwide. Currently this association has more than 460 Living Labs in Europe, North America, Asia and Oceania. Considering the importance of the concept of Living Lab in the HIDS project, it would be important to integrate this institution as an effective member, being the first institution to have this recognition in Latin America.

EBN: European Business and Innovation Centre Network

EBN is the leading pan-European association of business in supporting organizations that connects a global partner network of executives, industry leaders and best-of-class innovators of all kinds. EBN is a platform that provides services related with sustainable growth for organizations' business to strengthen their position in the region and in the world, and offers the option of obtaining the certified recognition as a valuable contributor to the ever-evolving innovation ecosystem. More than integrate EBN as a member, it would be an opportunity for HIDS to get the Business and Innovation Centre (BIC) certification, a quality-certified business support organizations, which dedicates their efforts and resources to help entrepreneurs with innovative ideas, make those ideas viable, successful and sustainable businesses. To do that, HIDS should mobilize resources to create in Campinas so a BIC could be installed here. This would be an important certification for HIDS, to position as an institution that fosters the creation and growth of innovative entrepreneurs.

UNITAR: United Nations Institute for Training and Research

This is the main training arm of the United Nations, working in every region of the world that provides innovative learning solutions to individuals, organizations and institutions in order to enhance global decision-making and support country-level action for shaping a better future. The Institute covers topics in the broad areas of supporting capacity for the 2030 Agenda, strengthening multilateralism, advancing environmental sustainability and green development, improving resilience and humanitarian assistance, promoting sustainable peace, and promoting economic development and social inclusion. This is done by programs such as the Global Network comprised of 20 International Training Centers for Authorities and Leaders that provides innovative training around the world and serves as a center for the exchange of knowledge among government officials, the private sector and civil society. The contacts between UNITAR and HIDS have been already initiated in an event where both institutions

identified confluence of their action fields and declared their interest in deepen their cooperation and opening the possibility of this Hub join UNITAR[120]

United Nations Environment Program

The UN Environment Program aims at informing and enabling countries to implement the environmental dimension of sustainable development. Its contributions can be in the form of financial support, in kind and/or technical expertise, through its various programs:

- Elimination of single-use plastics
- Exchange of information, generation of indicators and statistics
- Global Marine Litter Alliance

United Nations Development Program (PNUD)

They generate solutions for countries seeking to achieve their own development goals and meet the objectives shared and committed with the international community, including the Sustainable Development Goals. They provide specialized technical assistance to promote local economies, value chains and linkage to sustainable livelihoods.

United Nations Industrial Development Organization (UNIDO)

It is a specialized agency of the United Nations, to promote development and industrial cooperation in countries with economies in transition to reduce poverty and ensure environmental sustainability.

United Nations SDG Partnership Platform

Brazil is listed as a partner or lead entity in the Partnerships for SDGs online platform in the following listing of partnership initiatives and voluntary commitments:

- National Plan on Climate Change
- Promoting Urban Low Emission Development Strategies
- Solar energy legislation
- The Renewable Energy Reference Centre

3.7 Value creation CANVAS

The business model proposition for HIDS presented here has been summarized using the business model and value proposition canvas developed by Alexander Osterwalder (2008) and the SDG Project Canvas (2018). The Canvas has been filled in using the information collected during the investigation of the study, previous documentations and the workshops developed.

The development of the business model focuses on two aspects:

[120] http://www.hids.unicamp.br/hids-pode-integrar-rede-do-unitar-da-onu/

1. Describing the value creation process, through different Sustainable Development opportunities and the identification of needs unmet from different stakeholders

2. Describing the value capture process, through the study of the different potential revenue models and sources and the conditions for translating this value into services for stakeholders.

A value creation canvas with focus on SDG has been designed to define the scope of actions that satisfies the demands and needs of the different user segments identified, according to the strategic vision and mission.

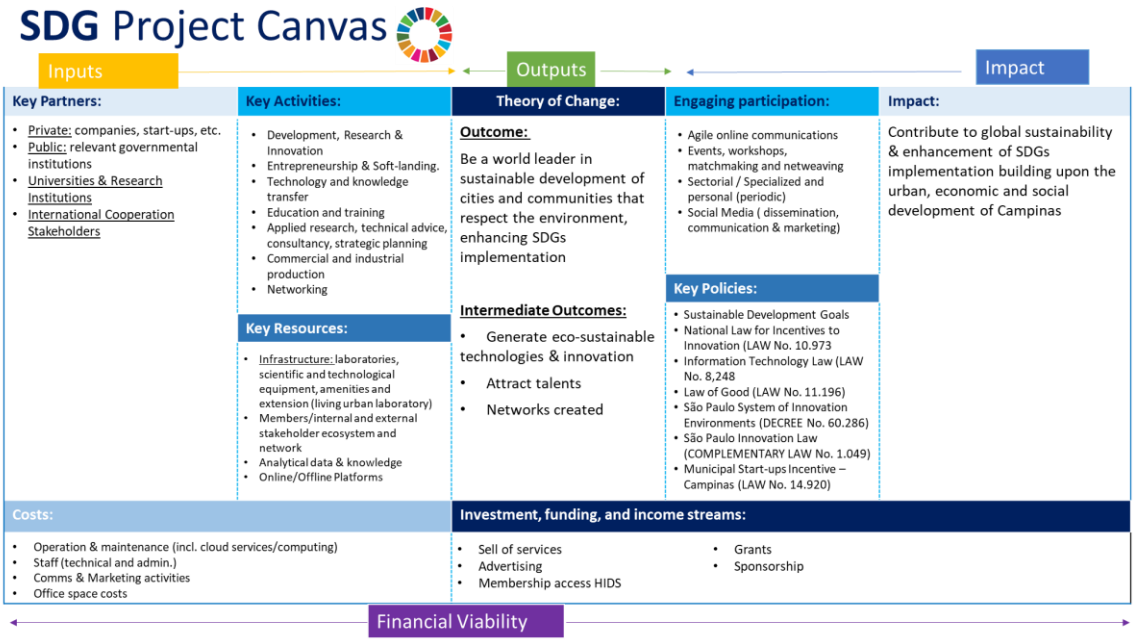


Figure 12 – SDG Project Canvas

This next Business Model Canvas is the first draft of possible scenarios of services, and its value capture process.

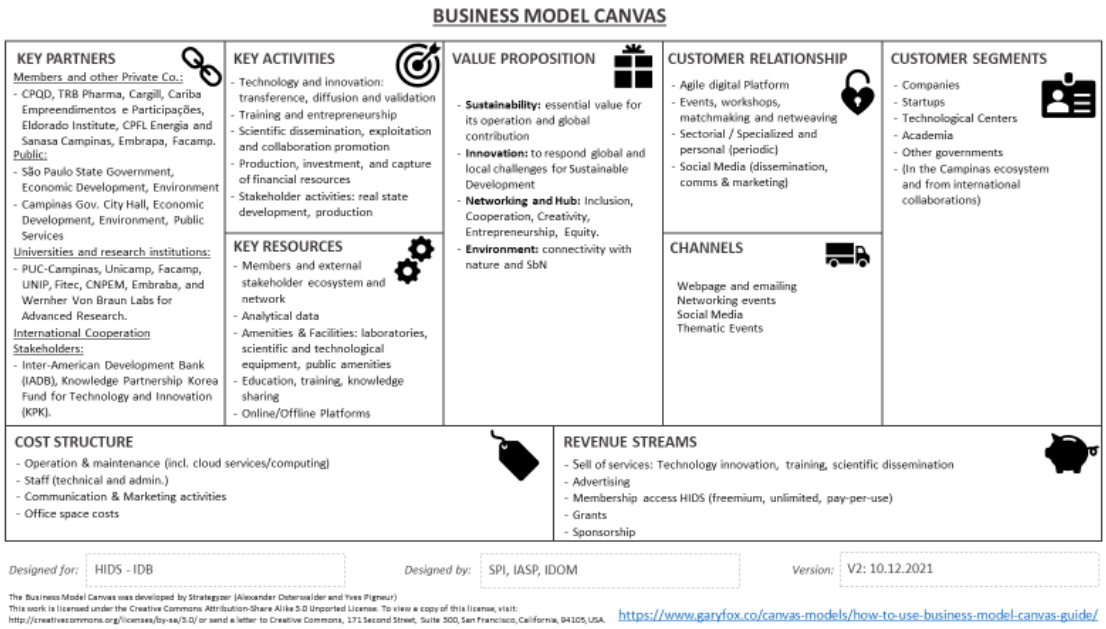


Figure 13 – Business model Canvas

The following figure summarizes the characteristics through which the value proposition will be generated. The table includes the definition of the different services that HIDS could provide, considering the thematic areas: i) energy, ii) health, iii) agri-food, iv) Sustainable urbanization and v) *ICT*. Considering the need of sustainable innovation and describing which are the specific benefits of each service for the different user segments.

Value	Services	Description
Sustainability (SDGs)	• Training and entrepreneurship: Incubation and acceleration (SDGs 8, 9, 11)	Services and infrastructure to support the development of companies linked to sustainability.
	• Scientific dissemination, exploitation and collaboration promotion: Applied research, technical, advice and consultancy (SDGs 9, 11, 12, 17)	Bringing together the expertise of all actors related to HIDS, converted into advice services in areas related to sustainability (urban planning, sustainable urbanism, urban revitalization, etc.)
	• Scientific dissemination, exploitation and collaboration promotion: Analytical knowledge production (SDGs in general) (also E*nvironment* value)	Articulating the work and output of research lines and groups into useful products with impact and visibility, focused on the monitoring and follow-up of the SDGs.
	• Services and activities carried out by HIDS stakeholders: Commercial and industrial production (SDG 8, 12)	This service category is exclusively oriented towards activities carried out by HIDS stakeholders (and not by HIDS itself), in particular industrial companies, and small and medium-sized service companies.
Innovation (R&D+I)	• Technology and innovation: transference, diffusion and validation; Resource sharing	Laboratories, scientific and technological equipment, infrastructures, etc. made available by the HIDS scientific and technological actors to the entire network: creation and sharing of "living labs", "shared structures".
	• Technology and innovation:	

	transference, diffusion and validation; Technological validation and demonstration (SDGs 9, 11, 17, among others)	Services, activities, procedures, infrastructures and equipment aimed at technological experimentation.
	• Technology and innovation: transference, diffusion and validation; Technology and knowledge transfer (SDGs 9, 11, 17, among others)	Transfer to public and private stakeholders the results of the technological development made in HIDS space; *knowledge centers, competence centers.*
	• Training and entrepreneurship: Training, qualification and requalification (SDGs 4, 5, 9, among others depending on the topics)	Availability of a diversified training offer, both in thematic and education level. Particularly considering the reskilling and upskilling needs resulting from the green transition and digital transition processes.
	• Training and entrepreneurship: Innovative Entrepreneurship (SDGs 8, 9, 11)	Availability of one-stop-shops and strategic support for potential entrepreneurs linked to HIDS, with special focus on sustainable, innovative, and/or technology-based companies.
Networking & Hub	• Open and collaborative innovation (SDGs 9, 11, 17, among others depending on the topics)	Creation, development, and maintenance of platforms (material and immaterial) to reach collaborative ideation processes between actors in the innovation value chain.
	• Production, investment, and capture of financial resources: Fundraising and Financing	Services, structures, processes and activities to attract financial resources to the HIDS territory: setting up a HIDS Project Office, business and investment rounds and pitching sessions, network of private investors, etc.
	• Production, investment, and capture of financial resources: Softlanding and internationalization. (SDGs 9, 11, 17)	Infrastructures and services to support the "soft landing" of international companies in the context of Campinas' innovation ecosystem.
	• Scientific dissemination, exploitation and collaboration promotion: Applied research, technical assistance and consulting	Structuring, support infrastructures for scientific dissemination; Organization of services and activities for scientific dissemination.
	• Production, investment, and capture of financial resources: Events, co-creation and netweaving	Organization of events (technical-scientific and others) for visibility and impact of its brand, to support the interaction and connection between its stakeholders from HDI and other contexts.
Environment	• Services and activities carried out by HIDS stakeholders: Amenities and extension (SDG 3, 11, 13, 15, among others)	Infrastructures, equipment, and services aimed at increasing the quality of life of the population living and working in the HIDS territory.

Figure 14 - Characteristics through which the value proposition will be generated

Chapter 4

Operational Plan

4. Operational Plan

4.1 Roadmap and implementation process

In order to define the next steps that HIDS should take for the first two years of operations, the following chapter contains: 1) a financial plan with scenarios for costs and revenue streams in the medium term, including potential development partners; 2) an action plan in a roadmap format that has been developed detailing the needed actions in the short term in order to put the hub in march, and; 3) relevant key performance indicators and other aspects that will contribute to the sustainability and success of the HIDS.

Each stage of implementation has its own objective, its alignment with the short-term strategic goals, specific needed activities or actions for its fulfillment, metrics that will help measure the progress of the stage with an example on how they can be used, and an estimated implementation time.

Figure 15.Stages of implementation of the roadmap

Find in the following a breakdown in detail of each stage of implementation of the roadmap:

4.1.1 Stage 1. Complete approval of the masterplan components

1. Complete approval of the masterplan components	
Description	Since the masterplan is formed by seven components developed by seven different interdependent work groups, last approved deliverables must be in coordination between each other to have a definitive and final version of the masterplan. If needed, final adjustments must be done before initializing with the implementation process.
Objective	The purpose of this stage is to start with a route map implementation process fully in place with the final version of the masterplan so the process itself has sense over the agreed final deliverables of the seven components.
Strategic goal alignment	HIDS and its implementation: SG1. Complete the masterplan and its different components.
Activities	• Find the final approval of proposals and deliverables of the seven workgroups that are developing each component of the masterplan.

	• Prepare an executive summary that gathers the final deliverables from all the components of the masterplan. • Agree on a last version of the financial plan for the first two years of operation of the hub, revise on key assumptions and make last update changes if needed. • Start with the execution strategies of each component of the masterplan. To note that not all of the components will have the same progress in time but will have to follow a coherent order to keep the harmony with the route map process.
KPI's	• All deliverables definitive versions are approved and ready to start its implementation.
Metrics of progress	• All deliverables of each component of the master plan have a final and approved version; Ex: Number of deliverables with a definitive version with approval (number of final deliverables ready / total of deliverables).
Duration	12 months

4.1.2 Stage 2. Formalization of governance structure and processes

2. Formalization of governance structure and processes	
Description	The formalization of the governance structures, policies and internal processes for the hub's decision-making must be aligned with the governance component and the legal strategy (if applicable) of the masterplan and must be created from this moment to begin to manage the resources required by HIDS for its implementation, as well as to channel the participation of civil society and strengthen its sense of belonging.
Objective	To have clarity in the assignment of responsibility to avoid impasses and setbacks in the management requirements of the hub as well as the indispensable mechanisms for adherence to the established internal processes.
Strategic goal alignment	HIDS and its implementation: SG1. Ensure the material and immaterial implementation of HIDS and its full operation from a convergent strategic vision.
Activities	• Establish formally the governance structure and the internal processes that the hub will follow. • Define and create the key decision-making processes and policies in

	strategic, market and operational aspects. • Design and create the participatory mechanisms to channel the perspective and needs of the civil society within the region to address them by the activities and services of the hub.
KPI's	• Fulfill the leadership of HIDS internally and externally. • Formalized governance structure and internal processes • Successful testing on governance and internal processes procedures
Metrics of progress	• Governance structure is formally created and ready to start operations; Ex: number of positions that have been formally created (number of key positions that have been formally created / total of key positions needed to start with the operations of the hub). • Key internal processes and policies are formally created and ready to start operations; Ex: number of processes and policies created / total of key processes and policies). • Participatory mechanisms have been created and ready to operate; Ex: Participatory mechanisms created out of participatory mechanisms designed (participatory mechanisms / participatory mechanisms designed).
Duration	3 months

4.1.3 Stage 3. Follow on legal strategy and physical-spatial design

3. Follow on legal strategy and physical-spatial design	
Description	The implementation of the legal strategy is crucial not only to comply with regulations and provide the services of the hub but also to distinguish the legal personality and the aspects that correspond to HIDS as a company and HIDS as an urban region. Additionally, it is just as important to monitor the design, construction and equipping of the physical spaces necessary for the operation of the hub.
Objective	Start operations with the needed immaterial and material infrastructure taking in account of what is established on financial plan.
Strategic goal alignment	HIDS and its implementation: SG1. Ensure the material and immaterial implementation of HIDS and its full operation from a convergent strategic vision.
Activities	• Start with the implementation of the legal strategy: due diligence, consolidation of the legal entity / personality of the hub and realize

	adjustments if needed. • Determine physical & technological needs for the operations of the hub's office and start with contracting, construction, and procurement processes for equipment. • Follow adequacies of the physical-spatial design and equipment with all partners (urbanization scope). • Start the execution of what is established on the financial plan.
KPI's	• General required permits in order. • Legal entity established. • Legal documents on urban planning scope in order.
Metrics of progress	• Complete all aspects of legal strategy; Ex: number aspects developed of the legal strategy / total of aspects of the legal strategy. • Progress on covered physical and technological needs for the operations of the hub's office; Ex: number of covered needs / total of needs. • Progress in the specifications of the adequacies and/or construction of the physical-spatial design; Ex: necessary completed actions of the physical-spatial design / total of actions of the physical-spatial design.
Duration	6 months

4.1.4 Stage 4. Office establishment

4. Office establishment	
Description	Establishing the hubs' office is essential for the implementation of the services that are intended to be offered. For this, it is necessary to have the technological and human resources. The technological equipment and those key positions will be of main help to get the HIDS operation started. The contracted personnel will be responsible for defining the objectives of their respective department, as well as complying with the pre-established internal activities and the already defined processes within the framework of the governance structure of the operational plan.
Objective	Count with the needed technological and human resources to start with operations of the hub and provide the services mentioned on the operational plan.
Strategic goal alignment	HIDS and its implementation: SG1. Ensure the material and immaterial implementation of HIDS and its full operation from a convergent strategic vision.

Activities	• Start with the process of construction of infrastructure (if needed) and the procurement processes to obtain the necessary technological equipment for the hubs' office. • Hire the key positions of the main departments of the hub for the implementation of the services. • Define and begin with the short-term activities of each of the HIDS departments.
KPI's	• Quality of Security • Quality of Cleanliness • Quality of Utilities Services (energy, telecom, water, waste, etc.) • Quality of Maintenance of Offices (Furniture, Lighting, etc.) • Quality of Common Places
Metrics of progress	• Complete the establishment and the technological equipment of the office; Ex: Progress on the construction and equipment (i.e. completed stages of construction and equipment / total stages of equipment and construction). • Hire key positions of the necessary departments for the start of operations of the hub; Ex: Number of hired personnel / total of needed personnel. • Define and start with short-term activities of each department; Ex: number of departments that have defined and started with their short-term activities / total of departments that have defined and started with their short-term activities.
Duration	6 months

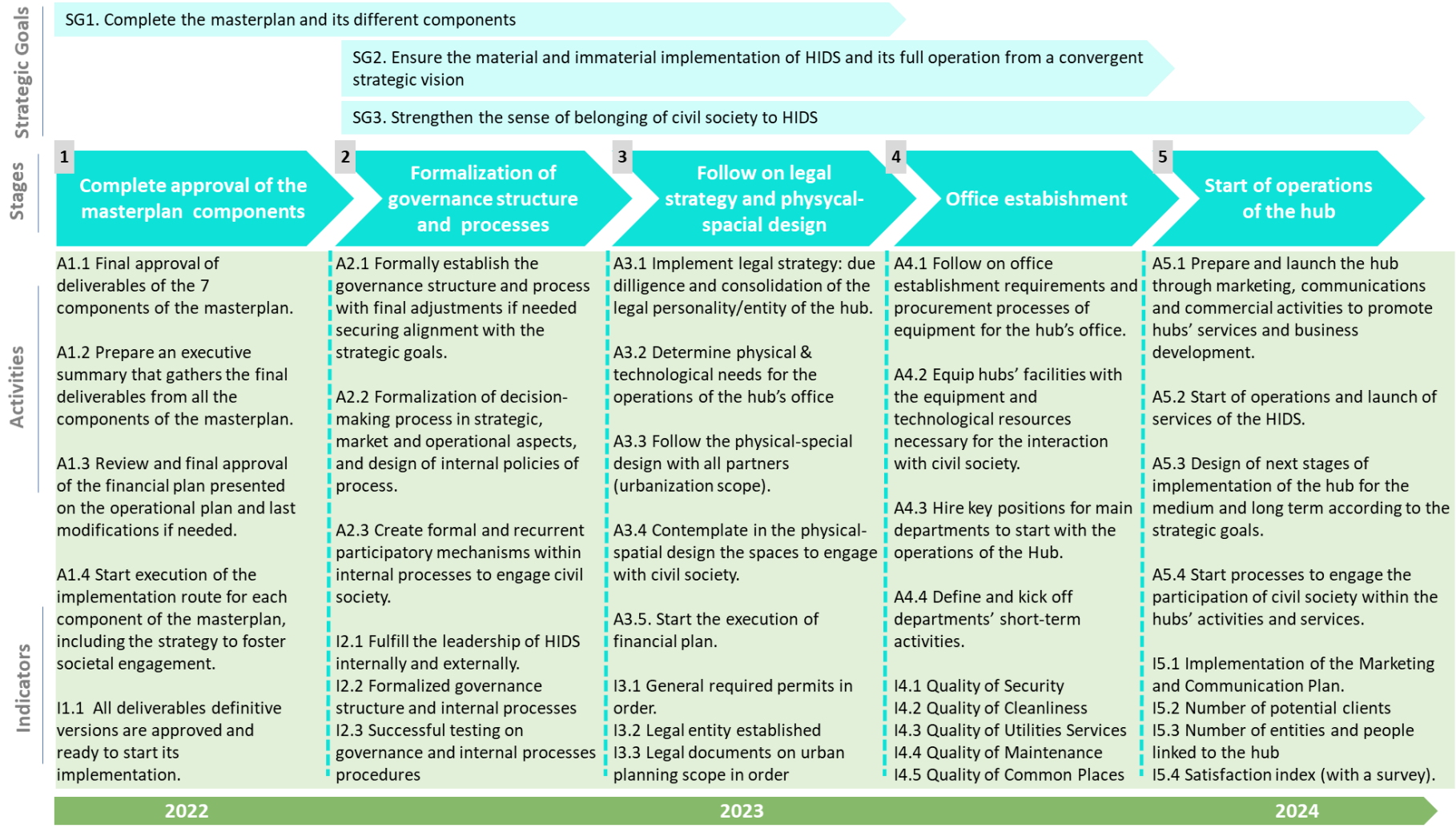
4.1.5 Stage 5. Start of operations of the hub

5. Office establishment	
Description	The start of operations of the HIDS is the last stage of the implementation process in the short-term but the first considering the strategic goals that places planning in the medium and long term. This stage implies preparing and launching the hub through marketing, communications and commercial activities to promote hubs' services and business development, start with the approved technological and non-technological services offered by the HIDS, and the design of the next steps for the hub in the medium and long term.
Objective	Get the hub ready for the start of regular operations and introduce it to the market through the promotion of its services, also to prepare it for the next stages of implementation according to the strategic goals.

Strategic goal alignment	HIDS and its community: SG3. Strengthen the sense of belonging of civil society to HIDS.
Activities	• Prepare and launch the hub through marketing, communications and commercial activities to promote hubs' services and business development • Start of operations and launch of the approved technological and non-technological services of the HIDS. • Design of next stages of implementation of the hub for the medium and long term according to the strategic goals.
KPI's	• Fulfill the implementation of the Marketing and Communication Plan. • Number of company members, clients, and projects linked to the hub. • Community engagement: number of people engaged in the activities (students, professors, and civil society, etc.) • Satisfaction index (with a survey).
Metrics of progress	• Progress on launching strategic activities to promote hubs' services; Ex: Actions prepared to promote hubs' services / actions launched to promote hubs' services. • Start with the offered services; Ex: number of services already operating / total of services offered by the hub. • Design of next stages of implementation for the medium and long term; Ex: next stages of implementation for the medium and long term designed.
Duration	6 months

This roadmap and implementation process can be summarized in the following figure:

Figure 16. Operational Plan: Roadmap for the implementation of the hub



In the following is presented an estimated timeline of the work plan for the implementation of the roadmap:

Table 1. Roadmap chronogram

Activities	Months																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Stage 1. Complete approval of the masterplan components																								
A1.1 Final approval of deliverables of the 7 components of the masterplan.																								
A1.2 Prepare an executive summary that gathers the final deliverables from all the components of the masterplan.																								
A1.3 Review and final approval of the financial plan presented on the operational plan and last modifications if needed.																								
A1.4 Start execution og the implementation route for each component of the masterplan.																								
Stage 2. Formalization of governance structure and processes																								
A2.1 Formally establish the governance structure and process with final adjustments if needed securing alignment with the strategic goals.																								
A2.2 Formalization of decision-making process in strategic, market and operational aspects, and design of internal policies of process.																								
A2.3 Create formal and recurrent participatory mechanisms within internal processes to engage civil society.																								
Stage 3. Follow on legal strategy and physycal-spacial design																								
A3.1 Implement legal strategy: due dilligence and consolidation of the legal personality/entity of the hub.																								
A3.2 Determine physical & technological needs for the operations of the hub's office.																								
A3.3. Follow the physical-special design with all partners (urbanization scope).																								
A3.4. Contemplate in the physical-spatial design the spaces to engage with civil society																								
Stage 4. Office estabishment																								
A4.1 Start with construction and procurement processess of equipment for the hub's office.																								
A4.2 Equip hubs' facilities with the equipment and technological resources necessary for the interaction with civil society.																								
A4.3 Hire key positions for main departments to start with the operations of the Hub.																								
A4.4 Define and kick off departments' short-term activities.																								
Stage 5. Start of operations of the hub																								
A5.1 Prepare and launch the hub through marketing, communications and commercial activities to promote hubs' services and business development.																								
A5.2 Start of operations and launch of services of the HIDS.																								
A5.3 Design of next stages of implementation of the hub for the medium and long term according to the strategic goals.																								
A5.4 Start processes to engage the participation of civil society within the hubs' activities and services.																								

4.2 KPI's that contribute to the sustainability and success of the HIDS

In line with the vision, mission and values of the hub, and with the very end to guarantee the alignment with the Sustainable Development Goals (SDGs), here are some indicators within the global indicator framework for the SDGs and targets of the 2030 Agenda for Sustainable Development. The framework includes 231 indicators that are annually reviewed and updated.

Among the SDGs that are aligned with the strategic objectives mentioned above (see 2.4 Strategic goals), this section only addresses those that are considered the most relevant to contribute to the sustainability and success of the HIDS. The rest of the SDGs indicators can be found in Annex C.

Table 2. SDG Indicators that contribute to the sustainability and success of the HIDS.

Goals and targets **(from the 2030 Agenda for Sustainable Development)**	**Indicators** **(How it is measured by the 2030 Agenda)**	**Strategic goals alignment**	**How HIDS promotes the reach of the goal**
Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all			
8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labor-intensive sectors	8.2.1 Annual growth rate of real GDP per employed person	5,6,7,8,9	Through the offered services and activities of the hub.
8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavor to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead	8.4.1 Material footprint, material footprint per capita, and material footprint per GDP 8.4.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP	2,4	Through the efficient use of resources of the hub.
8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all	8.10.1 (a) Number of commercial bank branches per 100,000 adults and (b) number of automated teller machines (ATMs) per 100,000 adults 8.10.2 Proportion of adults (15 years and older) with an account at a bank or other	8	Through the offered services and activities of the hub

	financial institution or with a mobile-money-service provider		
Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation			
9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	9.1.1 Proportion of the rural population who live within 2 km of an all-season road 9.1.2 Passenger and freight volumes, by mode of transport	5, 6, 7, 8, 9	Through the development of the region by attracting investment.
9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending	9.5.1 Research and development expenditure as a proportion of GDP 9.5.2 Researchers (in full-time equivalent) per million inhabitants	5,6,8,9	Through the offered services and activities of the hub.
9.b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities	9.b.1 Proportion of medium and high-tech industry value added in total value added	5,6,8,9	Through the offered services and activities of the hub.
Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable			
11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries	11.3.1 Ratio of land consumption rate to population growth rate 11.3.2 Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically	3, 4, 5	Through the urban planning scope of the HIDS and the offered services and activities.
11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	11.6.1 Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste	3, 4, 5	Through the urban planning scope of the HIDS and the offered services and

	generated, by cities 11.6.2 Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)		activities.
11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning	11.a.1 Number of countries that have national urban policies or regional development plans that (a) respond to population dynamics; (b) ensure balanced territorial development; and (c) increase local fiscal space	3, 4, 5	Through the urban planning scope of the HIDS and the offered services and activities.

Chapter 5

Financial Plan

5. Financial Plan

A financial plan with two different scenarios for costs and revenues streams in the short and medium term of 5 years have been developed based on HIDS governance, services, and activities proposed. Assumptions that served as basis are explained below, and the Excel calculation sheet is available for further consultations and use. A Start up period of 4 months (Y0) is considered to launch year-based activities.

5.1.1 Start-up *(Operational) Cost*

Assumption considered for the startup OPEX cost is the hiring of the 8 main roles to launch activities of the hub's office in 4 months, a part of renting an office space and buying all equipment needed. Staff weighted average monthly salary, including taxes and benefits, is assumed to be of USD $3,500. It is a conservative salary for the highest position, but if a senior level is expected, it is recommended to add incentives on sales and include extra income as a direct cost of sales. Marketing, communication & advertising activities shall start one month later and have relevant one-time costs. These activities are focused on launching and promoting hub's services and business development. The estimations take into account: design of banners, videos, newsletters, and a small social media and emailing campaign.

Cost Item	*Months*	*Cost (USD) /Month*	*Units*	*One-Time Cost (USD)*	*TOTAL COST (USD)*
Marketing, Comms & Advertising	3	$ 200	1	$ 2,000	$ 2,600
Staff Salaries (incl. taxes and benefits)	4	$ 3,500	8	-	$ 112,000
Rent / Lease / Utilities	4	$ 4,000	1	$ 2,800	$ 18,800
Other operational costs (i.e., office material, software)	4	$ 20	8	$ 1,000	$ 1,640
TOTAL					**$ 135,040**

5.1.2 Start-up Capital Expenditure

The identified capEx for start-up is mainly equipment and furniture for the hired staff to launch the office activities. It is possible that HIDS itself would like to invest in the construction of own buildings and infrastructure. Therefore, these costs are indicated, but no further information is available to estimate investment costs.

Cost Item	*Units*	*Cost/Unit*	*TOTAL COST*
Equipment (office)			
Computer hardware, laptops, desktop computers	8	$ 1,450	$ 11,600
servers, and peripherals	1	$ 1,800	$ 1,800
furniture	1	$ 5,000	$ 5,000
Construction (new buildings, laboratories, office spaces, etc.)			
Infrastructure (construction of public services)			
TOTAL			**$ 18,400**

5.1.3 Profit and Loss Statement

Two scenarios have been constructed taking into account three main incomes: sell of services, members quotas and external financing. Even these 3 incomes are in both cases part of the balance of the financial plan, the scenarios differentiate their performance.

Scenario 1: Strong sell of services

First scenario assumes a strong strategy on selling the 5 types of services and success on growing those sales. This scenario is conservative on members quotas, but also assumes a growth every year. The forecast is also conservative on grants receive as external finance, use first to sustain the launch and first operation to the hub and decrease till economic self-sustain.

- Sales 30% annually growth from Y1 baseline.
- Members' quotas revenue baseline 20,000 USD and 20% annual growth rate.
- Grants received start estimation of 153,440 USD and decreasing till the hub's office is economically sustainable by its own operations in Y4.
- The fix staff team will grow in 2 or 3 persons per year since Y0 (8 main roles) to complete a team of 19 in Y5.
- Other specific human resources to deliver services should be accounted as Direct Cost of Service Sold.
- Direct Cost of Service Sold is estimated to be in total 80% of the sale.
- Capex costs considers the additional equipment and furniture of the new hired staff.

These assumptions result and economic sustainability in Y4 and a net income at the end in Y5 of 279,834 USD, which can be used to invest in own project, offices, or more specialized own equipment.

REVENUES		*Y0*	*Y1*	*Y2*	*Y3*	*Y4*	*Y5*
	Estimated Services Sales						
	Technology and innovation: transference, diffusion and validation	$0	$20,000	$26,000	$33,800	$43,940	$57,122
	Training and entrepreneurship	$0	$100,000	$130,000	$169,000	$219,700	$285,610
	Scientific dissemination, exploitation and collaboration promotion	$0	$60,000	$78,000	$101,400	$131,820	$171,366
	Prospection of investments & financial resources	$0	$50,000	$65,000	$84,500	$109,850	$142,805
	Institutional relations and community engagement	$0	$40,000	$52,000	$67,600	$87,880	$114,244
	Net Sales	$0	$270,000	$351,000	$456,300	$593,190	$771,147
	Direct Cost of Services Sold (80%)	$0	($216,000)	($280,800)	($365,040)	($474,552)	($616,918)
	Gross Profit from Sales	$0	$54,000	$70,200	$91,260	$118,638	$154,229
	Members' quotas	$0	$20,000	$24,000	$28,800	$34,560	$41,472
	Financing	$0	$0	$0	$0	$0	$0
	Grants	$153,440	$91,000	$70,000	$16,000	$0	$0
	Total Income	**$153,440**	**$489,000**	**$585,400**	**$683,620**	**$865,026**	**$1,121,078**
Operational Expenses							
	Advertising, Comms & Marketing	$2,600	$2,400	$2,400	$2,400	$4,200	$4,800
	Staff Salaries (inc. taxes and benefits)	$112,000	$420,000	$504,000	$588,000	$672,000	$798,000

	Rent / Lease / Utilities	$18,800	$60,000	$72,000	$84,000	$96,000	$114,000
	Other operational costs (e.i. office material, software)	$1,640	$2,400	$2,880	$3,360	$3,840	$4,560
Capital Expenditures							
	Equipment (office)						
	Computer hardware, laptops, desktop computers	$11,600	$2,900	$2,900	$2,900	$2,900	$4,350
	servers, and peripherals	$1,800	$0	$0	$1,800	$0	$1,800
	furniture	$5,000	$1,000	$1,000	$1,000	$500	$0
	Total Cost	**$153,440**	**$488,700**	**$585,180**	**$683,460**	**$779,440**	**$927,510**
Balance							
	Net Income	**$0**	**$300**	**$520**	**$680**	**$86,266**	**$279,834**

Scenario 2: Strong external finance capture (grants)

Second scenario expects a strong strategy and success on capturing external finance in the form of grant agreements. This scenario is conservative in sale of services with lower initial estimations and a constant annually growth of only 15%, as for the members quotas. Grants receive start in an estimation of 153,440 USD, as in scenario 1, but increasing every year to sustain costs and deployment of services.

Other important assumptions:

- Sales 15% annually growth from Y1 baseline.
- Members' quotas revenue baseline 10,000 USD and 15% annual growth rate.
- Grants received start estimation of 290,000 USD annually and increase every year to sustain operations up to 580,000 USD in Y5.
- The fix staff team will grow in 2 or 3 persons per year since Y0 (8 main roles) to complete a team of 19 in Y5, with a weighted average monthly income of USD 3,500. This is the biggest fix cost of the operations of the hub and should be cut or make a direct cost of sales if grants are not accessed.
- Other non-fix specific human resources to deliver services should be accounted as Direct Cost of Service Sold.
- Direct Cost of Service Sold is estimated to be in total 80% of the sale.
- Capex costs considers the additional equipment and furniture of the new hired staff, so it remains conservative.

These assumptions result in a strong dependence of external financing and do not reach economic sustainability in the mid-term of 5 years.

REVENUES		*Y0*	*Y1*	*Y2*	*Y3*	*Y4*	*Y5*
	Estimated Services Sales						
	Technology and innovation: transference, diffusion and validation	$0	$10,000	$11,500	$13,225	$15,209	$17,490
	Training and entrepreneurship	$0	$50,000	$57,500	$66,125	$76,044	$87,450
	Scientific dissemination, exploitation and collaboration promotion	$0	$30,000	$34,500	$39,675	$45,626	$52,470
	Prospection of investments & financial resources	$0	$25,000	$28,750	$33,063	$38,022	$43,725
	Institutional relations and community engagement	$0	$20,000	$23,000	$26,450	$30,418	$34,980
	Net Sales	$0	$135,000	$155,250	$178,538	$205,318	$236,116
	Direct Cost of Services Sold (80%)	$0	($108,000)	($124,200)	($142,830)	($164,255)	($188,893)
	Gross Profit from Sales	$0	$27,000	$31,050	$35,708	$41,064	$47,223
	Members' quotas	$0	$10,000	$11,500	$13,225	$15,209	$17,490
	Financing						
	Grants	$153,440	$290,000	$356,000	$420,000	$477,000	$580,000
	Total Income	**$153,440**	**$489,000**	**$584,850**	**$683,178**	**$779,654**	**$928,052**
Operational Expenses							

	Advertising, Comms & Marketing	$2,600	$2,400	$2,400	$2,400	$4,200	$4,800
	Staff Salaries (inc. taxes and benefits)	$112,000	$420,000	$504,000	$588,000	$672,000	$798,000
	Rent / Lease / Utilities	$18,800	$60,000	$72,000	$84,000	$96,000	$114,000
	Other operational costs (e.i. office material, software)	$1,640	$2,400	$2,880	$3,360	$3,840	$4,560
Capital Expenditures							
	Equipment (office)						
	Computer hardware, laptops, desktop computers	$11,600	$2,900	$2,900	$2,900	$2,900	$4,350
	servers, and peripherals	$1,800	$0	$0	$1,800	$0	$1,800
	furniture	$5,000	$1,000	$800	$700	$500	$500
	Total Cost	**$153,440**	**$488,700**	**$584,980**	**$683,160**	**$779,440**	**$928,010**
Balance							
	Net Income	**$0**	**$300**	**$170**	**$188**	**$402**	**$444**

5.1.4 External Financing

The short and mid-term financial plan to launch the hub's office and activities estimates the need of external finance in the form of Grants, because the legal model and entity need to be formally established and revenues from sales or quotas constantly active to obtain other type of financing mechanisms, such as loans, sustainable bonds, etc. Even though, partners can use this market mechanisms to finance HIDS physical-spatial design, components, equipment, etc. On a long run (>5y operations) and depending on the legal form the hub could explore further financing opportunities in the market.

As grants are the most relevant mechanism to start up, the following aspects are recommended:

International Public Funding, multilateral development banks and bilateral aid agencies are ideal to co-fund the hub establishment and launch of specific activities. It is common to have mixed sources for this kind of purposes, so the hub should not be limited to bid to different opportunities mapped in the Funding Sources topic (3.5.2). Best matches or most suitable/potential sources are:

- The Brazil Prosperity Fund[121] is a five-year programme (from April 2018 to March 2023) funded by the UK Government. This £56 million programme aims to support Brazil's economic openness and sustainable infrastructure, leading to increased productivity to facilitate increased income, sustainable jobs and poverty reduction. The secondary objective is to integrate use of innovative technologies by Brazilian firms and open new markets, leading to opportunities for UK and international businesses. It is divided into 4 different strands: trade (£16 million), green finance (£5 million), energy (£25 million) and future cities (£10 million). This last strand is the most potential to support HIDS development.
- The Global Future Cities Programme[122] in Latin America (facilitated by UN HABITAT, IADB (IFD/CTI)) carries out technical assistance on urban planning, transport and resilience to encourage sustainable development and to alleviate poverty through strategic and capacity building partners such as UN HABITAT, UKBEAG, and with Ernst and Young (EY) as delivery partner in Brazil. An implementation phase has ended but it is recommended to engage for next phase and selection of cities. No estimation of funding is available but its important to mention that it is a technical assistance not capital investment source.

[121] https://www.gov.uk/government/publications/brazil-prosperity-fund-annual-review-2020
[122] https://www.globalfuturecities.org/partners

- The IADB's estimated financing in the strategy with Brazil 2019-2022[123] projects an annual average of US$1.8 billion in approvals and annual disbursements of US$1.75 billion. It has the objective to promote sustainable growth and construction of an effective public sector. The more relevant priority areas for HIDS are sustainable infrastructure to improve competences; and two cross-topics: environment and climate change, and innovation and digital transformation. It is important to mention this can be a capital investment source for HIDS's masterplan.
    - Within the sovereign guaranteed the current pipeline of total funding for the subsector of R&D and innovation[124] reaches US $109 million, while US $3.3 M for the same sector in their non-sovereign guaranteed active portfolio.
    - Environment and natural disasters[125]: Labeled for the sector of environment and natural disasters, at the current investment portfolio of projects in Brazil, US$162 M are contemplated for projects in implementation and US $22 M for projects in preparation.
- World Bank in Brazil[126] (specially for activities related to water, digitalization, among other topics). The Country partnership framework for the period 2017 to 2023[127] of the World Bank Group, is built around three focus areas: (i) fiscal consolidation and government effectiveness (US $1.9 B; for Sao Paulo US 46.3 M); (ii) private sector investment and productivity (US $229 M; for Sao Paulo US $703.7 K); and (iii) equitable and sustainable development (US $2.5 B; for Sao Paulo US $355.7 M). The last focus area has an objective: Inclusive and Sustainable Urban Services[128] Additionally, the IFC[129] alone has financed about US$3.34 billion in investments and leveraged additional private sector financing, through equity and debt, of about US$638.76 million. Identified as a potential source for urban services and private companies (members of HIDS).

Private External Investors might be seen more as potential clients of services and projects, but in an instance, if angles investors want to be donors of the hub's activities, this revenue should consider as grants in the balance. It is also important to maintain activities to "pitch" initiatives to venture capital and angel investors mapped and during events such as Innovation4Climate to potentially receive donations, awards and other type of grant funding, before the hub have "bankable" or commercial projects to access market financial products and mechanisms.

[123] https://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=EZSHARE-750030607-13
[124] https://www.iadb.org/en/sector/science-and-technology/overview
[125] https://www.iadb.org/en/projects-search?country=BR&sector=PA&status=Implementation&query=
[126] https://www.worldbank.org/en/news/feature/2020/10/29/working-together-for-a-water-secure-brazil#partnerships
[127] https://brasilaberto.worldbank.org/pt/portfolio
[128] https://brasilaberto.worldbank.org/pt/indicators
[129] https://brasilaberto.worldbank.org/leveraging-finance

Private investment estimations depend mainly on the available products on the market, companies' circumstances, and the negotiation terms, only estimates can be calculated from the investment projects in portfolio. Depending on the investment projects HIDS promotes in the future, this type of source and actors mapped can be contacted to pitch. Some monetary examples: in 2021 MOV Investimentos[130] achieved an investment per company of approximately US $384 B. Trilinc Global[131] has reached an investment of US $15 M per company across Latin-American countries. Vox Capital[132], has invested approximately US $1 M per company in venture capital and US $345 K in credit funds. Taking this as example, the range of investment is wide open and varies according to different factors.

[130]https://movinvestimentos.com.br/wp-content/uploads/2021/11/MOV_RelatoriodeImpacto2021_vfinal-1.pdf
[131] https://www.trilincglobal.com/impact/our-philosophy/
[132] https://en.voxcapital.com.br/venturecapital

6. Annex A. Surveys and Interactions

With the objective of aligning the strategic framework proposed in the Final Report, several interactions with stakeholders related to the development of HIDS took place. Data already collected by previous consultations were also used, in order to incorporate the work carried out in the scope of the project.

To this end, such actions and sources of information will be listed in this document, which will also present the main results of the demand survey, which sought to interact with companies in the innovation ecosystem of Campinas to better understand what their perspectives and expectations were regarding the development of HIDS.

Among the previously generated data sources, the following should be highlighted:

- The consultation with the members of the Founding Advisory Board carried out in December 2020 by the company Inventta which is in charge of the governance work component. This consultation evaluated their perspectives on the following topics: Vision; Image of the future; Value Proposition; and Assets and Capabilities.

Stakeholder	Vision	Image of the future	Value proposition	Assets and capabilities
SÃO PAULO GOVERNO DO ESTADO	Centre of excellence in sustainability	Sustainable economic development model Open architecture model	Attracting investment from international funds Intersection between sustainability and technology Waste processing projects Bionanotechnology	Management model Political representation

	New relationship model in search of sustainability District that replicates a city 15 minutes city	Must not be a real-state model Must be occupied by people living in the area Smart City	Ecosystem engagement Design and experimentation of new business models Technologies aligned to the SDGs	Pilot projects for smart city Electric mobility Digital agriculture Blockchain IoT
	To work in search of innovative solutions for society's major challenges To be a HUB that articulates and coordinates actions among institutions with competences for sustainable development	Smart City A showcase model to promote Campinas as a "city of knowledge and innovation	Leverage for regional development Strengthen Campinas assets and capacities for the 2030 Agenda Environment for new form of urbanization - Smart Cities Attraction of investments for regional development Strengthening of the ecosystem	Technical knowledge of legislation Strategic and political articulation Actions for financial viability Human Resources Knowledge of city management

UNICAMP	To contribute to sustainable development, aggregating national and international efforts to produce knowledge, innovative technologies and education for future generations, mitigating and overcoming the social, economic and environmental fragilities of contemporary society	Model of integration nature/urbanism Ideal place for technological development within the culture of sustainable development	Fostering institutional synergies Living laboratories within the SDGs themes Choose one/two that "dialogue" with the Brazilian GDP Be a city and state management tool with Public/Private integration	To provide and integrate its human resources into the HIDS Attracting and working with the interested international community
PUC CAMPINAS	Free knowledge zone	World reference in solutions for society Known throughout society in the region Open system Present society	Tax exemption Connection between institutions' assets Connection with the MRC Rescuing Campinas' attention and self-esteem	Law and legal model Architecture Human resources

FACAMP	Innovative in public management	Ensuring the right to mobility Better teaching technologies Cannot be limited to current stakeholders Cannot be an ivory tower	New models in mobility New teaching technologies Living lab Disseminating technologies	Communication, advertising and marketing Law and legal model International relations Energy
ELDORADO INSPIRAÇÃO PELO NOVO	Innovation cluster	Business Generator Resource catalyst Start-up generator	Generate business Articulate ecosystem assets and agents Fill gaps in the ecosystem Attracting investments	Microelectronics Information and Communication Technology Resource Management for HIDS
CNPEM	A planned city	Inspired by innovative and sustainable cities Brazilian Silicon Valley Focus on biotechnology	Going CO2 neutral Living labs Aggregator of companies and research institutions Attraction and generation of start-ups	Unique biotechnology equipment Construction of living labs

Embrapa	Sustainable development model district	People-centered Public, private, people and partners (4P's)	Urban Farming Real life environments Social innovation	Digital farming Urban farms Blockchain IoT Artificial Intelligence
TRB Pharma Indústria Química e Farmacêutica Ltda	Enabler of the relationship between university and private sector	Fears that rules will impede today's activities	Expanding the relationship capacity of the HIDS agents Flexibility in the generation of patents	Health and medicines
CARIBA Empreendimentos	Expanded GlobalTech vision (with more resources, equipment, activities, infrastructure)	Viable, profitable and self-sustaining	Concentrating equipment, resources and activities in the same region	Land situation management Property issues
Cargill	Nourishing the world in a safe, sustainable and responsible way	Pole of sustainable technology development World reference	Development Indicators in Brazil Talent pool	Experience in the food and agribusiness area

	A smart and sustainable city model City of the future	Access to the entire population in a democratic, inclusive way Inspiration for new generations	Integration among actors Capacity building and talents	Electric energy Renewable sources

- The HIDS' development priorities from the perspective of the academic community at Unicamp, which were gathered in the survey carried out in 2019 by the Executive Board of Integrated Planning at Unicamp (DEPI). As a result of the consultation, it was possible to verify that for the Unicamp community, among the 17 SDGs are prioritized: Quality education; Clean and affordable energy; Sustainable cities and communities; Clean water and sanitation; Responsible consumption and production. The themes considered most relevant for the creation of living laboratories at HIDS were identified as: Environmental conservation and preservation; Energy; and sustainable urbanism.

Among the interactions promoted with stakeholders involved in the development of HIDS, the following can be highlighted:

- Periodic meetings with the HIDS work team.
- Bilateral meetings with representatives of the governance components, physical-spatial design and legal model.
- Meeting with the Founding Advisory Board of HIDS, in which the proposed strategic framework for collecting feedback was presented. On the occasion, an online questionnaire was made available aimed at identifying demand for HIDS services, business opportunities and synergies between the institutions present.
- Development of two workshops, which are aimed at developing the HIDS vision and its strategic framework.

Finally, a survey was carried out specifically aimed at analyzing the demand of innovative companies in the innovation ecosystem of Campinas regarding the services to be offered by HIDS, in order to validate them. From January 24th to February 7th, 2022, 21 interviews were carried out through telephone calls and online questionnaires.
Among the main results, the following can be listed:

- Of the 21 companies participating in the survey, 18 identify themselves as startups, 2 as medium or large companies, and 1 as an accelerator/incubator.

- 71.4% of companies declared that they were not aware of the existence of HIDS before the survey, while 28.6% were already aware of HIDS.
- Among the participating companies, when asked about the relevance of holistic sustainability (environmental, social, economic) for the development of the activities of their organizations, 9.5% declared it to be very low, 14.3% average, 19% high, and 57.1% very relevant.
- Regarding access to techniques, knowledge and skills related to holistic sustainability, 52.4% believe they are well supported, while 47.6% believe they need more support.

The companies participating in the survey considered the following HIDS services to be highly relevant for the performance of their activities:

Training, qualification and requalification: 81%
Events and networking: 81%
Technical advice and consultancy: 76.2%
Strategic and future planning: 76.2%
Support for fundraising: 71.4%
Technology and knowledge transfer: 61.9%
Validation and technological demonstration: 61.9%
Production of analytical knowledge: 61.9%
Creation of spaces for innovative entrepreneurship: 57.1%
Incubation and acceleration: 33.3%

- 100% of the companies declared that HIDS is a possible partner, which can help to expand their businesses and improve them in terms of sustainable development concepts. None of the companies defined HIDS as a possible competitor, or identified that its activities could be harmful to their business.

When asked about what would be the main contributions of HIDS towards the development of new innovative companies, it was possible to highlight the following answers:

- If the Hub manages to offer all these activities, it will be a great opportunity to support and support companies that seek to develop increasingly towards sustainability.
- Everything that contributes to organization, training and management, helps those who are mainly starting out, as many mistakes are made and the HUB will be able to give greater direction.
- It is a necessary incentive for cities that have social problems, as in Campinas that have a problem with low access to information by a large portion of the local population.
- Raise the level of companies, with competitiveness in the market in a very short period of time, integrating all important aspects in the current scenario.
- If the HUB provides laboratories, it is much more competitive than the company having to acquire the specific infrastructure for testing.

- Organically leverage the startups that HIDS supports. A way to put startup ideas and projects into practice.
- Build an ecosystem around the theme of sustainability/ESG, fundamental for the success of new companies' businesses.
- Bringing people together through knowledge, bringing new perspectives and innovation.
- Visibility for prospecting customers and obtaining investments.
- HIDS has great potential for adding value to businesses, far beyond academic and educational bias. It is this innovation bias, in the strictu sensu, that HIDS needs - to support the journey of innovation from idea to market.

Such interactions and data analysis allowed the development of knowledge able to mature the strategic perspectives of the HUB, being crucial to validate the propositions present during the development of the products of this consultancy, identify partnerships and emerging synergies in relation to its activities and the actors of the innovation ecosystem of Campinas, as well as areas of specialization aligned with the capacities of the actors involved in HIDS and the demands of the local society.

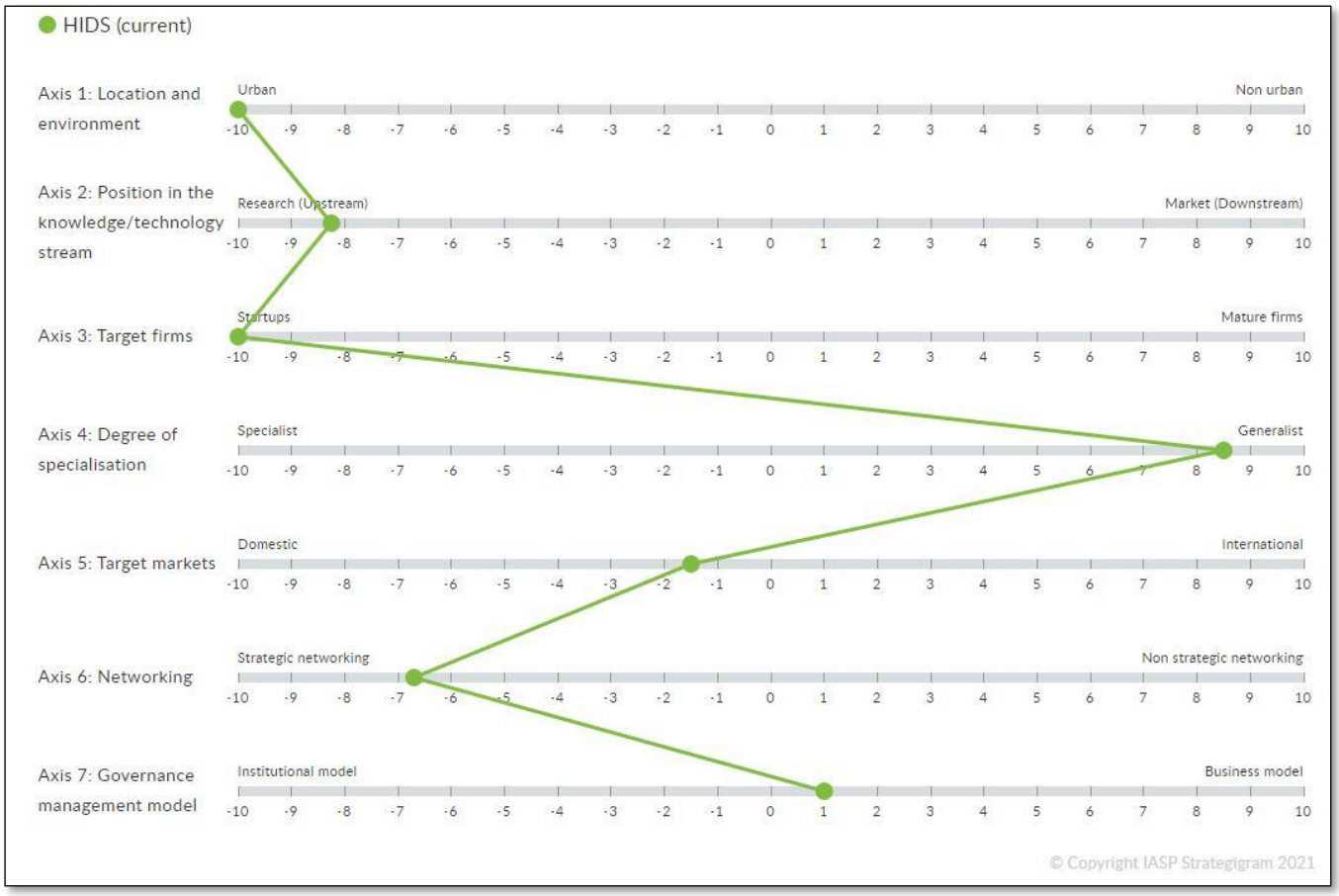
7. Annex B. Benchmarking Report

The HIDS team was asked to complete the Strategigram as an exercise to gain a much deeper understanding of what Innovation Spaces (IS) of different kinds are really about and what the main issues and problems are that the IS management has to deal with, increasing their knowledge about such projects in general, as well as HIDS particular case.

Although the Strategigram was initially conceived as an instrument for operational organizations, it has proven to be useful for IS modelling, since it offers a methodology that systematically covers the main strategic ingredients that cannot be omitted when planning a new Innovation Space.

The Strategigram that we present in this report belongs to a project, it is therefore a simulation carried out by the HIDS representatives considering how they think HIDS will be in their first stage, within the first 5 years of life.

Since HIDS is currently in a projection phase it is not possible to carry out a benchmarking exercise as such. However, we have carried out a comparison to analyse whether the hub that is being designed is in line with the main global trends worldwide and also to offer some good practices from which HIDS can learn.



7.1 International Benchmarking: Global Trends

Being the largest networks of Science and Technology Parks and Areas of Innovation in the world and the only one with a real global reach, IASP is in a unique position to observe the different models and strategies and the evolution that these have undergone since the history of IS begun some seventy years ago.

IASP has always carried out an intensive knowledge management activity, understanding that knowledge about the IS industry is one of the most valuable assets that can offer its members.

One of the results that such continuous knowledge management activity has yielded is a software-based tool developed by IASP and called Strategigram. That enables our members to rigorously analyse the strategic model, establish educated comparisons among them and also see the evolution of the main strategic components of IS.

Using this tool, we present now the strategic trends that can be observed in our industry worldwide, which can be graphically represented as follows:

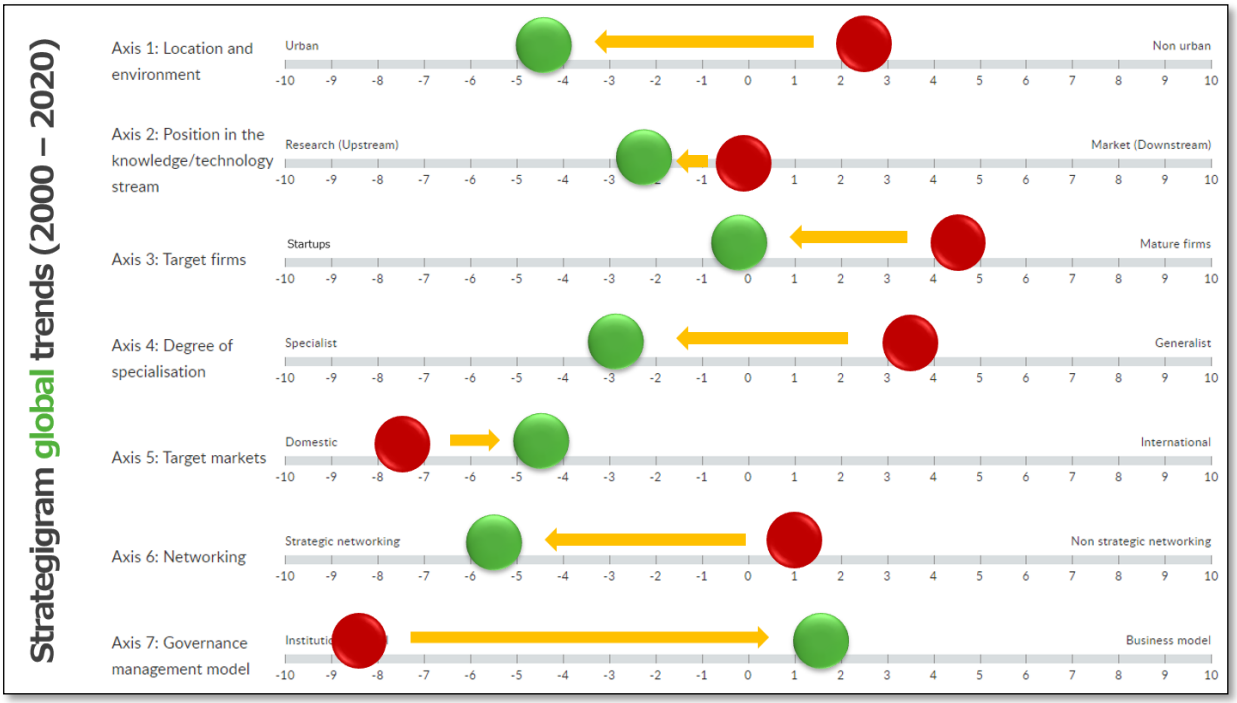


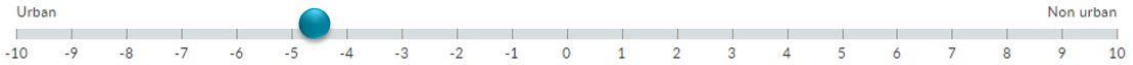
Chart 1- Strategigram global trends (2000-2020). Source: IASP – Strategigram

In the above graphic the red balls indicate the average position globally of IS on each given axis, 20-25 years ago. The green ball indicates the average position of IS today.

It is important to realize that the path of these evolutions has varied from region to region. In some cases, it has been quite swift while in others the change of strategic priorities has been rather slow. Also, even within the same region the changes observed in some of the seven axes here reflected occurred faster than in others. The graphic represents the average position of parks 15-20 years ago and the current average position. By average we naturally mean that the biggest number of parks are accumulated in the positions indicated by the balls, but of course

you can find examples spread all throughout the axes. The above Graphic illustrates this (Chart 1).

7.1.1 Axis 1: Location and environment



Global Trend

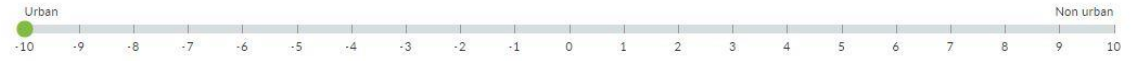
The original position in red was on the right side of the axes, as indeed the majority of parks were located outside cities, not far but definitely not downtown. There are a number of reasons for that phenomenon and we can mention two of them:

- A quite a few STPs then were intensively created by universities and very often located in the university land or campuses which also used to be outside the cities.
- The prices of land were more affordable in non-urban areas.

The graphic also shows a clear trend for parks to become more urban. This urbanization of STPs is happening in two ways:

- New parks are being created, more than before, inside the cities.
- For parks already outside the city, or new parks built outside the city, on one hand they used to be not in but quite near the city, and on the other hand, they are now introducing city elements within the park itself, in an effort to increase what we can call the “urban density” of the park. Elements such as residential areas or buildings, sports clubs, the organization of leisure and cultural activities, kindergartens, etc. are now the norm, and the idea is to inject “life” in the parks beyond the mere work-professional activities.

The rationale is that parks must be attractive not only for companies and organizations but also for people, for the entrepreneurs and the new creative class and highly qualified technicians.



HIDS

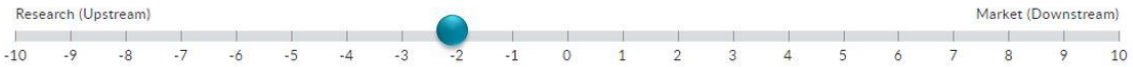
The position of HIDS that the Strategigram reveals is fully aligned with the current trends that can be observed in our industry. Innovation Spaces are continuously marching towards a greater integration with the city, and in this sense, we can say that HIDS is in the right direction, where the main public and private elements and mechanisms necessary for the creation and development of innovative companies will all cohabit, as well as being an attractive area to live in, which can facilitate the attraction of talent to the hub.

In principle it is foreseen that HIDS is to be located on an area belonging to the University, adjacent to the University itself. It is also being planned that there will be housing or residential zones specifically aimed at companies and their employees, as well as social and recreational areas and services such as restaurants, pubs, cafeterias, shops, social services, etc.

Organizations with similar positions in the axis

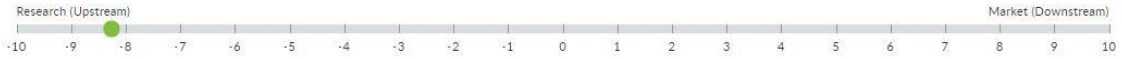
Organization	Country	Website	Axis position
Jeju Free International City Development Center	South Korea	http://www.jeju-sp.com/	-10
La Salle Technova Barcelona	Spain	http://technovabarcelona.org/en/	-10
Teknopark Istanbul	Turkey	www.teknoparkistanbul.com.tr/en	-10
Wista-Management GmbH Berlin Adlershof	Berlin	www.adlershof.de/en/	-10

7.1.2 Axis 2: Position in the knowledge/technology stream



Global trend

The changes of strategic approach in this axis are quite small yet perceptible. Parks have slightly moved towards up the upstream of the flow of technology of innovation, meaning that they want to make sure that their activities and services are also closer to universities and research institutions (whilst still remaining pretty close to companies and the market place) and by doing so they want to reinforce their role of privileged interlocutor with both academia and the businesses.



HIDS

The fact that one of the main promoters of HIDS is the university, UNICAMP, is evident in the intention to position HIDS to work intensively in the research stream. As HIDS may be located on university-owned land this makes the link even stronger, as well as the planned location of a University-Industry liaison office, the establishment of a large number of technology centers (20) and that most of the people foreseen to work in HIDS will be employed by those technology centers gives rise to this rather extreme position on the axis.

The role of universities and research centers is crucial to generate knowledge, as well as for the attraction of talent and therefore key to the success of an area of innovation focus on supporting the creation of new companies, start-ups/spinoffs. But the involvement of public administrations and the private sector is also important. The HIDS representatives foresee up to a 50% percentage of ownership of HIDS for companies/private investors.

Although the global trend is to be orientated towards research, the position of HIDS is much more extreme than that of most hubs in the world. While maintaining its “research vocation”, this

will probably change gradually over time to find a better balance that brings its objective closer to the market, working more intensively with companies.

Organizations with similar positions in the axis

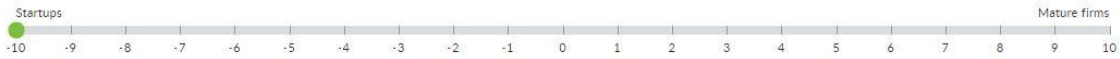
Organization	Country	Website	Axis position
BILKENT CYBERPARK	Turkey	https://cyberpark.com.tr	-7.75
Corporación Parque Tecnológico Sartenejas - PTS	Venezuela	http://www.pts.org.ve/	-8.25
Feevale Techpark	Brazil	http://www.feevaletechpark.com.br/	-7.5
Parque Tecnológico del Litoral Centro SAPEM	Argentina	http://www.ptlc.org.ar/	-8.25
Parque Tecnológico do Rio/UFRJ	Brazil	www.parque.ufrj.br/	-8.25
PUCPR Tecnoparque - Pontífica Universidade Católica do Paraná	Brazil	http://hotmilk.pucpr.br/	-7.75
Universidad Carlos III de Madrid	Spain	http://www.uc3m.es/	-7.75

7.1.3 Axis 3: Target firms

Global trend

A couple of decades ago parks were mainly concerned with attracting already existing firms whereas it has been increasingly clear that a greater attention is now paid to the development of startups. This means that STPs have increased their activities in business incubation, acceleration and mechanisms to stimulate entrepreneurial growth.

It is important to mention that this graphic reflects trends globally A breakdown of different regions of the world may offer a greater variety of positions, and for example, STPs in western Europe or North America will show a much greater attention to startups, with the green ball probably somewhere around the -5 or -6 position.



HIDS

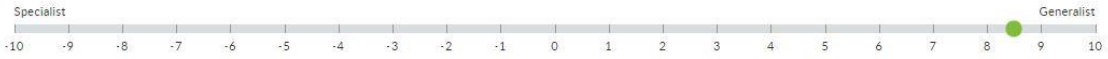
As mentioned above, the global trend in our industry is to favor the creation and establishment of startups. HIDS in this sense follows the global trend, although the extreme position in this axis implies a very strong focus on the development of startups. While a clear emphasis on supporting the creation of startups is a feasible and understandable strategy, we suggest that

you consider making sure that other potential users and beneficiaries of your project receive your attention, such us existing SMEs. If HIDS remains solely concentrated on fostering the creation of startups, you risk to "reduce" your project to a simple business incubator, which is an important element, but only one element of modern innovation spaces. Working with existing and more mature companies can often serve as anchor for the arrival of other companies and for the creation of new companies under its orbit. As HIDS gets established, this position will change over time and may move towards more central positions, although it will remain in the startup area on the axis.

Organizations with similar positions in the axis

Organization	Country	Website	Axis position
Administrative Committee of Zhongguancun Science City	China	http://www.zhsp.gov.cn/	-9.25
Kaunas Science and Technology Park	Lithuania	http://kaunomtp.lt/en	-9
Parque Científico Tecnológico de Gijón	Spain	https://innovacion.gijon.es/	-9.25

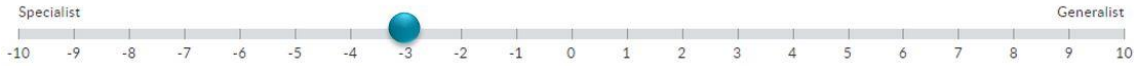
7.1.4 Axis 4: Degree of specialization



Global trend

A very clear trend is also visible in this axis and an ever-increasing number of STPs are using the strategy of specialization. Whilst we still see many STPs that will accept companies from any which technology sectors in their premises, as long as they show high innovation levels, more and more parks are choosing to specialize in a limited number of technology sectors.

This may be a good moment to say that this trend by no means claims to show the right way to go. It is a fact that in certain parts of the world having a generalist park, instead of a specialist one is in fact the right thing to do. What this graphic shows is what is currently happening in an increasing number of parks, and the graphic also seems to show an ongoing conversion of STP strategies, but also indicating clearly that different strategies are still in order.



HIDS

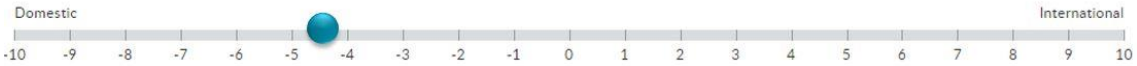
HIDS is positioned as a generalist area of innovation that welcomes companies from any technology sector, although it plans to have some of its facilities and/or infrastructures dedicated to specific sectors.

It doesn't follow the global trend, but as we have explained what the tool shows are facts and not value judgments on whether it is more convenient or not to take one path or another. However, HIDS is born with a vocation to be a sustainable development hub, which implies that it will adopt certain measures/policies to be created with parameters that make it a sustainable entity taking into account the United Nations Sustainable Development Goals (SDGs) and this could be seen as an opportunity to promote the development of companies working in sectors related to this topic. HIDS could be a living lab where they could develop and test their products/services. We believe that this axis should lead to reflection on whether it would be of importance to try to attract and/or create this type of specialized companies and how to attract them. This could be an important element to distinguish HIDS from other such entities, to eventually be positioned as a reference point. From a branding point of view, this would also be key, and would play a significant factor in attracting residents.

Organizations with similar positions in the axis

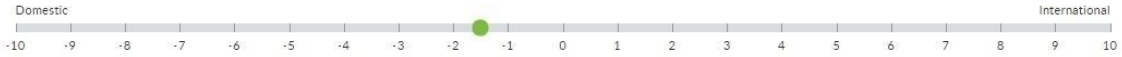
Organization	Country	Website	Axis position
CIUDAD DEL SABER	Panama	http://www.ciudaddelsaber.org	8
Kermanshah Science & Technology Park	Iran	http://www.kti.ir/	8.5
Khon Kaen University Science Park	Thailand	https://sciencepark.kku.ac.th	8.25
Knowledge Oasis Muscat	Oman	http://www.kom.om/	8.25
La Salle Technova Barcelona	Spain	http://technovabarcelona.org	8.5
Yasnobod Innovation Technopark	Uzbekistan	http://yait.uz/	9
ComoNExT SpA	Italy	http://www.comonext.it/	8.5

7.1.5 Axis 5: Target markets



Global trend

In axis 5 we detect an increasing concern of STPs of becoming more international, which not only is intended for doing a better job of attracting FDI, but also in knowing how to support the internationalization efforts of their companies.



HIDS

HIDS occupies a relatively central and somewhat eclectic position in this axis. It is quite normal that IS projects start with a bigger emphasis on the domestic market and begging to emphasize their international dimension as time goes by and the project reaches a high development.

In any case it is important to understand since day one that IS of whatever type can't do nowadays without a significant international component. Such component, by the way, should not be understood only as all those programmes and activities that aim to attract foreign companies and investments to HIDS. This is unfortunately a mistake that to many IS make. In such a globalized economy as ours, implementing programmes and activities to help our own domestic startups and SMEs to "go abroad", to expand and became international, to find partners, suppliers and clients in other countries is just as important to be truly and successfully international.

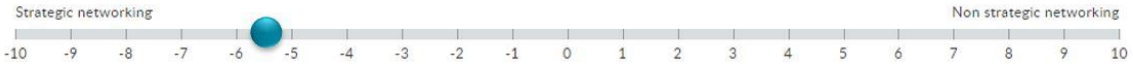
In this sense we seem to notice that on the one hand you state that one of your main goals will be to attract foreign companies, while at the same time you declare that startups are your main focus. We recommend that you make sure that both goals are coherent and fully compatible.

Organizations with similar positions in the axis

Organization	Country	Website	Axis position
Knowledge Oasis Muscat	Oman	http://www.kom.om/	-1.25
Parque Científico Tecnológico de Pando	Uruguay	http://www.pctp.org.uy/	-1.5
Parque Tecnológico São Leopoldo - TECNOSINOS	Brazil	http://www.tecnosinos.com.br/	-1.5
Parque de Innovación Tecnológica del Centro de Investigaciones Biológicas del Noroeste,	Mexico	https://www.cibnor.gob.mx/	-1.75
Stiftelsen Dalarna Science Park	Sweden	http://www.dalarnasciencepark.se/	-1.5
TEHNOPOL Tallinn Science Park	Estonia	https://www.tehnopol.ee	-2

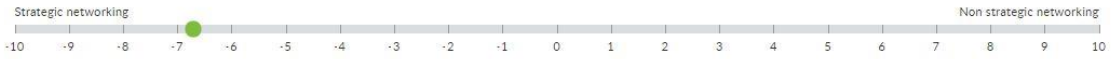
		/en/	
Wista-Management GmbH Berlin Adlershof	Germany	https://www.adlershof.de/en/	-1.5

7.1.6 Axis 6: Networking



Global trend

Understanding that networking activities is an essential part of the STP business, most parks have reinforced their efforts to be able to conduct a more professional networking activity which is becoming a major strategic element in their plans. Networking is being increasingly incorporated to their annual business plan, is receiving its own budget and parks try to secure that they have their right profiles in their staff to do smart and professional networking.



HIDS

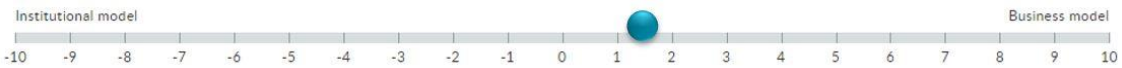
The position on the axis clearly reflects the importance that HIDS attaches to networking, as they plan to participate in different events and to organize events themselves to strengthen networking and cooperation among the institutions located in their area. Participation in formal networks that can serve as a platform to expand their contacts and to provide them with higher visibility is also in their plans.

In order to develop strategic networking, a key decision is to foresee a budget specifically dedicated to networking and to which a part of the overall budget will be allocated. HIDS plans to have such a budget and also to allocate more than 20% of the general budget to it, both facts reflecting the significant role networking will play. However, it should be noted that having a budget without having drafted an annual plan to reach a series of specific objectives can be a waste of resources that unfortunately does not produce the desired results and does not serve to carry out correct networking work. Therefore, it is recommended to take this aspect into account. Also, participation in formal networks can shorten the learning curve and serve as a very important guide/accompaniment in the early stages of development.

Organizations with similar positions in the axis

Organization	Country	Website	Axis position
Ideon Science Park	Sweden	http://www.ideon.se/	-6.75
Linköping Science Park	Sweden	http://www.linkopingsciencepark.se/	-7
Luleå Science Park	Sweden	www.luleasciencepark.se/	-7
Mazandaran Science & Technology Park	Iran	http://www.mstp.ir/	-6.75
Mersin Technology Development Zone	Turkey	www.technoscope.com.tr/	-6.75
NETPark	UK	http://www.northeasttechnologypark.com/	-7.5
PUCPR Tecnoparque - Pontífica Universidade Católica do Paraná	Brazil	http://hotmilk.pucpr.br/	-6.5
Shanghai Hi-Tech Park United Development Co., Ltd.		http://www.caohejing.com/	-6.85
TEHNOPOL Tallinn Science Park	Estonia	https://www.tehnopol.ee/	-6.75
Turku Science Park Ltd	Finland	urkubusinessregion.com/en	-7.5
Wroclawski Park Technologiczny	Poland	www.technologpark.pl/	-6.75

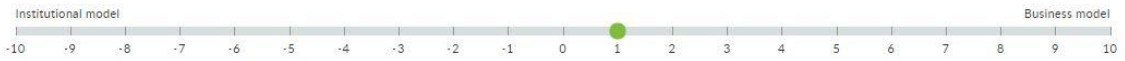
7.1.7 Axis 7: Governance and management model



Global trend

On this axis we see the biggest strategic change. While STPs remain projects that are mostly created and founded by public money and public administrations, the presence of “the private” has largely increased, and it has been done in two ways. Firstly, and obviously, the private sector is investing money in creating and developing STPs and similar projects. In some cases, they do it from scratch and in many others, they invest in already existing STPs. In this last case the most typical way is via PPP schemes. But, as mentioned before, it is the private money that is now getting involved in our industry, also in the governance of the parks: the composition of the board of directors of STPs, or equivalent bodies, the profile of the CEOs of parks, the type of staffing, and the legal forms that the company that manages the parks are adopting clearly indicates an approximation to the private market management styles.

The idea behind these tactics is to have public owned parks (whether owned by governance agencies or by public universities) being able to operate without the burden of the public procurement restrictions and more according to the agility that international markets require, yet remaining public in nature and main goals.



HIDS

In line with the worldwide trend, HIDS shows a well-balanced position between the institutional and the business model that which could perhaps lead to the HIDS being set up with a public private partnership model. This model is often used to build projects from scratch where no previous infrastructures or operations exist. In the majority of cases, it would be the public party that holds a majority share of the project. The parties agree on the governance model, the management, the main strategy, mission and other important aspects that need to be decided upon before starting. Regardless of the “ownership distribution”, of whether one of the parties is dominant or not, the most significant feature of this model is that the partnership is formed before launching the project (or in its very early stages), and all the parties in the partnership will jointly define the mission, goals and strategy of the project. Typically, the parties involved would create an intermediary organization in charge of owning, building and managing the project. This model has been adopted by some of the innovation areas that will be presented in the following section, such as Ann Arbor SPARK and Here East.

Organizations with similar positions in the axis

Organization	Country	Website	Axis position
Luoyang National University Science Park	China	http://www.lyusp.com/	1.5
Minsk City Technopark	Belarus	http://mgtp.by/	0.75
PIIT Parque de Investigación e Innovación Tecnológica	Mexico	https://piit.com.mx/en/index.php	0.75
Parque Científico Tecnológico de Pando	Uruguay	http://www.pctp.org.uy/	1.5
Parque Científico y Tecnológico de Bizkaia	Spain	https://parke.eus/	1
Parque de Innovación De La Salle A.C.	Mexico	http://www.parquedeinnovacion.org.mx/	1
Technoparc Montréal	Canada	https://www.technoparc.com/en/	1.25
Turku Science Park Ltd	Finland	https://turkubusinessregion.com/en	1
Wista-Management GmbH Berlin Adlershof	Germany	https://www.adlershof.de/en/	1.25

The following chart shows the distribution of STPs worldwide today. This chart has been created based on the data of 105 STPs using the Strategigram. The position of the parks on the different axes corroborates the trends displayed in the previous chart.

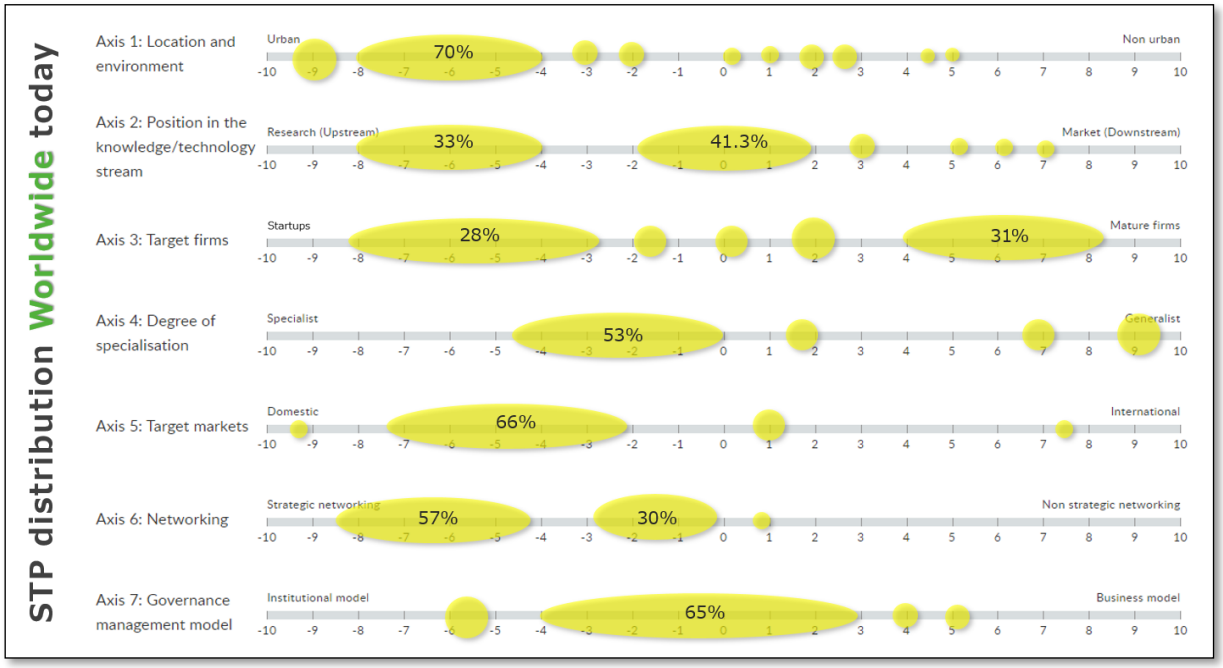


Chart 2- Strategigram STP distribution worldwide today (2020). Source: IASP – Strategigram

7.2 International Benchmarking: Best Practices – Areas of Innovation

In the middle of the 20 century the “science park” concept appeared and it quickly came a popular concept and became to be used and developed in an ever-increasing number of countries and regions. From the USA soon jump to Europe and then continue its expansion to Asia, Australia, Latin America and then Africa.

As it could be expected the use of this concept in an ever greater number of different socioeconomic contexts triggered a very reach evolution of the concept, and expressions such as technology park, research park, innovation hub, science city, knowledge city or area of innovation were soon coined to reflect projects that begin to present different features, even if they all maintained the same main common denominators, namely the goal of developing the knowledge economy, of supporting innovative and technology-based businesses, and strengthening the collaboration between universities and companies.

Based on the information that we have got so far HIDS will have features that are similar to those typically present in innovation spaces that are often known as areas of innovation or innovation hubs. Nevertheless, we recommend not to become obsessed with taxonomy and names, and rather focus on mission and elements necessary to fulfill that mission.

IASP official definition:

"Areas of innovation" are places designed and curated to attract entrepreneurial-minded people, skilled talent, knowledge-intensive businesses and investments, by developing and combining a set of infrastructural, institutional, scientific, technological, educational and social assets, together with value added services, thus enhancing sustainable economic development and prosperity with and for the community.

There are many different models of areas of innovation (also known by the acronym AOIs)– spanning from the broader city or region model with innovation activities in different locations within the area, to more place-specific projects like innovation districts, knowledge quarters, innovation hubs and the like. As a common feature they all have a management team tasked to execute a strategy conducive to growing innovation activity in the area.

This section presents six areas of innovation that we believe can serve as inspiration for HIDS, located in different parts of the world: Ann Arbor SPARK (USA), Here East (UK), Skolkovo (Russia), 22@Barcelona (Spain), RutaN (Colombia) and Porto Digital (Brazil).

In addition to the information presented below Josep Piqué, who was CEO of 22@Barcelona and was involved in the project since its inception, gave a presentation in which there was also time for discussion in order to give a more in-depth understanding of the concept of areas of innovation through the 22@Barcelona case study. 22@Barcelona, is recognized as a best practice worldwide and an example for many other areas of innovation that emerged later or

even at the same time on different latitudes, as was the case of Porto Digital, confirmed by former manager Francisco Saboya in some of his publications.

The information presented in this section has been extracted from the following sources:

- Information provided directly by Ann Arbor SPARK, Here East, Skolkovo and 22@Barcelona management team
- IASP website – members area – the information included has been directly provided by the four areas of innovation presented in the report.
- Promotional material.
- Interviews to Paul Krutko, Ann Arbor SPARK manager, Gavin Poole, CEO, and Mike Magan, COO of Here East-Plexal Innovation District within the study carried out in collaboration with the Joint Research Institute, EU for the publication *"Public-Private Partnerships for Science and Technology Parks"*
- *Application of the triple helix model in the revitalisation of cities: the case of Brazil.* Josep Miquel Pique and Francesc Miralles. Int. J. Knowledge-Based Development, Vol. 10, No. 1, 2019
- *Porto Digital: a model of implementing a technology park as a driver for economic development.* Emanoel Querette. IASP World Conference. The Research Triangle Park, NC, USA. 2009.
- *Areas of innovation in cities: the evolution of 22@Barcelona*. Miquel Pique and Francesc Miralles. Int. J. Knowledge-Based Development, Vol. 10, No. 1, 2019
- *Towards a more inclusive and sustainable 22@ within Poblenau.* Ajuntament da Barcelona. Fundació Barcelona Institute of Tecnology for the Habitat. 2019
- *22@Barcelona. 200-2015.* Report done by: Team INNOVA coordinated by Montserrat Pareja-EastawayResearch Group CRIT 'Creativity, Innovation and Urban transformation 'Faculty of Economics and BusinessUniversity of Barcelona Council of Business and Tourism of the Municipality of Barcelona.

7.2.1 PORTO DIGITAL

Country	Brazil
City	Recife
City's population	4,054,866 inhabitants
Website	www.portodigital.org
Year of creation	2000
Area	149 hectares
Main technology sectors	Creative industry ICT & Communications Computer Science and hardware Software Engineering Urban technologies
General manager	Business professional and academic
Number of companies	Over 300
Number of employees	8,500

Introduction

Known for its singular territory among other technological parks, the Porto Digital is one of the first urban parks and innovation environments in Brazil.

Porto Digital occupies a total area of 149 hectares in the state capital of Pernambuco, encompassing the whole of the island Recife neighborhood and a block of the Santo Amaro district. The limits of the park, however, expanded to the interior of the state in 2014, and Porto Digital also operates the 'Armazém da Criatividade' (Creativity Warehouse), situated within the city of Caruaru's fashion center.

The park project undertook the urban regeneration of the Recife district, which has an eclectic architectural heritage of diverse colonial, industrial and modern styles and has benefited from investment of R$ 90 million towards urban renovation over the last decade. Municipal, state and federal legislation, and the active participation of the public sector, have facilitated and stimulated private investment, with the goal of developing a world-class business environment.

Porto Digital complements existing regeneration initiatives in the city, demonstrating that it is possible to combine technology development with preserving a city's history and culture. The park has restored several outstanding buildings, adjusting the infrastructure of the area to welcome modern companies, while preserving its architectural characteristics.

Several corporate buildings in the surrounding area of the island and of the Santo Amaro district house the Porto Digital technology companies, a bank district, public and government agencies, a shopping mall, notaries, law firms, accounting firms, publicity agencies, marketing and communication agencies, training centers, reception halls, dozens of restaurants, cinemas, theatres and art institutions. In Caruaru, Porto Digital operations give support to a fashion chain as well as to design and games initiatives, besides the information technology sector.

The origin and objective

The origin of Porto Digital was distinct from traditional science and technology parks. The traditional technology-led development model focused on providing physical space for companies near universities and providing supportive business services.

Porto Digital does not directly provide supportive services, office spaces nor is located within/near a university campus. Porto Digital is an urban, open Technology Park, located in an ancient historical district, which has been renewed for sheltering technology firms. There are no walls delimitating the park. Such characteristic is determinant to building an innovative and creative environment for the firms and the workers. As well as office buildings, other urban artifacts have been refurbished, such as parks, museums, theatres, and others.

The birth of Porto Digital resulted from the impacts of market transformations and global economic trends. Whether formally created in 2000, it was originated from diverse factors which indicated, through the 1980's and 1990's, the possibility to develop a pool of knowledge production in information technology in Recife. By that time, Recife had all the ingredients to develop a successful strategy for technology-led economic development: political disposition in developing a local technology pool, a highly qualified work force pool, information technology enterprises, market demand, world class university and research center and available spaces in the ancient port district area. The underutilized spaces in the old Recife Port's area represented an opportunity in locating the Information Technology firms, which would, at the same time, contribute to revitalize the area.

Investments of more than US$15 million in telecommunication facilities, such as optic fibers, and building refurbishing transformed the ancient historic buildings in high-tech office spaces for IT companies and R&D Institutes.

A relevant characteristic of Porto Digital, when compared to other science and technology parks in the world, is that it was not born from within the University, in order to develop business up from its research products. Porto Digital, based in Gibbon's[133] innovation 'mode 2', was developed to be an Information Technology cluster, closely integrated to university and research institutes but focusing on the market and the demands for technology products and

[133] Gibbons, M; Limoges, C; Nowotny, H; Schwartzman, S; Scott, P; and Trow, M (1994). The new production of knowledge; the dynamics of science and research in contemporary societies.

services. Gibbons' mode 2 is closely related to the concept of the "triple helix". The Triple Helix20 conceptual model of innovation ecosystems is in the core approach to the creation of Porto Digital. Since its conception, it was possible to identify each one of the 'helixes': the local government, the university and private sectors related to the IT industry. Gibbons' "mode 2" of innovation refers to a new form of knowledge production, which is context-driven, problem-focused and interdisciplinary and emerged in the mid-20th century. The innovation process involves multidisciplinary teams for short periods of time, working on specific real market problems. What distinguishes the mode 2 of knowledge production from the "mode 1" is that, this is the traditional Academy knowledge production way, which is an, often abstract, investigate oriented and discipline-based knowledge production.

Conceptual model

Porto Digital conceptual model is based on the Local Innovation System (LIS) approach. It is structured in three axes: (i) innovation territory; (ii) innovation support policies and institutions; (iii) a new productive arrangement for the firms of the industry.

Success factors of this model are: local infrastructure improvements, attraction of business incubator for the continuous and sustained generation of new enterprises, attraction of innovation and research institutes for the knowledge and innovation production, attraction of instruments for economic and financial support to the innovation process, and a mix of high-performance companies.

Such model takes in consideration three orthogonal elements of the innovation process: institution, territory and organization.

At a lower level, firms and organizations settled in a territory form a business cluster, characterized for the lack of a specific and coherent institutional framework. The combination of an institutional system with organizations results in a National Innovation System, which means, "a group of economic agents, institutions and practices that constitute, develop and relevantly participate in the innovation process". Local development policies are perceived in the definition of an institutional framework over a territory. However, the lack of organizations and/or firms makes this agreement just impracticable.

Triple helix model

Founded in 2000, the Porto Digital project is a joint initiative of the state of Pernambuco Government and the private sector. It is considered a reference in the use of the Triple Helix model, alongside the 22@Barcelona innovation district, which creates an innovative environment through synergic action between government, academy and industry.

As such, the Porto Digital has an import role in the revitalization and economic development of the City of Recife since it develops revitalization projects to repurpose a socially and physically degraded area of the city that lost importance due to the relocation of economic activities. As the buildings became degraded and vacant, the local infrastructure became underutilized, amounting very little to the local economy (Toledo, 2012). The project has two important counterparts for the city, such as the occupation of the island with almost 9,000 workers and 274 companies and the success of the city in meeting with its history. However, there is a dimension of 22@Barcelona that the Porto Digital has not yet been able to face, which is the creation of housing units in Porto Digital (Saboya, 2017).

The innovation district is comprised mostly by small and medium information technology and communication (ITC) businesses, and by anchor institutions like the Federal University of Pernambuco's computing center, the Porto Digital's management center, and the Recife's advanced studies and systems center [Centro de Estudos e Sistemas Avançados do Recife (CESAR)].

The Park has given international visibility to the region and greatly increased its competitiveness, creating an innovative cultural environment that boosted the neighborhood revitalization (Marques and Leite, 2008). Its strategic plan is based on a 20 years' span, and is divided into eight axes (Toledo, 2012):

1. fostering businesses and human capital development
2. incubation and acceleration of new businesses
3. mobilisation of venture capital
4. fostering cooperation between government, industry and academy
5. promoting the institutional image of the Porto Digital
6. stimulating social accountability practices
7. stimulating the improvement of real estate and technological availability, as well as urban and business services continuous improvement of the technical staff, work environment, and the Porto Digital's management center.
8. It operates in two knowledgeable and innovation intensive activities: software and ITC services, creative economy activities, mainly in games, multimedia, films and animations, music, design and photography (Porto Digital, 2016).

The Porto Digital is known as one of the main innovation and technology environments in Brazil (Toledo, 2012) for carrying out a fast urban revitalization process through the recovering of buildings, urban areas as well as the historic patrimony. It demonstrated that it is possible to combine technological development and the preservation of history and culture, retrofitting buildings to receive modern companies while maintaining its architectonic characteristics (Porto Digital, 2016). According to Saboya (2017), Porto Digital is a way to present an open urban laboratory, with characteristics of a city in a limited area, as well as the 22@, which is an indirect inspiration and a support for the development of the project.

7.2.2 RUTA N

Country	Colombia
City	Medellin
City's population	2,569,000 inhabitants
Website	www.rutanmedellin.org/es/
Year of creation	2009
Area	172 hectares
Main technology sectors	ICT Health Energy
General manager	Business professional and academic
Number of companies	154
Number of employees	2,900

City of Knowledge

For the past decade, the city of Medellín has undergone a process of social, urban, cultural and economic transformation, which has allowed it to show itself to the world as a success story worth publicizing and promoting. This is how the city continues to create strategies and programmes that allow it to continue to be a source of admiration for the world and pride for its citizens, such as having been awarded the prize for city of the year in innovation worldwide, ahead of New York, Tel Aviv and a group of more than 200 cities initially nominated, within the framework of a competition led by the Citi Group, the Wall Street Journal and the Urban Land Institute. In this context, the Mayor's Office of Medellín seeks to influence the improvement of the city's competitiveness conditions, implementing a new public policy that conceptualizes and implements a strategy that will allow Medellín to become a city of knowledge.

Mission

Ruta N leads the city's economic evolution towards science, technology and innovation-intensive activities, in an inclusive and sustainable way.

The main mission is to articulate the STI ecosystem to transform Medellín into a knowledge economy, in which, by 2021, innovation will be its main driving force. To achieve this, three strategic priorities have been outlined: to attract talent, capital and global companies to the city;

to develop and strengthen the innovative and entrepreneurial business fabric; and to generate STI solutions for the city's challenges.

The program offer is built on these priorities and is constantly evolving to respond to the changing needs of the ecosystem, always bearing in mind that its main indicator is, ultimately, the power of innovation to positively transform the quality of life of the people who live in Medellín.

Vision

By 2021, innovation will be the main driver of the city's economy and the city's well-being, based on a world-class ecosystem.

From industrial pole to global innovation hub

All the processes that cities undergo are reflected in the social and physical fabric of their territories. Medellín is no exception. Known as the "industrial capital of Colombia" in the 20th century, it decided to stop supporting its economic development exclusively on traditional industries, to generate a break and promote a knowledge economy: one that places more value on ideas than on labor.

To begin with, this industrial city had to realize that, without innovation and differentiation, it would not be competitive in the globalized world. The rest is a sum of political decisions and pre-existing conditions in the territory: the Municipal Administration created an entity such as Ruta N to promote business based on science, technology and innovation but, at the same time, Medellín had the necessary conditions for this to happen (some of the best universities, the main economic groups in the country and a private sector strongly committed to the region development.

Like cities with more developed indices, the first thing that was done was to promote a public policy to give a clear route to the efforts in CT+i. In a joint effort with researchers, public sector entrepreneurs and other actors in the innovation ecosystem, the Medellín Science, Technology and Innovation Plan was born. This plan is the city's guide in its commitment to innovation and prioritizes three strategic markets in which opportunities were identified: health, energy and ICT.

The establishment of the public policy on science, technology and innovation, and its constant updating through the CT+i Observatory, allowed the city to establish impact indicators that will lead it to meet its main objective: to improve the quality of life of the citizens of Medellín through the generation of skilled jobs and an increase in per capita income.

To achieve this goal, Ruta N generated a promotion and attraction strategy based on four ingredients of the global innovation ecosystem: the training of the necessary talent, access to capital, business development and the generation of spaces conducive to innovation.

At the same time, it was understood that, in addition to focusing on the development of these four key ingredients, it was important to detonate parallel processes that would enhance each of the actions carried out. These efforts should not come exclusively from the public sector. That is why, in order to encourage investment in innovation in the private sector, the Great Pact for Innovation was created, a strategy to mobilize the city's ecosystem actors to invest in science, technology and innovation activities, which, as of 2016, has more than 2,300 signatory organizations. This initiative has been key in encouraging companies to invest in innovation: in recent years, for every peso invested by Ruta N in the development of the CT+i plan, private companies have been able to contribute.

Urban component

This project has a fundamental urban component. As Medellín worked to make innovation a hallmark of the city, a differentiating factor and a common characteristic of public and private initiatives, it sought references of how other cities had been positively transformed. Experiences such as those of Boston and Barcelona were reviewed, identifying the need for a physical space to materialize this strategy. Thus, was born the Medellín Innovation District, a project of more than 172 hectares and made up of three neighborhoods (Jesús Nazareno, Sevilla and Chagualo).

Having an Innovation District in Medellín has enabled the generation of more than 2,900 jobs and the arrival of 154 new companies in the city from 23 countries. But it has also positioned the city as a global benchmark in the field. Juan Luis Mejía Arango, rector of Eafit University, once said that in the 1990s the only international journalists who came to Medellín were war journalists. Today the city is known worldwide for its advances in innovation.

Although the aim of making innovation the main driver of Medellín's economic development is medium to long term, the achievements are beginning to be seen. The Regional Innovation Survey showed that 57% of the city's companies generated at least one innovation in the last year and increased their sales by 26% as a result. It also found that 30% of the city's new jobs were created as a result of these innovations.

Strategy

The aim of this whole city strategy is not to create the "next Silicon Valley", but to impact every actor in society and transform its productive fabric. That innovation permeates the processes of large, small and medium-sized companies, and the way in which we educate ourselves and relate to each other. That every citizen feels the positive effect of innovation in their daily lives.

In 2017 the Global Innovation Cities Index of the Australian agency 2ThinkNow ranked the city as a global innovation hub. This achievement puts Medellín on a par with Latin American powers and makes it the first Colombian city to achieve this category. It continues to ratify the

city as an attractive territory for the arrival of startups and global innovative businesses, and sends a clear message: grow, from Medellín, for Latin America and the world.

Medellín's experience is relevant for other cities because it shows that, through planning and the definition of a productive vocation, together with collective work, the sustainability and development of a territory can be boosted. This innovative and resilient Medellín is, without a doubt, a clear example of an urban, political, economic and social transformation.

Created by the Mayor's Office of Medellín, EPM and UNE, the Ruta N Medellín Corporation is an entity from which different programmes are developed and the municipality's resources for science, technology and innovation - STI - are channeled. It seeks to promote the development of innovative technology-based businesses that increase the city's competitiveness, boost the economy, strengthen strategic clusters and provide better jobs for the citizens of Medellín. The Ruta N Corporation is making progress in the consolidation of Medellín as a city of knowledge. For this reason, in order to increase the city's competitiveness, it has undertaken the formulation of a technological district in the north of the city. This district will lay the foundations for the economic development of this area, attracting companies linked to science, technology and innovation, especially in the health, energy and ICT sectors.

This transformation has five dimensions:

- the urban, which consists of the physical transformation of the territory through real estate development and infrastructure;
- the business dimension, which promotes the attraction of national and international companies, as well as promoting and strengthening local entrepreneurship in order to give it a boost on the international stage;
- social, which seeks to include all citizens in this territory of knowledge, through the implementation of a culture of innovation; human talent, which maps out what professional skills the city needs in order to implement strategies that enable the creation, development and retention of talent in the territory;
- innovation, which seeks to integrate science and the market to help elucidate how to make science, technology and innovation relevant to the city's progress,
- and finally, governance, which is transversal to all these dimensions and ensures that they are articulated in a way that gives strength and relevance to this district.

Thanks to a regional innovation system made up of Ruta N, Tecnnova, universities, government, interface entities, among others, the city has ensured that STI is thought of transversally in all processes, working in an articulated way to be able, together, to think of a knowledge economy. All are integrated to promote the city of knowledge. All this with the aim of generating greater added value to the products and services offered by the strategic sectors identified in the city and thus fostering economic development in conditions of globalization.

7.2.3 TECHNOPARK SKOLKOVO LLC

Country	Russia
City	Skolkovo - at 30km from Moscow
City's population	Moscow: 12,538,000
Website	www.technopark.sk.ru
Location	In a city
	Located on a university campus or adjacent to it
Year of creation	2010
Built area	23,500m2
Main technology sectors	Energy Saving and Conservation Nuclear Science and Technology Informatics and Telematics Space Technology Biomedical Science and Technology
Companies located in the park	431
Number of employees	4,637
Technology Centres employees	100
Skolkovo ecosystem companies	2,700
Skolkovo ecosystem employees	40,000

Introduction:

Founded in 2010, Technopark Skolkovo is based on the outskirts of Moscow and forms part of the Skolkovo Foundation, whose overarching goal is to create a sustainable ecosystem of entrepreneurship and innovation, engendering a startup culture and encouraging venture capitalism.

Technopark Skolkovo forms part of the Skolkovo Innovation Center, composed of companies and startups developing innovative technologies, and the Skolkovo Institute of Technology (Skoltech), a new graduate research University established in collaboration with the Massachusetts Institute of Technology.

In 2020 there were more than 2,700 companies inside the Skolkovo ecosystem, and employing more than 40,000 people.

The status of a Skolkovo Member gives startups the right to apply for R&D grants, providing that the startup manages to attract equal co-financing. Resident companies also enjoy various tax breaks, including on customs duty on importing scientific equipment from abroad, as well as mentoring and consulting services.

Skolkovo Technopark offers facilities and services that include offices and laboratories with industrial ventilation, seamless antistatic flooring, modern climate systems, and a supply of dry compressed air and water, all designed in consultation with residents to meet their business needs. In addition, the Technopark offers common use centers for prototyping, including industrial design, 3D-prototyping, functional coatings, computer engineering, embedded control and monitoring systems, numerical modelling and computational technologies, electronics development and instrument making, and precision machining process. Its common use centers also offer facilities for medical research, metrological research, and testing and certification.

Innovation ecosystem context

Skolkovo is an innovative city under construction located 3 km from Moscow. 22,000 people will live and work in the city. Skolkovo City is based on the principle of 4E: environmental friendliness, energy efficiency, ergonomics, economy. There are also schools on the territory of Skolkovo. Moscow government supports Skolkovo with grants and subsidies.

The Russian government has set up a number of investment and measures to support innovation ecosystem in the country, putting in place state programs aimed to help knowledge-based industries, to build clusters in selected municipal zones and regions, and to support a country-wide network of technoparks.

The State supports the creation of technoparks in the field of high technologies in the form of subsidies to the budgets of subjects of the Russian Federation for reimbursement of the costs of creating the infrastructure of technoparks in the sphere of high technologies. The state started practicing this form of support in 2015. These subsidies are formed at the expense of federal taxes and customs duties paid by the residents of technoparks. The emphasis is shifted towards stimulating the development of existing structures in the subjects of the Russian Federation and the creation of new ones.

Moscow is the largest Russian metropolis and the most developed region of the country with more than 500 Research institutes, including 50 Technical universities that provide a solid R&D, educational and industrial base.

Moscow is the major national R&D hub with the highest concentration of venture capital. According to the Russian Regional innovation index, in 2019 Moscow received the 1st rank in ‘Socio-Economic Conditions for Innovation Activities’ and the 2nd rank in ‘Innovations Policy Quality’.

Moscow is one of the key players in Russian innovation landscape for the next decade that was declared on a federal level to be a period of digital economics. This means that technoparks are becoming fundamental ones for the national development.

Moscow and the Moscow region, where around 40% of the total number of Russian technoparks is located. This high concentration of technology parks in Moscow and the high level of efficiency of their functioning is due to the high interest of Moscow Government in the creation of specialized sites for the development of high-tech companies, a high concentration of scientific and educational institutions which have substantial groundwork for the development of high-tech economic activities and scientific research, as well significant number of industrial facilities optimal for launching of technology parks. The interest of the Government of Moscow is also focused on providing substantial quantities of preferences for residents and management companies of technoparks, which cannot be found in other regions.

The Moscow Administration provides technoparks with benefits for income, land and property taxes. technoparks residents have the possibility to rent offices on very favorable terms.

According to Federal State Statistic service (Rosstat), in 2018 in Moscow, the share of staff employed in R&D sector amounted to around 205 000 persons or more than 30% of the total number of employees in R&D area of Russia. In particular, this policy includes the creation of a regional legislative framework, the use of state support measures for managing companies and residents, attracting funds from private investors and the Federal budget.

Objective:

When constituted:

Skolkovo was established to solve the following problems:

1. Russia needs an "innovative lift" for modernization and technological development of the economy
2. Integration of Russian science and technology into the world economy is necessary
3. The emergence and support of competitive knowledge-based companies is required
4. Scientific research needs to be encouraged
5. A full-fledged ecosystem is needed for the development of innovations and scientific developments

Currently:

The goal of the Foundation is to support technological entrepreneurship in Russia and the commercialization of the results of research activities.

Ownership:

Skolkovo Foundation is a non-profit organization founded in 2010 and functions as the administrator of the Skolkovo Innovation Center.

The purpose of the Foundation is to support technological entrepreneurship in Russia and commercialize the results of research activities.

The activities of the Skolkovo Foundation are regulated by federal laws and other statutory acts, as well as documents formulated by the Foundation itself. In particular, regulations on the investment committee and investment policy are formulated by the Foundation, as are the procedures for submission and consideration of applications from participants.

Governance and Management:

The Skolkovo Foundation governing bodies overseeing the Technopark Skolkovo:

1. Skolkovo Foundation Board of trustees: with 13 members including government and academy representatives.
2. Skolkovo Foundation Council: with 19 members, including government, academy, and business representatives.
3. Chairman of the Skolkovo Foundation
4. Board of Foundation: with 10 members

Strategy:

On Sept. 28, 2010, then-President Dmitry Medvedev signed a law “On the Skolkovo Innovation Center,” giving rise to the project’s managing entity, the not-for-profit Skolkovo Foundation.

Charged with providing the catalyst for the diversification of the Russian economy, the Skolkovo Foundation’s overarching goal is to create a sustainable ecosystem of entrepreneurship and innovation, engendering a startup culture and encouraging venture capitalism.

The Skolkovo Foundation identified five key areas of potential growth: energy efficiency, strategic computer technologies, biomedicine, nuclear technologies and space technologies.

To achieve this the Foundation is overseeing the creation of the Skolkovo Innovation Center, composed of companies and startups, developing innovative technologies (currently numbering over 1,000), a Technopark, the Skolkovo Institute of Technology (Skoltech), a new graduate research University established in collaboration with the Massachusetts Institute of Technology, and Skolkovo city, located near Moscow. Together these entities will establish a vibrant ecosystem of technology innovation and entrepreneurship. Thirty of the

world's most successful corporations, including Boeing, Cisco Systems, EADS, GE, Johnson & Johnson, IBM, Intel, Microsoft, Siemens, Nokia, Samsung etc. have already recognized the opportunity Skolkovo presents, having signed R&D partnership agreements with the Foundation.

Dozens of innovative projects developed by Skolkovo Startups have found success in international markets, in particular, equipment for the dynamic modelling of oil and gas fields, next-generation screen displays and laser systems for soft-tissue surgery.

Surveys have showed that Skolkovo startups are three times more likely to attract investment than non-members.

In August 2013, the Skolkovo project was chosen for inclusion in the government's "economic development and innovation economy" program, resulting in the allocation of 3.5 billion Rubles for the development of Skolkovo through 2020.

Milestones in the Skolkovo ecosystem development:

- 2010-2012 – Reaching the chain-reacting amount of ecosystem elements.
- 2013-2015 – Improving the quality of ecosystem elements and ensuring their integration.
- 2016 and later - Moving transition to self-development stage, revealing the commercialization
- capabilities.
- 2017 – The start of creation Regional Operators – Skolkovo brunches in Russian regions. From this moment Skolkovo starts to transfer its experience to other Russian cities and innovation area.
- 2018 - The representative office of the Skolkovo Foundation was opened in China. It offers a wide range of services for the residents of the Innovation Center: from advisory support to arranging business missions and finding investors.
- 2019 - Since 2019, legislation has allowed any organization conducting research activities in Russia to access the services and benefits of the Skolkovo Innovation Centre.

Networking:

In Skolkovo there are a number of crucial institutions that creates a necessary network for startups creation and growth:

- SkVentures – Venture Fund of Skolkovo (Skolkovo – Venture Investments LLC) was launched in 2017 and currently has more than $20 bln assets under management. The fund invests in IT startups of venture and growth stages with focus on financial technologies, Internet of Things, artificial intelligence, virtual and augmented reality, big data, cyber security and other areas.

Fund mandate: a) companies engaged in commercialization of the developments performed by the Skolkovo Fund residents; b) companies complying with the purposes, directions, KPI's and(or) significant control results of NTI (National Technology Initiative) roadmaps

- Sk Legal - Skolkovo Intellectual Property Centre (IPC) was established in 2011. The team of the center includes more than 40 lawyers and patent attorneys providing the full range of professional services to the participants of the Skolkovo project and to third parties with legal advice and patenting in Russia and abroad.
- Customs and Financial Company (CFC) is established to support export-import activities of Skolkovo startups. CFC successfully handles export of goods to support the activities of Skolkovo residents, including participation in international exhibitions. CFC is also engaged in various products from equipment and machinery to biological substance and chemical reagents.

Skolkovo innovation center coordinates a network of 16 regional operators which are the major points of focus for innovation companies in the regions.

Regional operators are science and technology parks that have been accredited by Skolkovo as providers of Skolkovo services in the regions of Russia. They are competent in developing the startups teams and in managing innovative projects within their geographical outreach. The regional network helps to improve coverage of startup communities and increase the number of applications to the Skolkovo ecosystem. Skolkovo regularly hosts trainings for technoparks in order to improve the skills required for supporting regional startups.

Skolkovo is well-known international and has a wide network of international partners including industrial companies, development institutions, accelerators support international activities of startups in North America, Europe, and Asia.

Technopark Skolkovo is member of IASP from 2012. In September 2016 it hosted and organized along with the Teknopark Strogino and MSU Science Park, the 33rd IASP World Conference gathered nearly 1600 delegates from 64 countries in Moscow.

Held in three different venues Skolkovo Technopark, the World Trade Center and MSU Science Park - it showcased the flourishing science park and area of innovation community in Moscow, fast becoming a major tech hub in Europe. It was the first time an IASP World Conference took place in Russia, recognizing its growing role in the international innovation community.

Working with the university:

Skolkovo has close connections with more than 30 Russian universities and several international including MIT.

Technopark Skolkovo works closely with Skoltech as part of the Skolkovo ecosystem. The university act as a ‘catalyst’ for the development of advanced research, enhancing the entrepreneurial activity.

Skoltech has 200 full time professors, lecturers, guest and associate professors; 1,000 master and post-docs; 20% of international students from 38 countries; and more than two thirds of students are involved in the development of innovation projects and startups.

Skoltech is composed of nine centers for research, education and innovation: biomedicine and biotechnology; infectious diseases and functional genomics; electrochemical energy storage; designing, manufacturing technologies and materials; hydrocarbon recovery; photonics and quantum materials; big data; space; and advanced studies.

Skoltech is diversifying its academic network by expanding cooperation with the best international universities. It opened laboratories in cooperation with Munich Technical University and the University of Calgary. We share academic knowledge and human resources with 30 universities, mostly from Europe and USA. Representatives of 800 foreign universities and research centers are co-authors of Skoltech science papers.

7.2.4 22@BARCELONA

Country	Spain
City	Barcelona
City's population	1,664,182 inhabitants
Website	www.bcn.cat
Year of creation	2000
Area	200 hectares
Number of companies	Over 300
Number of employees	8,500

Background and objectives

The 22@, also known as 22@Barcelona or the innovation district was constituted in Poblenou in 2000 It is a suburb in Barcelona located in the Sant Martí district.

The project aimed at creating a new perspective to the area, transforming it into an innovative productive environment with modern spaces strategically arranged to boost the implementation and clustering of technology and science-based businesses (Pareja-Eastaway and Piqué, 2011).

The neighborhood originated during the 18th and 19th centuries as a result of the expansion of the city of Barcelona. Until the first half of the 20th century period, the area consolidated as an industrial zone-based primarily on textile goods. However, because of obsolescence and the loss of competitiveness of the traditional industry, the district was abandoned and degraded zones emerged as negative results of the capital crisis (Marques and Leite, 2007).

22@Barcelona project pursued a threefold objective: the urban, economic and social revitalization of the old industrial neighborhood of Poblenou. The idea was to create a compact intelligent city, under a balanced, hybrid model where productive spaces, homes, green zones and public equipment could coexist, allowing the area to become an interesting place to live and work (Ajuntament de Barcelona, 2012; Fajardo, 2014).

The first focus of the 22@Barcelona Society during the transformation of the district of innovation was the urban development of the zone's 200 hectares, creating a special urban law for 22@ and a special infrastructure plan (Pareja-Eastaway and Piqué, 2011).

The project has invested 191.3 M€ in local infrastructure and has mobilized 1581 M€ in construction and land investments (Mur and Clusa, 2011).

In order to convert Poblenou into an attractive zone for the urban, economic and social activities, the industrial areas were reassigned from old industrial zones (22a) to knowledge-

based industrial zones (22@), including knowledge-based facilities (7@), green zones and subsidized housing. In addition, some buildings were selected to be restored as part of the local historic patrimony (Pareja-Eastaway and Piqué, 2011; Ajuntament de Barcelona, 2012; Fajardo, 2014).

The 22@ project attracted anchor companies as a magnet to other businesses, and also built new office spaces destined to small and medium enterprises in order to facilitate the landing process. Both public and private universities, as well as centers of professional education and life-long learning were installed to foster the education of local talent and the attraction of international talent aiming at the creation of new knowledge. A clear cluster strategy was developed on IT, media, energy, health and design; incubators were created to spur startups; new residences for students and professionals were built; venues for exhibitions as well as support services (venture capital, consulting, and others) were created to support the development of the district (Battaglia and Tremblay, 2011; Ajuntament de Barcelona, 2012). According to the 22@ business census 2015, more than 8,223 companies are located in 22@, and more than 93,000 jobs are now in the district.

In the social sphere, 22@ was involving professionals, residents and regular citizens in the knowledge-based economy. The goal was to use technology to involve residents in the professional, research and education networks. The CreaTalent, for example, was promoting the scientific and technological vocations of the children of the district.

Additionally, the digital district program supported the development of innovative projects based on new ICTs and was developed by multidisciplinary and multi-age groups. Cultural factories and museums were included in the social strategy.

22@Barcelona is as a central piece of the grand design of the city of Barcelona: to become ‘Barcelona, the knowledge city’ (Trullén, 2001). Its main goal was to transform from an industrial society into a knowledge-based society, based on new generation activities related to education, creativity and innovation (Pareja-Eastaway and Piqué, 2011).

Facts and figures

Data referring the first 15 years of life of 22@Barcelona

Basic characteristics

- 22@Barcelona covers 198.26 ha, 1,159,626 m2 of land, and 115 blocks.
- 4614 pre-existing houses are recognized in the area, and 4000 new subsidized housing units are planned (25% rented housing).
- Increase of green areas covering 145,000 m2 of land.
- New facilities: 145,000 m2 of land.
- Heritage elements to be conserved: 114.

- Investment through the Special Infrastructure Plan (PEI): 180 million euros.

Urban transformation in the neighborhood

- The 22@ sector has more than 1600 subsidized housing units completed.
- 40,737 m2 have been developed for green areas (public and private).
- Approximately 14,000 m2 have been constructed above ground level
- for facilities for the productive fabric (for example, the MediaTIC building
- or the business incubator Almogàvers Business Factory) and the
- neighborhood fabric (CEIP Llacuna primary education center or the
- Camí Antic de València Community Centre and Senior Citizens' Centre).
- 15 km of streets have been redeveloped.
- In total, 50.60% of 22@ land awaits completion of its transformation.

Economic transformation in the neighborhood

- While in 2000 3473 companies were calculated in the neighborhood, according to the Business Census (2015), the number of companies installed in 22@ is currently 8823.
- Since 2000, 4500 businesses have installed themselves in the district, which means an average of 545 new businesses installed each year.
- Of these 4500, 47.3% are newly formed and the rest are relocations.
- Approximately 30% are involved in knowledge- and technology-intensive activities.
- In 2015, 22@ has a total of 2914 freelance workers.
- The number of workers (Business Census, 2015) is estimated to be around 93,000. Of this number, workers with university qualifications represent, on average, 32.2% of overall workers in 22@.
- Exporting companies invoice on average 38% of their sales volume abroad.
- While in 2010 the percentage of businesses located in 22@ with a positive view of the evolution of the economic context for the following year was 53%, this percentage increased to 72% in 2015.

Social transformation in the neighborhood

- The population of the Sant Martí district increased by 3.69% for the period 2007-2014.
- The foreign population from the EU-28 is over-represented in the neighborhoods of Vila Olímpica (10.63%), La Llacuna (8.06%), and Diagonal Mar (8.22%).
- Household disposable income is higher than in Barcelona overall and has increased substantially since 2009 in the neighborhoods of Diagonal Mar and Vila Olímpica. The

rest of the neighborhoods present a household income that is below Barcelona's and that has been decreasing since 2009.

Infrastructures and urban development

The objectives of the 22@Barcelona Plan were stated to renew the urban and economic Poblenou (Pareja-Eastaway and Pique, 2011) suggesting a compact and diverse city with a balanced and sustainable focus, instead of a model specialized on industrial land.

Therefore, the new economic activities coexist with research, training and technology transfer, housing, equipment and trade, in one high quality environment, whose density makes it compatible with a balanced allocation open space and equipment.

On the one hand, through a system of incentives for the real state, urban renewal processes contribute to the redevelopment of all streets with the renewal of infrastructure, improved quality and capacity of the urban services and of the new organization of the urban mobility. In addition, free land was generated for the community from initial 100% private land, with the transformation, 30% of the land will become public land-to create new green zones, facilities and social housing. On the other hand, the so-called '@' activities are favored. These activities are those that use talent as a main productive resource.

Thus, the progressive transformation of the industrial land solves historical deficits and restores the social and business dynamism that has historically characterized Poblenou. Since the project's inception in 2000 until now, the urban renewal project has involved the creation of a diverse and balanced environment where most innovative companies coexisted with research centers, training and technology transfer and with shops, housing and green zones, that promote social and entrepreneurial dynamism.

Companies and economic development

A cluster strategy was developed in the district in order to promote the knowledge-based economy. In 2004, adding value at the physical transformation (urban and infrastructures), 22@Barcelona developed policies centered on emerging sectors with local assets and international opportunities to grow: media, ICT, medical technologies and energy. In 2008 the design cluster began as a new strategic sector of Barcelona (Pareja-Eastaway and Pique, 2014).

Promoting urban clusters in the territory of 22@Barcelona, the district improved the innovative capacity of the ecosystem of innovation. Each of the five clusters of 22@Barcelona was located in the district in different levels of maturity. The methodology followed in all cases was aimed at establishing a cluster program.

22@Barcelona promoted the creation of sectorial centers of technology transfer as tools for better connection between research (universities) and companies. 22@Barcelona was working on consolidating these, as Barcelona Media Foundation in the sector audio-visual and Barcelona digital foundation in the sector ICT. In 2009, support was given to Barcelona Centre of Design (BCD) and the consolidation of Institute for Energy Research Catalonia (IREC) which together with b_TEC were leading the energy cluster.

In 2008, with the strategic objective of strengthening the support to companies that wanted to be located in the 22@Barcelona, the initiative 22@PLUS was promoted. The 22@PLUS was conceived as a compact value proposition to companies looking at possible relocation in the district and consisted of a catalogue of services that included comprehensively all the elements of value added at 22@Barcelona. This initiative is now the business one-stop service (OAE) for companies wishing to settle down in the district.

Talent and social development

To develop a talent management strategy that supplied the raw material for the knowledge economy (Florida, 2005), 22@Barcelona managed the implementation of university centers in the district with the objective of locating talent in the district and installed critical mass of talent and new generations of talent.

It was promoted in primary and secondary schools with the aim of influencing scientific and technological vocations, entrepreneurship and understanding of global citizenship. These actions connected schools with clusters developed in the district (creatalent program). As such, 22@Barcelona led to an approach of schools with businesses, promoting career guidance (Porta 22), workplace internships (Staying in Company) and employability (Talent Marketplace 22@). Likewise, with the aim of developing a community of professionals in the district, 22@Barcelona promoted events such as the 22@Update breakfast which served to interrelate across profiles and create a sense of belonging.

Universities and companies acted as true international magnet of talent. In this sense, landing performances were promoted for the international community, ensuring a comprehensive welcome. Publications such as ‘Welcome to Barcelona’ which describes international schools or practical processes of life in Barcelona facilitate the implementation and integration of newcomers. In parallel, 22@Barcelona developed social programs in order to involve the neighborhood. programs such as digital district have included grandparents and parents in the process of the district by the implementation of digital training programs.

Key learnings

Key learnings from 22@Barcelona are:

1. the holistic approach for the urban, economic and social transformation
2. a district for working and living
3. a triple helix orientation and governance in the transformation process (government,
4. universities and industry)
5. clear rules for the transformation (urban planning, infrastructure plan and 22@
6. company)
7. the district as an urban lab, as the base of the smart city
8. the smart specialization (clusters and technology) of the district
9. the attraction of anchor companies and institutions
10. the promotion of technology-based entrepreneurship, incubators and investors
11. the attraction, retention, development and creation of talent

The future- road map

The Poblenou is without doubt the territory in Barcelona that has undergone the most profound transformation over the past 35 years. The construction of the Olympic Village (Vila Olímpica) and the seafront together with the opening of the Diagonal, the remodeling of Plaça de les Glòries and the transformation of the industrial fabric, largely through the 22@ Project, have changed and continue to change both the physiognomy of Poblenou and its socio-economic characteristics.

Plan 22@ (The 22@ Plan), which was approved in 2000, set out the guidelines to transform 200 hectares of industrial land. This emblematic project has had positive impacts, such as Barcelona's top ranking in terms of innovation and attracting businesses, gaining new land for facilities and green areas, developing new public housing, and reurbanising spaces and streets. On the other hand, the plan has not adequately addressed the deficiencies suffered in Poblenou related to the urban model and the daily life of residents, such as the closing down of small retail businesses and workshops, abandoned warehouses and the proliferation of large plots of land unused for long periods of time, generating isolation and exclusion. In parallel, hotel use has been excessive, which has created an imbalance compared with other uses.

Aside from Poblenou's physical and socio-economic transformation, it has also been one of the spaces in the city most intensely affected by the more general phenomena that have taken place and continue to take place in Barcelona, such as the tourism effect and the problems related to accessing housing, with consequences such as gentrification and a tendency towards a monoculture n certain (monoculture in certain) places.

The tensions between the different stakeholders in this territory and the developing diversity of Plan 22@ (the 22@ Plan) prompted Barcelona City Council to initiate the participatory reflection including all the stakeholders involved. Various work spaces and participatory processes have taken place with the goal of drawing up a shared roadmap to guide the future transformation of Poblenou, seeking a rebalance that accommodates the interests of the different social, local resident and economic stakeholders.

Further information about the future of 22@Barcelona can be found in the publication: *"Towards a more inclusive and sustainable 22@ within Poblenau"*. Document that presents the set of actions identified by the various stakeholders in order to define a roadmap that enables 22@ areas to cohese the neighborhoods of Poblenou and el Maresme based on an inclusive, sustainable transformation.

7.2.5 HERE EAST

Country	United Kingdom
City	London
City's population	9,425,622
Website	www.hereeast.com
Year of creation	2012
Area	The Campus has 1.200.000 sqft in total of premises
Main technology sectors	Creative industry Robotics Mobility e-sports
General manager	A business professional
Number of companies	Approx. 170 companies
People	About 4,000 people working and studying

Introduction

Here East (www.hereeast.com) is a brand new Innovation District in East London, at Stratford, in the wider area of London 2008 Olympic Games venue.

New hub for creativity and innovation in East London, easily accessible on public transport and surrounded by parkland. It is expected to attract creative businesses and technology companies, and it is already catalyzing further regeneration in the area.

Designed to be flexible with future use in mind, Here East has the connectivity, infrastructure and state-of-the-art utilities for a range of different potential uses in the future.

The Campus has 1,200,000 sqft in total of premises out of which 80,000 sqft correspond to the building of the startup focused Innovation Centre Plexal (mainly in form open space hot desks and small offices, further 130,000 sqft are occupied by University and College departments and the rest is mix of offices, studios and high ceiling spaces for special purposes. Companies of all sizes occupy from 10 – 10,000 sqft space. The three main building are the Press Centre, the Broadcast Centre, and the Theatre (conference venue), encompassing the beautifully landscaped open area named The Yard. The buildings offer flexible working space, with large open floors, retail units, large-scale studios, including active television studios supported by a state-of-the-art data center and lots of space where startups can develop and grow.

Today there are 150 startups in Plexal, 20 larger businesses in the premises of the bigger buildings described above, which also host several departments of London Colleges and Universities. Here East is hosting in total 4000 people, out of whom 1000 students (60-70 PHDs) and close to 700 are those employed in the startup building.

Objective

The project aimed not only to capitalize on expensive infrastructure, that had become idle after the Olympics, but also to have an impact on the wider Hackney Community, related to employment and education and to serve as a regional regeneration vehicle, based on vibrant, technology sectors.

Ownership, Governance, Management

Here East was established after a public private partnership (PPP) tender in 2012, for transforming the Olympic Games Press and Broadcast Center Area and Buildings, into an Innovation District, with special purpose buildings serving innovation, startup entrepreneurship in creative and emerging technologies, R&D and tertiary education.

The tender provided that the Public Body (Landlord is the London Legacy Development Corporation/ reporting to Mayor of London office) will lease the space and buildings for 200 years, while the private partner will in turn invest 150 million GBP to refurbish the existing buildings (70% of current infrastructure) and to add premises according to a plan, that would lead to the creation of London's and one of Europe's biggest Innovation Districts. The successful bidder (based on both quantitative and strategic/qualitative criteria), Delancey, a Real Estate Funds advisory group, backed by funds like DV4, started immediately works in the existing buildings. While some tenants were already in place as from 2013, the iconic, startup innovation building, branded as PLEXAL, commenced operation in October 2016.

The Here East Innovation District was formed with a rather classical PPP procedure, where the public partner contributed the land, mandated the scope of the project and the private partner following an agreement on a common vision, invested 150 million GBP for refurbishment, adaptations and initial operation costs till break-even of the Management Company. The company was set for operating the infrastructure, and in addition also to set up the Here East Innovation Ecosystem, with several intangible important services to innovative tenants, startups, SMEs, big companies and university departments moving there.

The shares of the Management Company belong 100% to the investor. The private partner is 100% responsible for covering any deficit from the operation (as happened in the initial operating years) as well as with commercial risks of the project.

Additional projects that were created in the district, outside of the initial PPP contract, and which were funded by the public sector include the 13 million GBP Cybersecurity Innovation Center. These projects were attracted through competitive procedures.

In addition to the socioeconomic impacts the public sector benefits also indirectly from the increased assets value around the Here East Innovation District.

The policies and strategies of Here East and the specialized substructures such as Plexal (www.plexal.com) are developed by the management team, the landlord (public partner) having no institutional involvement in that. However, the management team is constantly in close cooperation and consultancy with all relevant London City Departments (Foreign Direct Investments Dept.) as well as relevant government departments at central level (Dept. of Transport, Health, Work and Pension, even the strategy team of Downing Street No10/the Prime Minister's office), adjusting strategy and projects, according to the local/municipal and national innovation-related opportunities and priorities.

Any surplus generated by Here East following investment repayment, will be used for expanding current infrastructure, alongside to the distribution of dividends to investors.

Although Here East is operationally a fully private venture, its management team is very selective when it comes to tenants. They interview candidate tenants and evaluate their business, or future businesses of startups, in terms of sector dynamics and relevance to sectors focused by Here East, and the potential of businesses to grow globally and became serious scale-ups.

Thus, the content of business is much more important, than the need to fill the space with rent paying tenants. The long-term lease gives the management team (which has quite a clear vision) the freedom to deliver results, according to the business plan of Here East, without making compromises on initial strategy.

The managers of Here East were invited to comment on their experiences and potential advice they could give to other STP/Innovation District developers (although it is clearly quite early for an ex-post evaluation).

Their opinion on the applicability of the PPP model for/in STPs and Innovation District is, that it is difficult to develop a triple "P" strictly based on financial and technical parameters, without a shared vision. Significant communication is needed, among the partners and stakeholders, who should collaboratively develop this vision.

In their case a big percentage of the partnership proposal scoring, during the evaluation, was based on the vision and strategy for the buildings, alongside the technical and financial capability. Thus, the vision was proposed, agreed and approved by each side during that bidding process.

Classical PPP approaches placing emphasis on financial and technical criteria, availability payments, structure etc., are not suitable for Innovation Projects where vision is equally (or

even more-) important. Thus, such PPPs could exploit the Here East example where vision was on par with financial and technical aspects of the tender.

Partners

There is just one partner in the Management Company of Here East Innovation District - the Private Investor Delancey, which has been the same throughout all stages of development. The Landlord, which provided the 200 years leasing contract, had no other financial contribution to the project than the real estate but has been continuously consulted during the planning and construction phase.

Strategy- vision

Although Here East Innovation District is a rather new venture, significant successes have already been recorded. The management team implements a business plan with KPIs for letting and jobs creation.

As with other Innovation and Technology Parks, the qualitative criteria are also important, alongside numerical achievements. SMEs are attracted to Here East with a scope of improving and growing their business, by osmosis with innovation and knowledge developers present in the Innovation District.

Startups are attracted also, by the very well-designed conducive environment for innovation and entrepreneurship. In addition, individuals and companies, outside of Here East are attracted to the knowledge and entrepreneurship events taking place there.

Here East has 4 major ‘E’ strands to its vision, these are:

Education: Education and skills are at the heart of Here East. Hackney Community College will provide the UK’s first digital apprentices, with the necessary skills to take advantage of the new jobs in the digital economy. Loughborough University will provide a new research center for postgraduate studies linking culture, business, sport, exercise and health.

Employment: To create more than 7,500 jobs on site and in the local community, providing routes into employment for local people and a local legacy of jobs, skills and economic growth.

Enterprise: To provide low-cost space with unrivalled infrastructure. Incubator and accelerator space will be provided by TechHub and Space Studios, helping startup businesses to develop, grow and succeed.

Environment: To promote collaboration and innovation. It will bring together startups, established businesses, venture capitalists and academia in one place to share knowledge and expertise.

Relationship with academia:

Loughborough University London

The London 2012 Olympic and Paralympic Games and its legacy was a real opportunity to build a fairer, more inclusive, East London. With Loughborough University London we wanted to ensure that, as much as possible, we created the opportunity for local and global talent to come here to learn and grow. Loughborough University London is an inspiring postgraduate campus located on Queen Elizabeth Olympic Park.

Established exclusively for postgraduate study and research, Loughborough University London combines influential thought leaders, pioneering researchers and creative innovators. Each master's and PhD degree is led by real-world issues and industry challenges, enabling students to contribute to local and global innovations.

Loughborough University London is part of an exciting community of organizations, creatives and educational providers located inside Here East. Our unique location provides a stimulating environment for students and staff to ask questions, challenge ideas and collaborate with a wide range of inspiring industry partners.

Staffordshire University London – Digital Institute

In 2019, Staffordshire University branched out its award-winning higher education to the European capital of technology with the launch of Staffordshire University London. The specialist Digital Institute is located in Queen Elizabeth Olympic Park, London and extends the reach of the University to the heart of the European capital of technology.

The institution offers a specialist selection of undergraduate and postgraduate courses designed to corner the industries of tomorrow, including games, cyber security and esports.

This state-of-the-art space within Here East acts as a hub of collaboration, education, and houses the latest digital facilities, including a fully operational esports arena, a control room, studio suites, and multiple dynamic learning spaces.

Staffordshire University London is a perfect example of a commitment to making the most employable graduates for the most significant and growing industries. The Digital Institute offers a selection of finest technological and digital courses, centered on the gaming and computing sectors. The undergraduate and postgraduate portfolio has been designed to cover the lifecycle of modern industry.

Staffordshire University London, have their own expert academic team, facilities, and are part of a bustling community within the Here East campus. They share their location with leading companies in communication, broadcasting and technology, giving students the chance to network while they study and open doors and opportunities for future careers. What's more, central London is just a short tube ride away.

They are working to create a network of employers to expand work experience opportunities in new and upcoming industries – just one advantage of being in one of the best-connected places in London. Plus, the ease of travel via public transport between Here East, the UK and the rest of the globe gives students the chance to juggle work, social and professional development activities easily.

7.2.6 ANN ARBOR SPARK

Country	United States of America
City	Ann Arbor (Michigan)
City's population	121,885
Website	www.annarborusa.org
Year of creation	2005
Area	City has an area of 28.70 square miles (74.33 square kilometres); Rented/dedicated building: 18,000 square ft.
Main technology sectors	Advanced Services in Technology Transfer ICT & Communications Manufacturing and Automation Technologies Military and Defence Software Engineering and Bioscience
General manager	A business professional
Number of companies	Washtenaw County (Ann Arbor MSA): 8,212 establishments. Downtown district: approx. 180 companies
Number of employees	• About 61,000 in the city of Ann Arbor; • About 152,000 for county (Ann Arbor MSA); • Approx. 3000 in the downtown district

Introduction:

Ann Arbor SPARK is a non-profit organization dedicated to the development of economic and employment opportunities in Washtenaw and Livingston counties located in South East Michigan, USA. Ann Arbor SPARK aims to advance the economy of the Ann Arbor region by establishing it as a desired place for innovation, business location and growth, and for highly skilled workers to live and work.

One of SPARK's primary objectives is to bring together private and public partners, like the Michigan Economic Development Corporation (MEDC), Michigan Works! Association, city and municipal partners, University of Michigan, and others to support the growth of companies and the creation of jobs in Washtenaw and Livingston counties. SPARK has a contractual partnership with the Economic Development Council of Livingston County

(EDCLC) to provide economic development services to businesses in the area. The EDCLC Board oversees the work that Ann Arbor SPARK does to advance the economy of Livingston County. This partnership leverages project-based and strategic economic development services in the region through proactive outreach to local businesses in Livingston County that result in value-added services and connections.

Ann Arbor SPARK is an area of innovation serving companies scattered throughout the downtown innovation district and the surrounding region. In the downtown district alone, there are approximately 180 companies with over 3000 employees in existing private real estate. SPARK provides services and support where they are domiciled and also rents an 18K square foot building that houses offices, events space, startup tenants, etc.

Ann Arbor region draws on a wealth of advantages in talent, location and innovation to craft a dynamic $23.5 billion economy. With innovation-driven cornerstone industries, including automotive and mobility, life sciences and health care, technology, and data and information, the two-county region benefits from a deep pool of educated talent, world-class research and education assets and a lower cost structure than coastal locations. The University of Michigan and Eastern Michigan University help drive entrepreneurial innovation in the region.

There is a wealth of opportunity for businesses to start and grow in the region. With many established industries, the Ann Arbor region also has become a magnet for emerging and rapidly growing sectors and world-class companies have come to Ann Arbor, including Google, Barracuda Networks, FordLabs, Toyota, Thomson Reuters, TD Ameritrade, Expedia and Nokia.

Additionally, companies are able to capitalize on its proximity to world-class academic institutions, like the University of Michigan and Eastern Michigan University, that are funneling talent into the workforce. The region of 562,000 residents offers a highly educated workforce, nearly 55% of adults have at least a bachelor's degree, well above state and U.S. averages.

As a renowned high-tech community to live and work, the Ann Arbor region has been awarded as:

- 1st Most educated cities in the USA – wallethub.com 2019
- 2nd Autonomous vehicle Jobs – axios/ziprecruiter 2018
- 2nd Best cities to live in America – niche.com 2019
- 3rd Best college towns & cities in America - wallethub.com 2019
- 4th Best cities to retire – usatoday.com 2018
- 9nd Most innovative metro areas – Verizon 2019

Objective:

SPARK's primary mission was and is to bring together private and public partners, like the Michigan Economic Development Corporation[134] (MEDC), Michigan Works! Association[135], city and municipal partners, University of Michigan, and by 2019 eighty private sector companies to support the growth of existing companies and the creation of new technology-based companies and jobs in the counties surrounding Ann Arbor.

Ownership, governance and management:

The ownership of Ann Arbor SPARK evolved over 15 years. Originally, the structure was a tacit partnership between local government and the University of Michigan. A non-profit entity was formed under Federal and State laws in which the Board consisted of private sector representatives, the local municipality, and academia. Every year the budget of SPARK is determined by a board consisting of members from local government, academia and private sector who devise a program of activities based on funding contributions from each of those sectors.

Presently there are 80 private companies who annually fund SPARK, including large corporations such as Google and Toyota and smaller local firms. These private companies have a mix of motivations ranging from being good corporate citizens as well as seeking to benefit from the showcase of technology that is presented. Some of the private sector funders use money from their own foundations to support SPARK, not money from their operations. In the report for 2018 which is publicly available on the organization's website the total budget is 6.47 million USD, the major part of which dedicated to acceleration, incubation and grants to early-stage companies while the operating budget was 1.875 million USD. The funding sources for this operating part were roughly split into 1:1:3 respectively for public (which includes government & municipal funding), academia (university) and private contributions and sponsorships. Some companies provide non-budgetary contributions, an example of which are credits given to SPARK by Google for social media marketing.

The City of Ann Arbor's motivation is that SPARK has enabled a professional staff that it otherwise would not have been able to afford without the benefit of additional resources from the private and academic sectors. City of Ann Arbor contributes 75k USD to the yearly 7.0 million USD effort (rounded total budget).

During the 2008 – 2012 timeframe, Michigan was still viewed as a flyover State for venture capital investing. Recognizing Ann Arbor SPARK's success in nurturing startups and accelerating their growth, the State of Michigan through the Economic Development initiative of the Governor, created a state funded VC fund of 24 million USD paid to be housed at SPARK.

[134] https://www.michiganbusiness.org/
[135] https://www.michiganworks.org/

SPARK made pre-seed investments in over 100 companies across the State of Michigan with half of the portfolio being located in the Ann Arbor region as a locus of technology startups. The State required that 50% of the its funding must be matched by other sources. To date, 560 million USD of additional capital came into the portfolio companies. 70% of the companies originally invested in are still in existence.

On the non-startup side, there is a variety of city and local government support with the university providing approx. 15% of the funding, the private sector about 30%, and the remainder coming from a variety of city and local government sources. After a national search, the group hired Paul Krutko in 2011, an experienced Silicon Valley economic development executive as its second CEO. His tenure has been marked by the ability to attract technology companies from Silicon Valley to locate facilities in the Ann Arbor area of innovation.

Since 2011, SPARK has attracted approximately $1.5 billion USD in investment in company investment and 15k new jobs. In 2018, 150 million USD was the investment by the private sector, signaling that the private sector role is a mature one.

It is estimated that 50% of all startups in the State of Michigan happen in and around the Ann Arbor area of innovation. Ann Arbor attracts successful entrepreneurs from across the state and the nation.

The local chamber of commerce primarily works with the private sector companies serving the local market. SPARK's focus is on companies from the startup phase through mature players like the Toyota North America Research Facility that are growing the regional GDP by selling goods and services outside the region to national and global markets and not local ones.

SPARK CEO sees himself as helping to lead strategic projects on behalf of the stakeholder members of Ann Arbor's triple helix by developing the concept, bringing new and current players to the table, and providing an environment and community to facilitate partnerships and investment.

SPARK can be seen as a premier example of an emerging area of innovation/innovation district model in the US. This model is coming more and more to the fore and to some extent replacing "science parks" as the leading model.

Strategy:

Ann Arbor SPARK Five-Year Strategic Plan (2018-2021).

Mission Statement

SPARK will advance the economy of the Ann Arbor Region by establishing the area as a desired place for business expansion and location by identifying and meeting the needs of business at every stage, from those that are established to those working to successfully commercialize innovations.

Values

To provide high value and innovative services to our stakeholders and customers helping meet their challenges in an increasingly dynamic and volatile global economy.

To pursue the principles of open-source economic development by engaging in regional and state-wide collaboration with public, private and non-profit partners to advance the Ann Arbor region, Southeast Michigan, the State of Michigan and the nation.

Strategic Direction 1 Acceleration- Create long term regional prosperity by accelerating the growth of startups and early-stage companies through investment and by support through offering direct and consultant services and through collaboration with other partners.

Objectives:

- Look for new funding and service opportunities to expand support to early stage and second stage companies to accelerate their growth to global scale whenever possible.
- Cultivate SPARK's capacity to connect emerging companies with early financing, talent and other resources to strengthen the bridge from startup to maturity. No venture or business should have to leave our region due to a lack of talent, capital or real estate.

Strategic Direction 2 - Talent - Maximize the retention, development and attraction of knowledge workers and experienced entrepreneurial management though convening and collaborating with partner organizations and direct program delivery to meet the needs of early stage and mature companies we serve.

Objectives:

- Engage in developing new strategic and tactical approaches with partner organizations to respond to the "talent" deficit.
- Scale initiatives like Tech Trek and the TrueJob Portal to build on initial success from Strategic Plan 1.0.

Strategic Direction 3 - Growth - Maximize job creation and capital investment growing the regions GDP through the retention and expansion of established driving industry companies that sell goods and services outside the Ann Arbor region and through the targeted attraction domestically and internationally of similar companies that fit the regions identified clusters.

Objectives:

- Achieve levels of investment and job creation at levels that exceed comparable US communities of our size with major research universities. (i.e. Chapel Hill, NC, Evanston, IL, Madison, WI, Boulder, CO)
- Attract new companies that "fit" our region and grow those already here, advancing our existing and emerging clusters and the opportunities for existing talent within the community and attracting new talent here.

Strategic Support 1 - Leadership - Further strengthen the Ann Arbor SPARK organization to maintain SPARKs position as one of the nations and world's leading economic development organizations. Increase Ann Arbor SPARKs role in activities that advance regional collaboration toward economic prosperity.

Objectives:

- Maintain the best staff with top-notch skills.
- Develop targeted quantitative and qualitative success metrics that demonstrate ROI to ensure continued funding support from our stakeholders.
- Continue to proactively convene community leaders and organizations, where appropriate, to develop collaborative approaches to continued prosperity and enhanced inclusion in the region.

Strategic Support 2 - Planning - Lead the creation of a long-term strategic framework for maximizing the Ann Arbor regions economic competitiveness globally in the year 2025 that reflects best practices, new opportunities with appropriate partners and that is informed by stakeholder input.

Objectives:

- Ensure that appropriate office and research/development space, especially Class A for driving industry companies, particularly headquarters and ICT companies is being developed in Ann Arbor and surrounding communities within our regional partnership.
- Collaborate with partners to identify, create and enhance other regional physical assets, and infrastructure including hotel and meeting space necessary to support effective and sustainable economic development.
- Collaborate with the University of Michigan to identify opportunities to develop a university affiliated technology park(s).

Strategic Support 3 - Communication and Engagement – Building on SPARK's successful event and social media program, expand local, regional, state-wide, national and global awareness of the Ann Arbor region's attractiveness for business location and career and life opportunities.

Objectives:

- Utilize social media channels and resources available to SPARK to communicate a positive message to external audiences concerning the attributes of our region for companies, individuals and families.
- Collaborate with partners in communicating that message in any and all appropriate venues.

Entrepreneur Partners

Ann Arbor Angels: The Ann Arbor Angels is a membership organization of angel investors that invest in early-stage technology companies in the greater Ann Arbor area. www.annarborangels.org

BBC Entrepreneurial Training & Consulting (BBCetc): BBCetc concentrates its efforts in the areas of business development, SBIR/STTR training, and proposal preparation and support. www.bbcetc.com/

Michigan Angel Fund (MAF): The MAF is a for-profit, pooled, professionally managed angel fund. MAF was established by Ann Arbor SPARK and supported by the Michigan Economic Development Corporation to help finance early-stage companies in the state of Michigan and to attract additional angel investors to the Michigan entrepreneurial ecosystem. www.miangelfund.com

Michigan Emerging Technologies Fund (ETF): The Michigan Emerging Technologies Fund (Michigan ETF) is designed to expand funding opportunities for Michigan technology-based companies in the federal innovation research and development arena. The fund will match both Phase I and Phase II SBIR/STTR awards until funds are exhausted. www.mietf.org

Small Business Administration: The SBA helps Americans start, build, and grow businesses. Approximately 35-40% of all SBA loans are made to startups. www.sba.gov

Venture Capital and Angel Investors: The mission of both venture capital firms and angel investors is to invest in startup, early-stage, and emerging growth companies in exchange for an equity position. The vision of the Michigan Venture Capital Association (MVCA) is to increase the amount of capital and talent available to venture and angel investors so they can fund Michigan's most innovative entrepreneurs and work closely with them to transform breakthrough ideas into new companies and industries that drive Michigan job creation and economic growth. MichiganVCA.org

Networking/relationship with academia:

Ann Arbor SPARK is a public private partnership of the University of Michigan, over three dozen leading private corporations and the municipal and county governments located in the Ann Arbor region that was formed through the collaboration of the Office of the President of the University of Michigan and its Office of Technology Transfer and those other entities listed including the resident venture capital community.

The University of Michigan currently has the largest research budget of a public university in the US at approximately $1.5B. The President of the University of Michigan as well as the Presidents of the Eastern Michigan University and Washtenaw are members of the board of

directors along with CEOs of several leading technology companies' residents in the area along with key elected officials.

The depth of the relationships across the academic, private and public sectors is illustrated by the fact that the first chair of A2 SPARK who was a regional venture capitalist who now is the Governor of the State of Michigan who after completion of a three-year term was succeeded by the Vice President for Research of the University of Michigan who was succeeded by the President of the Bank of Ann Arbor. All of the academic institutions provide significant funding to A2 SPARK for operations, as do on-going annual contributions by the private corporations and funding from the local governments. The Executive Director of the University of Michigan's Office of Technology Transfer chairs the A2 SPARK Entrepreneurial Services Committee and the President/CEO of Ann Arbor SPARK is member of the OTT National Advisory Board.

A key partnership is with the City of Ann Arbor Local Development Finance Authority that provides nearly $2M in on-going operating capital for direct acceleration services to startups and \nearly stage companies that are being created through the on-going research and development across the myriad of scientific and practical research being conducted at the University of Michigan. This is funded through a special taxing district called a SMART Zone centered around the downtown of Ann Arbor where a significant number of high technology companies are located. These funds are used to support incubator and acceleration facilities as while as direct service provision and consultancy to early-stage firms.

Additionally, A2 SPARK has a significant relationship with the State of Michigan in the initial development and spinoff of a bioscience industry acceleration facility within the area of innovation. This relationship also includes the management of a $25M pre-seed investment fund on behalf of the state that provides funding to early-stage companies before initial venture capital investment. Although A2 SPARK makes investments throughout the State of Michigan approximately 35% have been made in the proposed area of innovation. Over 90 investments have been made to date. A2 SPARK has also developed a pilot Angel Fund to test the concept of pooling Angel Investment into vetted companies spreading the angel investment risk across a portfolio of companies.

Ann Arbor's tech community benefits from regional colleges and universities, foremost of which is the University of Michigan. In 2016, U-M awarded 842 degrees in computer information systems, computer sciences, and electrical engineering. Eastern Michigan University awarded 57 degrees in computer operating systems, Web programming, and CAD/CAE.

The University of Michigan ranks among the world's top universities and its graduate and professional programs are consistently listed among the nation's top ten. University of Michigan's College of Electrical Engineering and Computer Science Engineering offers degree programs in: Computer Engineering, Computer Science, Data Science, Electrical Engineering and Eastern Michigan University.

The College of Technology at Eastern Michigan University, located in downtown Ypsilanti, offers four-year degrees in computer engineering technology and information security.

In addition to University of Michigan and Eastern Michigan University, Ann Arbor area employers can recruit from universities within an hour's drive of Ann Arbor—Wayne State University, Lawrence Tech, Kettering, and Michigan State University. All four have degree programs in computer science.

The University of Michigan (UofM) is behind the creation of Ann Arbor SPARK, and is one of their main promoters.

In 2005, the new President of the University of Michigan (UofM), Mary Sue Coleman was concerned about how effective the University was in impacting the regional economy through the commercialization of its research. This was an important concern because the University of Michigan is one of the largest research universities in the United States, with a current budget of $1.5B USD annually. The President's question focused around why University of Michigan was not generating the startups and spinouts like MIT (Massachusetts Institute of Technology) and Stanford given that the University of Michigan's research budget was larger than both and why there was not significant technology company growth through investment and job creation in the Ann Arbor region.

The President convened a national advisory panel of alumni that developed a triple helix organization called Ann Arbor SPARK which was an initiative which assembled private sector, academia - the University of Michigan, Eastern Michigan University, and Washtenaw Community College as well as local government.

The initiative had three initial objectives for UofM:

1. Help startups grow out of the University Michigan.
2. Improve the capabilities of The University of Michigan's Technology Transfer Office.
3. Direct some of the school's fundraising proceeds (target 10%) into early-stage companies without any geographic restriction.

One mandate was to tie into the University's alumni network and talent pool to help market Ann Arbor as an attractive place to start a company or relocate an existing one. The University of Michigan's 500,000 living alumni community is one of the largest in the country. Its graduates include such Silicon Valley luminaries such as Larry Page, a co-founder of Google.

8. Annex C. Global indicator framework for the SDGs and targets of the 2030 Agenda for Sustainable Development

With the objective to have a deeper insight of how the HIDS will be able to address the all SDGs, in this annex are presented all the indicators of the global indicator framework for the SDGs and targets of the 2030 Agenda for Sustainable Development. This global indicator framework was developed by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) and agreed upon at the 48th session of the United Nations Statistical Commission held in March 2017. The framework includes 231 unique indicators that are annually refined, reviewed and updated.

Table 3. Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development

Goals and targets (from the 2030 Agenda for Sustainable Development)	*Indicators*
Goal 1. End poverty in all its forms everywhere	
1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day	1.1.1 Proportion of the population living below the international poverty line by sex, age, employment status and geographic location (urban/rural)
1.2 By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	1.2.1 Proportion of population living below the national poverty line, by sex and age
	1.2.2 Proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions
1.3 Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable	1.3.1 Proportion of population covered by social protection floors/systems, by sex, distinguishing children, unemployed persons, older persons, persons with disabilities, pregnant women, newborns, work-injury victims and the poor and the vulnerable
1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance	1.4.1 Proportion of population living in households with access to basic services
	1.4.2 Proportion of total adult population with secure tenure rights to land, (*a*) with legally recognized documentation, and (*b*) who perceive their rights to land as secure, by sex and type of tenure

1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters	1.5.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population
	1.5.2 Direct economic loss attributed to disasters in relation to global gross domestic product (GDP)
	1.5.3 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030
	1.5.4 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies
1.a Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions	1.a.1 Total official development assistance grants from all donors that focus on poverty reduction as a share of the recipient country's gross national income
	1.a.2 Proportion of total government spending on essential services (education, health and social protection)
1.b Create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, to support accelerated investment in poverty eradication actions	1.b.1 Pro-poor public social spending
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture	
2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round	2.1.1 Prevalence of undernourishment
	2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)
2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons	2.2.1 Prevalence of stunting (height for age <-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age
	2.2.2 Prevalence of malnutrition (weight for height >+2 or <-2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight)
	2.2.3 Prevalence of anaemia in women aged 15 to 49 years, by pregnancy status (percentage)

2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	2.3.1 Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size
	2.3.2 Average income of small-scale food producers, by sex and indigenous status
2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of agricultural area under productive and sustainable agriculture
2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed	2.5.1 Number of (*a*) plant and (*b*) animal genetic resources for food and agriculture secured in either medium- or long-term conservation facilities
	2.5.2 Proportion of local breeds classified as being at risk of extinction
2.a Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries	2.a.1 The agriculture orientation index for government expenditures
	2.a.2 Total official flows (official development assistance plus other official flows) to the agriculture sector
2.b Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round	2.b.1 Agricultural export subsidies
2.c Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility	2.c.1 Indicator of food price anomalies

Goal 3. Ensure healthy lives and promote well-being for all at all ages	
3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births	3.1.1 Maternal mortality ratio
	3.1.2 Proportion of births attended by skilled health personnel
3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births	3.2.1 Under-5 mortality rate
	3.2.2 Neonatal mortality rate
3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases	3.3.1 Number of new HIV infections per 1,000 uninfected population, by sex, age and key populations
	3.3.2 Tuberculosis incidence per 100,000 population
	3.3.3 Malaria incidence per 1,000 population
	3.3.4 Hepatitis B incidence per 100,000 population
	3.3.5 Number of people requiring interventions against neglected tropical diseases
3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being	3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease
	3.4.2 Suicide mortality rate
3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol	3.5.1 Coverage of treatment interventions (pharmacological, psychosocial and rehabilitation and aftercare services) for substance use disorders
	3.5.2 Alcohol per capita consumption (aged 15 years and older) within a calendar year in litres of pure alcohol
3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents	3.6.1 Death rate due to road traffic injuries
3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and	3.7.1 Proportion of women of reproductive age (aged 15–49 years) who have their need for family planning satisfied with modern methods

programmes	3.7.2 Adolescent birth rate (aged 10–14 years; aged 15–19 years) per 1,000 women in that age group
3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all	3.8.1 Coverage of essential health services
	3.8.2 Proportion of population with large household expenditures on health as a share of total household expenditure or income
3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	3.9.1 Mortality rate attributed to household and ambient air pollution
	3.9.2 Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services)
	3.9.3 Mortality rate attributed to unintentional poisoning
3.a Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate	3.a.1 Age-standardized prevalence of current tobacco use among persons aged 15 years and older
3.b Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all	3.b.1 Proportion of the target population covered by all vaccines included in their national programme
	3.b.2 Total net official development assistance to medical research and basic health sectors
	3.b.3 Proportion of health facilities that have a core set of relevant essential medicines available and affordable on a sustainable basis
3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States	3.c.1 Health worker density and distribution
3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national	3.d.1 International Health Regulations (IHR) capacity and health emergency preparedness

and global health risks	3.d.2 Percentage of bloodstream infections due to selected antimicrobial-resistant organisms
Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	
4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes	4.1.1 Proportion of children and young people (*a*) in grades 2/3; (*b*) at the end of primary; and (*c*) at the end of lower secondary achieving at least a minimum proficiency level in (i) reading and (ii) mathematics, by sex
	4.1.2 Completion rate (primary education, lower secondary education, upper secondary education)
4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education	4.2.1 Proportion of children aged 24–59 months who are developmentally on track in health, learning and psychosocial well-being, by sex
	4.2.2 Participation rate in organized learning (one year before the official primary entry age), by sex
4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university	4.3.1 Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex
4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship	4.4.1 Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill
4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations	4.5.1 Parity indices (female/male, rural/urban, bottom/top wealth quintile and others such as disability status, indigenous peoples and conflict-affected, as data become available) for all education indicators on this list that can be disaggregated
4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy	4.6.1 Proportion of population in a given age group achieving at least a fixed level of proficiency in functional (*a*) literacy and (*b*) numeracy skills, by sex

4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development	4.7.1 Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (*a*) national education policies; (*b*) curricula; (*c*) teacher education; and (*d*) student assessment
4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all	4.a.1 Proportion of schools offering basic services, by type of service
4.b By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries	4.b.1 Volume of official development assistance flows for scholarships by sector and type of study
4.c By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States	4.c.1 Proportion of teachers with the minimum required qualifications, by education level
Goal 5. Achieve gender equality and empower all women and girls	
5.1 End all forms of discrimination against all women and girls everywhere	5.1.1 Whether or not legal frameworks are in place to promote, enforce and monitor equality and non-discrimination on the basis of sex
5.2 Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation	5.2.1 Proportion of ever-partnered women and girls aged 15 years and older subjected to physical, sexual or psychological violence by a current or former intimate partner in the previous 12 months, by form of violence and by age
	5.2.2 Proportion of women and girls aged 15 years and older subjected to sexual violence by persons other than an intimate partner in the previous 12 months, by age and place of occurrence
5.3 Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation	5.3.1 Proportion of women aged 20–24 years who were married or in a union before age 15 and before age 18

	5.3.2 Proportion of girls and women aged 15–49 years who have undergone female genital mutilation/cutting, by age
5.4 Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate	5.4.1 Proportion of time spent on unpaid domestic and care work, by sex, age and location
5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life	5.5.1 Proportion of seats held by women in (*a*) national parliaments and (*b*) local governments
	5.5.2 Proportion of women in managerial positions
5.6 Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences	5.6.1 Proportion of women aged 15–49 years who make their own informed decisions regarding sexual relations, contraceptive use and reproductive health care
	5.6.2 Number of countries with laws and regulations that guarantee full and equal access to women and men aged 15 years and older to sexual and reproductive health care, information and education
5.a Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws	5.a.1 (*a*) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (*b*) share of women among owners or rights-bearers of agricultural land, by type of tenure
	5.a.2 Proportion of countries where the legal framework (including customary law) guarantees women's equal rights to land ownership and/or control
5.b Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women	5.b.1 Proportion of individuals who own a mobile telephone, by sex
5.c Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels	5.c.1 Proportion of countries with systems to track and make public allocations for gender equality and women's empowerment
Goal 6. Ensure availability and sustainable management of water and sanitation for all	
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	6.1.1 Proportion of population using safely managed drinking water services

6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	6.2.1 Proportion of population using (*a*) safely managed sanitation services and (*b*) a hand-washing facility with soap and water
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	6.3.1 Proportion of domestic and industrial wastewater flows safely treated
	6.3.2 Proportion of bodies of water with good ambient water quality
6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	6.4.1 Change in water-use efficiency over time
	6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources
6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	6.5.1 Degree of integrated water resources management
	6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation
6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	6.6.1 Change in the extent of water-related ecosystems over time
6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies	6.a.1 Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan
6.b Support and strengthen the participation of local communities in improving water and sanitation management	6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management
Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all	
7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	7.1.1 Proportion of population with access to electricity
	7.1.2 Proportion of population with primary reliance on clean fuels and technology

7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	7.2.1 Renewable energy share in the total final energy consumption
7.3 By 2030, double the global rate of improvement in energy efficiency	7.3.1 Energy intensity measured in terms of primary energy and GDP
7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	7.a.1 International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems
7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support	7.b.1 Installed renewable energy-generating capacity in developing countries (in watts per capita)
Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	
8.1 Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries	8.1.1 Annual growth rate of real GDP per capita
8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labor-intensive sectors	8.2.1 Annual growth rate of real GDP per employed person
8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services	8.3.1 Proportion of informal employment in total employment, by sector and sex
8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavor to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead	8.4.1 Material footprint, material footprint per capita, and material footprint per GDP
	8.4.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP

8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	8.5.1 Average hourly earnings of employees, by sex, age, occupation and persons with disabilities
	8.5.2 Unemployment rate, by sex, age and persons with disabilities
8.6 By 2020, substantially reduce the proportion of youth not in employment, education or training	8.6.1 Proportion of youth (aged 15–24 years) not in education, employment or training
8.7 Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms	8.7.1 Proportion and number of children aged 5–17 years engaged in child labour, by sex and age
8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment	8.8.1 Fatal and non-fatal occupational injuries per 100,000 workers, by sex and migrant status
	8.8.2 Level of national compliance with labour rights (freedom of association and collective bargaining) based on International Labour Organization (ILO) textual sources and national legislation, by sex and migrant status
8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products	8.9.1 Tourism direct GDP as a proportion of total GDP and in growth rate
8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all	8.10.1 (*a*) Number of commercial bank branches per 100,000 adults and (*b*) number of automated teller machines (ATMs) per 100,000 adults
	8.10.2 Proportion of adults (15 years and older) with an account at a bank or other financial institution or with a mobile-money-service provider
8.a Increase Aid for Trade support for developing countries, in particular least developed countries, including through the Enhanced Integrated Framework for Trade-related Technical Assistance to Least Developed Countries	8.a.1 Aid for Trade commitments and disbursements
8.b By 2020, develop and operationalize a global strategy for youth employment and implement the Global Jobs Pact of the International Labour Organization	8.b.1 Existence of a developed and operationalized national strategy for youth employment, as a distinct strategy or as part of a national employment strategy
Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	

9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	9.1.1 Proportion of the rural population who live within 2 km of an all-season road
	9.1.2 Passenger and freight volumes, by mode of transport
9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries	9.2.1 Manufacturing value added as a proportion of GDP and per capita
	9.2.2 Manufacturing employment as a proportion of total employment
9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets	9.3.1 Proportion of small-scale industries in total industry value added
	9.3.2 Proportion of small-scale industries with a loan or line of credit
9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	9.4.1 CO_2 emission per unit of value added
9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending	9.5.1 Research and development expenditure as a proportion of GDP
	9.5.2 Researchers (in full-time equivalent) per million inhabitants
9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States	9.a.1 Total official international support (official development assistance plus other official flows) to infrastructure
9.b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities	9.b.1 Proportion of medium and high-tech industry value added in total value added

9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020	9.c.1 Proportion of population covered by a mobile network, by technology
Goal 10. Reduce inequality within and among countries	
10.1 By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average	10.1.1 Growth rates of household expenditure or income per capita among the bottom 40 per cent of the population and the total population
10.2 By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status	10.2.1 Proportion of people living below 50 per cent of median income, by sex, age and persons with disabilities
10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard	10.3.1 Proportion of population reporting having personally felt discriminated against or harassed in the previous 12 months on the basis of a ground of discrimination prohibited under international human rights law
10.4 Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality	10.4.1 Labour share of GDP
	10.4.2 Redistributive impact of fiscal policy[4]
10.5 Improve the regulation and monitoring of global financial markets and institutions and strengthen the implementation of such regulations	10.5.1 Financial Soundness Indicators
10.6 Ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions	10.6.1 Proportion of members and voting rights of developing countries in international organizations
10.7 Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies	10.7.1 Recruitment cost borne by employee as a proportion of monthly income earned in country of destination
	10.7.2 Number of countries with migration policies that facilitate orderly, safe, regular and responsible migration and mobility of people
	10.7.3 Number of people who died or disappeared in the process of migration towards an international destination

	10.7.4 Proportion of the population who are refugees, by country of origin
10.a Implement the principle of special and differential treatment for developing countries, in particular least developed countries, in accordance with World Trade Organization agreements	10.a.1 Proportion of tariff lines applied to imports from least developed countries and developing countries with zero-tariff
10.b Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes	10.b.1 Total resource flows for development, by recipient and donor countries and type of flow (e.g. official development assistance, foreign direct investment and other flows)
10.c By 2030, reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent	10.c.1 Remittance costs as a proportion of the amount remitted
Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable	
11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums	11.1.1 Proportion of urban population living in slums, informal settlements or inadequate housing
11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	11.2.1 Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities
11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries	11.3.1 Ratio of land consumption rate to population growth rate
	11.3.2 Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically
11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage	11.4.1 Total per capita expenditure on the preservation, protection and conservation of all cultural and natural heritage, by source of funding (public, private), type of heritage (cultural, natural) and level of government (national, regional, and local/municipal)
11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses	11.5.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population

relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations	11.5.2 Direct economic loss in relation to global GDP, damage to critical infrastructure and number of disruptions to basic services, attributed to disasters
11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	11.6.1 Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated, by cities
	11.6.2 Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)
11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities	11.7.1 Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities
	11.7.2 Proportion of persons victim of physical or sexual harassment, by sex, age, disability status and place of occurrence, in the previous 12 months
11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning	11.a.1 Number of countries that have national urban policies or regional development plans that (*a*) respond to population dynamics; (*b*) ensure balanced territorial development; and (*c*) increase local fiscal space
11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels	11.b.1 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030
	11.b.2 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies
11.c Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials	*No suitable replacement indicator was proposed. The global statistical community is encouraged to work to develop an indicator that could be proposed for the 2025 comprehensive review. See E/CN.3/2020/2, paragraph 23.*
Goal 12. Ensure sustainable consumption and production patterns	
12.1 Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries	12.1.1 Number of countries developing, adopting or implementing policy instruments aimed at supporting the shift to sustainable consumption and production

12.2 By 2030, achieve the sustainable management and efficient use of natural resources	12.2.1 Material footprint, material footprint per capita, and material footprint per GDP
	12.2.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP
12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses	12.3.1 (*a*) Food loss index and (*b*) food waste index
12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	12.4.1 Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement
	12.4.2 (*a*) Hazardous waste generated per capita; and (*b*) proportion of hazardous waste treated, by type of treatment
12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	12.5.1 National recycling rate, tons of material recycled
12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle	12.6.1 Number of companies publishing sustainability reports
12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities	12.7.1 Degree of sustainable public procurement policies and action plan implementation
12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	12.8.1 Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (*a*) national education policies; (*b*) curricula; (*c*) teacher education; and (*d*) student assessment
12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production	12.a.1 Installed renewable energy-generating capacity in developing countries (in watts per capita)

12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products	12.b.1 Implementation of standard accounting tools to monitor the economic and environmental aspects of tourism sustainability
12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities	12.c.1 Amount of fossil-fuel subsidies (production and consumption) per unit of GDP
Goal 13. Take urgent action to combat climate change and its impacts[3]	
13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	13.1.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population
	13.1.2 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030
	13.1.3 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies
13.2 Integrate climate change measures into national policies, strategies and planning	13.2.1 Number of countries with nationally determined contributions, long-term strategies, national adaptation plans and adaptation communications, as reported to the secretariat of the United Nations Framework Convention on Climate Change
	13.2.2 Total greenhouse gas emissions per year
13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	13.3.1 Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (*a*) national education policies; (*b*) curricula; (*c*) teacher education; and (*d*) student assessment

13.a Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible	13.a.1 Amounts provided and mobilized in United States dollars per year in relation to the continued existing collective mobilization goal of the $100 billion commitment through to 2025
13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities	13.b.1 Number of least developed countries and small island developing States with nationally determined contributions, long-term strategies, national adaptation plans and adaptation communications, as reported to the secretariat of the United Nations Framework Convention on Climate Change
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development	
14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution	14.1.1 (*a*) Index of coastal eutrophication; and (*b*) plastic debris density
14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	14.2.1 Number of countries using ecosystem-based approaches to managing marine areas
14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels	14.3.1 Average marine acidity (pH) measured at agreed suite of representative sampling stations
14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics	14.4.1 Proportion of fish stocks within biologically sustainable levels
14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information	14.5.1 Coverage of protected areas in relation to marine areas

14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation[4]	14.6.1 Degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing
14.7 By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism	14.7.1 Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries and all countries
14.a Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries	14.a.1 Proportion of total research budget allocated to research in the field of marine technology
14.b Provide access for small-scale artisanal fishers to marine resources and markets	14.b.1 Degree of application of a legal/regulatory/ policy/institutional framework which recognizes and protects access rights for small-scale fisheries
14.c Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of “The future we want”	14.c.1 Number of countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nations Convention on the Law of the Sea, for the conservation and sustainable use of the oceans and their resources
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	
15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with	15.1.1 Forest area as a proportion of total land area

obligations under international agreements	15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type
15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	15.2.1 Progress towards sustainable forest management
15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world	15.3.1 Proportion of land that is degraded over total land area
15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development	15.4.1 Coverage by protected areas of important sites for mountain biodiversity
	15.4.2 Mountain Green Cover Index
15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species	15.5.1 Red List Index
15.6 Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed	15.6.1 Number of countries that have adopted legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits
15.7 Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products	15.7.1 Proportion of traded wildlife that was poached or illicitly trafficked
15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species	15.8.1 Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species
15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts	15.9.1 (*a*) Number of countries that have established national targets in accordance with or similar to Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011–2020 in their national biodiversity strategy and action plans and the progress reported towards these targets; and (*b*) integration of biodiversity into national accounting and reporting systems, defined as implementation of the System of Environmental-Economic Accounting

15.a Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems	15.a.1 (*a*) Official development assistance on conservation and sustainable use of biodiversity; and (*b*) revenue generated and finance mobilized from biodiversity-relevant economic instruments
15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation	15.b.1 (*a*) Official development assistance on conservation and sustainable use of biodiversity; and (*b*) revenue generated and finance mobilized from biodiversity-relevant economic instruments
15.c Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities	15.c.1 Proportion of traded wildlife that was poached or illicitly trafficked
Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	
16.1 Significantly reduce all forms of violence and related death rates everywhere	16.1.1 Number of victims of intentional homicide per 100,000 population, by sex and age
	16.1.2 Conflict-related deaths per 100,000 population, by sex, age and cause
	16.1.3 Proportion of population subjected to (*a*) physical violence, (*b*) psychological violence and (*c*) sexual violence in the previous 12 months
	16.1.4 Proportion of population that feel safe walking alone around the area they live
16.2 End abuse, exploitation, trafficking and all forms of violence against and torture of children	16.2.1 Proportion of children aged 1–17 years who experienced any physical punishment and/or psychological aggression by caregivers in the past month
	16.2.2 Number of victims of human trafficking per 100,000 population, by sex, age and form of exploitation
	16.2.3 Proportion of young women and men aged 18–29 years who experienced sexual violence by age 18
16.3 Promote the rule of law at the national and international levels and ensure equal access to justice for all	16.3.1 Proportion of victims of violence in the previous 12 months who reported their victimization to competent authorities or other officially recognized conflict resolution mechanisms

	16.3.2 Unsentenced detainees as a proportion of overall prison population
	16.3.3 Proportion of the population who have experienced a dispute in the past two years and who accessed a formal or informal dispute resolution mechanism, by type of mechanism
16.4 By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime	16.4.1 Total value of inward and outward illicit financial flows (in current United States dollars)
	16.4.2 Proportion of seized, found or surrendered arms whose illicit origin or context has been traced or established by a competent authority in line with international instruments
16.5 Substantially reduce corruption and bribery in all their forms	16.5.1 Proportion of persons who had at least one contact with a public official and who paid a bribe to a public official, or were asked for a bribe by those public officials, during the previous 12 months
	16.5.2 Proportion of businesses that had at least one contact with a public official and that paid a bribe to a public official, or were asked for a bribe by those public officials during the previous 12 months
16.6 Develop effective, accountable and transparent institutions at all levels	16.6.1 Primary government expenditures as a proportion of original approved budget, by sector (or by budget codes or similar)
	16.6.2 Proportion of population satisfied with their last experience of public services
16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels	16.7.1 Proportions of positions in national and local institutions, including (*a*) the legislatures; (*b*) the public service; and (*c*) the judiciary, compared to national distributions, by sex, age, persons with disabilities and population groups
	16.7.2 Proportion of population who believe decision-making is inclusive and responsive, by sex, age, disability and population group
16.8 Broaden and strengthen the participation of developing countries in the institutions of global governance	16.8.1 Proportion of members and voting rights of developing countries in international organizations
16.9 By 2030, provide legal identity for all, including birth registration	16.9.1 Proportion of children under 5 years of age whose births have been registered with a civil authority, by age

16.10 Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements	16.10.1 Number of verified cases of killing, kidnapping, enforced disappearance, arbitrary detention and torture of journalists, associated media personnel, trade unionists and human rights advocates in the previous 12 months
	16.10.2 Number of countries that adopt and implement constitutional, statutory and/or policy guarantees for public access to information
16.a Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime	16.a.1 Existence of independent national human rights institutions in compliance with the Paris Principles
16.b Promote and enforce non-discriminatory laws and policies for sustainable development	16.b.1 Proportion of population reporting having personally felt discriminated against or harassed in the previous 12 months on the basis of a ground of discrimination prohibited under international human rights law
Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development	
Finance	
17.1 Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection	17.1.1 Total government revenue as a proportion of GDP, by source
	17.1.2 Proportion of domestic budget funded by domestic taxes
17.2 Developed countries to implement fully their official development assistance commitments, including the commitment by many developed countries to achieve the target of 0.7 per cent of gross national income for official development assistance (ODA/GNI) to developing countries and 0.15 to 0.20 per cent of ODA/GNI to least developed countries; ODA providers are encouraged to consider setting a target to provide at least 0.20 per cent of ODA/GNI to least developed countries	17.2.1 Net official development assistance, total and to least developed countries, as a proportion of the Organization for Economic Cooperation and Development (OECD) Development Assistance Committee donors' gross national income (GNI)
17.3 Mobilize additional financial resources for developing countries from multiple sources	17.3.1 Foreign direct investment, official development assistance and South-South cooperation as a proportion of gross national income
	17.3.2 Volume of remittances (in United States dollars) as a proportion of total GDP

17.4 Assist developing countries in attaining long-term debt sustainability through coordinated policies aimed at fostering debt financing, debt relief and debt restructuring, as appropriate, and address the external debt of highly indebted poor countries to reduce debt distress	17.4.1 Debt service as a proportion of exports of goods and services
17.5 Adopt and implement investment promotion regimes for least developed countries	17.5.1 Number of countries that adopt and implement investment promotion regimes for developing countries, including the least developed countries
Technology	
17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge-sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism	17.6.1 Fixed Internet broadband subscriptions per 100 inhabitants, by speed[5]
17.7 Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed	17.7.1 Total amount of funding for developing countries to promote the development, transfer, dissemination and diffusion of environmentally sound technologies
17.8 Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology	17.8.1 Proportion of individuals using the Internet
Capacity-building	
17.9 Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North-South, South-South and triangular cooperation	17.9.1 Dollar value of financial and technical assistance (including through North-South, South-South and triangular cooperation) committed to developing countries
Trade	
17.10 Promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the World Trade Organization, including through the conclusion of negotiations under its Doha Development Agenda	17.10.1 Worldwide weighted tariff-average

17.11 Significantly increase the exports of developing countries, in particular with a view to doubling the least developed countries' share of global exports by 2020	17.11.1 Developing countries' and least developed countries' share of global exports
17.12 Realize timely implementation of duty-free and quota-free market access on a lasting basis for all least developed countries, consistent with World Trade Organization decisions, including by ensuring that preferential rules of origin applicable to imports from least developed countries are transparent and simple, and contribute to facilitating market access	17.12.1 Weighted average tariffs faced by developing countries, least developed countries and small island developing States
Systemic issues	
Policy and institutional coherence	
17.13 Enhance global macroeconomic stability, including through policy coordination and policy coherence	17.13.1 Macroeconomic Dashboard
17.14 Enhance policy coherence for sustainable development	17.14.1 Number of countries with mechanisms in place to enhance policy coherence of sustainable development
17.15 Respect each country's policy space and leadership to establish and implement policies for poverty eradication and sustainable development	17.15.1 Extent of use of country-owned results frameworks and planning tools by providers of development cooperation
Multi-stakeholder partnerships	
17.16 Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries	17.16.1 Number of countries reporting progress in multi-stakeholder development effectiveness monitoring frameworks that support the achievement of the sustainable development goals
17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships	17.17.1 Amount in United States dollars committed to public-private partnerships for infrastructure
Data, monitoring and accountability	
17.18 By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island	17.18.1 Statistical capacity indicator for Sustainable Development Goal monitoring

developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts	17.18.2 Number of countries that have national statistical legislation that complies with the Fundamental Principles of Official Statistics
	17.18.3 Number of countries with a national statistical plan that is fully funded and under implementation, by source of funding
17.19 By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries	17.19.1 Dollar value of all resources made available to strengthen statistical capacity in developing countries
	17.19.2 Proportion of countries that (*a*) have conducted at least one population and housing census in the last 10 years; and (*b*) have achieved 100 per cent birth registration and 80 per cent death registration