



EUROPEAN  
COMMISSION



# Guidelines for Frameworks & Models

for a national set of rules for **establishing**,  
**organization** and **evaluating** activities of  
students' **startups** in the **IT sector**.

*This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.*

This report was prepared in 2014 for Tempus project “**National Education Framework for Enhancing IT Students' Innovation and Entrepreneurship**”, 530576-TEMPUS-1-2012-1-SE-TEMPUS-SMHES, WP3

The project team responsible for this report consisted of Dudar Zoia, Kauk Viktor, Shatovska Tetyana, Revenchuk Ilona, Chupryna Anastasiya, Vorochek Olga, Shamsha Borys, Fedasyuk Dmytro, Yakovyna Vitaly, Lyutak Igor, Reyda Oleksandr, Pietukh Anatolii, Krisilov Viktor, Liubchenko Vira, Samia Kamal, Bob Champion .

Tempus consortium partners:

- Linnaeus University, Växjö, Sweden
- Kharkiv National University of Radioelectronics, Kharkiv, Ukraine
- Lviv Polytechnic National University, Lviv, Ukraine
- Odessa National Politechnic University, Odessa, Ukraine
- Ivano-Frankivsk National Technical University of Oil and Gas, Ivano-Frankivsk, Ukraine
- Vinnytsia National Technical University, Vinnytsia, Ukraine
- Instituto Pedro Nunes, Coimbra, Portugal
- Oxford Brookes University, Oxford, United Kingdom
- Ministry of Education and Science, Youth and Sport in Ukraine, Kyiv, Ukraine
- IKEA AB, Älmhult, Sweden
- SIGMA Kudos Sweden AB, Växjö, Sweden
- Yuzhnoye State Design Office, Dnepropetrovsk, Ukraine
- Dublin City University, Dublin 9, Ireland

# INTRODUCTION

At the current stage of development, a systemic problem in Ukraine is the low effectiveness of the National Innovation System. This results in poor competitiveness of the economy and inadequate support of the country's sustained development. This is why it is necessary to define the general components of the National Innovation System, and how it will develop innovation and investment models. It is also necessary to identify weaknesses and obstacles that thwart progress, and advantages and potential capabilities of making coordinated systemic changes.

All analytical studies have shown that the IT industry is one of the core prospective lines of development for innovation in Ukraine. In order to set up collaboration links in the 'education-science-business' sector, it is necessary to reform approaches to students' IT tuition, take account of the pressing needs of the IT business and the prospective ways of IT development. From outset, the students should be encouraged to develop their own IT products or IT services and play their part in an innovative culture.

Unfortunately, education and science, are presently largely estranged from forming an innovative economy.

However, Ukraine has the potential for advancing intellectual property and opportunities for boosting the effectiveness of its usage. Despite the dramatic decline of academic science, there is still significant potential of creators with innovative value. The sole prerequisite for this is providing adequate conditions, including innovation structures at both regional and national levels.

The main objective of this report is determining and describing the models of state innovation activity which is aimed at making coordinated changes in all links of the National Innovation System, and which would be focused to a fundamental extension of its influence on the country's economic and social growth by creating appropriate innovation structures.

In Ukraine, the innovation activity infrastructure is still in its development stage. Presently, only separate kinds of innovation structures are in place, in particular, science parks, science centres, business incubators, IT parks, investment funds, and so forth.

Ukraine only has a limited number of innovation structures that are structurally incomplete, and their activities are functionally vague.

Development of an innovation infrastructure requires all-round state support. The content and form of this support has been described in basic legislative and statutory documents. This report also provides recommendations on actions to be taken to change these laws.

The prerequisite for successful innovation activity is its institutional support. Such support envisages the existence of appropriate governmental bodies, (i.e. ministries, state committees, departments) as well as the existence of laws, rules, regulations, and standards of innovation processes. The private and the public sector also contribute to institutions. Various public organisations (associations, unions, etc.) can conduct independent appraisals and influence innovative activity at both regional and national levels.

Integration of science and production is an integral component of the current innovation process. The active interaction of all business entities with research and development (R&D) organizations of different types, creates conditions for effectively implementing the achievements of scientific-and-technological advances and ensuring competitiveness of business entities.

Application of advanced technologies and usage of new kinds of products create a framework for a long-term competitive strategy for firms. It also forms and meets consumers' demands, whilst reinforcing the market positions of world economy leaders due to commercial application of innovations. Due to this, R&D programs are in increasing demand. This promotes emergence of various organisational forms, which focus RED to a specific market and intensive application of research results in production.

Based on integration and inter-firm cooperation principles; research and engineering collaboration is developing with academic institutions and universities. This paves the way for the emergence of new organisational forms of such interaction. These are technoparks, technopolises, research and industrial complexes of different kinds, business associations, and inter-firm strategic alliances (see Table 1). Such organisational forms of innovation address the problems of innovation development by forming of new technological structures and are a new method of managing the 'science-engineering-production' cycle.

In management processes, industry associations (Lat.-unions) play a significant role in introducing industrial innovations. They were most widespread in Japan under the auspices of the Ministry for Foreign Trade and Industry (MFTI).

An exceptional role in activating the research stage in the innovation cycle belongs to research associations. They have sectors for basic problem-oriented exploratory research. Research associations are intended for establishing close interaction between the academic sector and industrial production. In countries with a developed market economy, associations play a prominent role in defining the key lines of long-term economic development.

**Table 1** Organisational forms of innovation activity

Items	Kind of Organisation	Brief Profile
1	Business park	In general, this is a land estate, legally and technically organised as a specialised income generating property having an appropriate utilities and transport infrastructure. It usually includes an office, and production and warehouse facilities.
2	Industrial park	This is a variation of a business park. It is intended for accommodating primarily production and warehouse complexes.
3	Technopark	<p>A complex of independent organisations for the research and production cycle of developing innovations (R&amp;D institutes, higher education institutions (HEI), and enterprises).</p> <p>A variation of a business park established with involvement of major universities and research centres of corporations for organising large-scale R&amp;D efforts and their speedy introduction to production. It usually includes the following: laboratories and offices, and small production and warehouse complexes located in one building or a group of interconnected buildings.</p> <p>In Ukrainian legislation, a technopark is a legal entity or a group of legal persons (further, technopark participants) who act pursuant to a joint activity agreement without setting up a legal entity and pooling contributions. This is for the purpose of creating an organisational basis for executing technopark projects, and introducing to production research-intensive developments, high technologies, and ensuring industrial production of competitive products in the world market. (Law of Ukraine <a href="#">On the Special Regime of Innovation Activity of Technoparks</a>).</p>
4	Science park	A legal entity established on the initiative of a HEI and/or a research institution by pooling the contributions of founders for organising, coordinating and supervising the process of developing and executing science park projects (pursuant to the Law <a href="#">On Science Parks</a> ).
5	Technopolis	A specially established complex embracing the entire cycle of innovation efforts
6	Regional research & industrial complexes, and research & engineering centres	They conduct fundamental and applied research in different areas, followed by experimental verification and filing invention and discovery, methods and know-how patent applications.

**Table 1****Organisational forms of innovation activity (Continued)**

Items	Kind of Organisation	Brief Profile
7	Business incubators	Established with the purpose of 'nurturing' new businesses. Provides specially equipped premises and other property to entrepreneurs who are launching a business to promote their financial independence on special conditions and for a definite time interval.
8	Special departments of firms (creative teams, project groups, etc.)	Established at major enterprises and firms that manufacture research-intensive products. They define the innovation strategy.
9	Venture firms	Established for generating concepts, developing them and introducing to production. Distinguished by extreme innovation activity and significant risk.
10	Consulting and analytical firms	These firms predict development of technologies, new products and demand for innovations. They also identify long-term goals and research topics.
11	Strategic alliances: consortiums, joint ventures, etc.	Different forms of international engineering cooperation of firms, which are created for joint RED, mutual exchange of production experience, and risk sharing during RED.
12	Interim engineering teams	Established to elaborate a specific research-and-application problem for a definite period.
13	Cluster	A group of inter-related companies concentrated in a certain territory: vendors of equipment, completing articles and specialised services; infrastructures; R&D institutes; HEI and other organisations who mutually complement each other and reinforce the competitive advantages of separate companies and the cluster as a whole. Examples of clusters are the Silicon Valley and Hollywood in the U.S.A.

Earlier forms are extending their activities. This variety of consulting and research organisations has accumulated a wealth of experience by using consultancy methods to address the problems of firms. A line of small specialty firms also exist. They service all the stages of formation and implementation of program-oriented RED, and their consultancy expert validation and elaboration. In addition, there are small research-intensive venture firms, which can be set up on the initiative of individual inventors, academics or groups of specialists for implementing their own inventions.

Recently, one can witness the trend of integration of the state and the private corporate sector in executing major research-and-development programs, both national and international.

The interest in new structures for the interaction of research and production worldwide stems from the fact that their development can involve integrated solutions to a variety of problems in the R&D, social and economic areas, and primarily, to ensure production competitiveness in the global markets.

These and other organisational structures, which ensure development of innovation processes, bring order to this involved and risky process, stimulate it and regulate at different hierarchical management levels (i.e. at an enterprise or corporation) and in a region or the country as a whole.

**Technoparks.** World practice has witnessed the development of a special form of organising the 'research-production-consumption' process, namely, technoparks.

Technopark is an R&D and production complex including research institutes, laboratories, and pilot production plants with an advanced technology, which are established in reserved sites around major universities with a developed infrastructure. This comprises the following: laboratory buildings, general-purpose production premises, multiple access information and computing centres, transport and other communication systems, shops, housing and amenity spaces, and servicing and exhibition complexes.

The key objective of technoparks is achieving close territorial ties between the material base required for research, which belongs to industrial production, and the human component of the country's scientific potential, which forms the most favourable conditions for innovation process development.

The key principles of establishing technoparks are as follows:

- Coordinating the activity and collaboration of four key components: science & higher education institutions, the state production sector, private companies and regional municipal administrative bodies; advancing the processes of transferring research and engineering knowledge gained during basic and applied research to production;
- Developing innovative entrepreneurship;
- Attracting industrial and banking financial resources to the innovation sphere; and
- Concentrating venture capital and employing it.

With a view to promoting the development of technopark structures during the initial years of their existence, the state creates a privileged (preferential) regime in these territories.

Across the world, the following preferences are common for innovation structures:

- New firms originating in the technopark are exempt from paying registration tax;
- Firms that operate in the technopark are exempt from income taxes during the first two to three years of operation, and in the following years they pay it at rates reduced by 50 %;
- Funds allocated by firms to technopark development are excluded from taxed income; and
- Firms included in the technopark are exempt from paying land tax and property tax.

As a rule, the firms operating in the technopark are independent legal entities.

The first version of the Law of Ukraine [[On the Special Regime of Investment and Innovation Activity of Technoparks](#) No. 991 of 16.07.99 (further, Law on TP)] provided technopark projects with the following state support measures:

- Exemption from income tax;
- Exemption from value-added tax (VAT) on sales in Ukraine;
- Exemption from paying import duty;
- Exemption from paying VAT on import of goods;
- Product sales proceeds in foreign currency are exempt from obligatory sale; and
- Prolonging the term of export-import payments from 90 to 150 days.

To implement technopark projects, a budget program was envisaged for state support of technoparks by total or partial (up to 50%) interest-free crediting of technopark projects, and full or partial compensation of interest paid by technopark project contractors to commercial banks and other financial institutions for crediting technopark projects.

However, state support of innovation activities was liquidated due to the so-called 'technical error of the government' when, on the initiative of the Ministry of Finances in early 2005, the economic articles of the Law [On Innovation Activities](#) were cancelled. The Law [On the Special Regime of Technopark Activities](#) was blocked at the same time. This was done in spite of the fact that the state, pursuant to Article 8 of the Law on Technoparks, guaranteed a stable special regime for the entire term of validity of the law, i.e. 15 years.

In March 2006, state support of technoparks was renewed in part, though it is effective only partially:

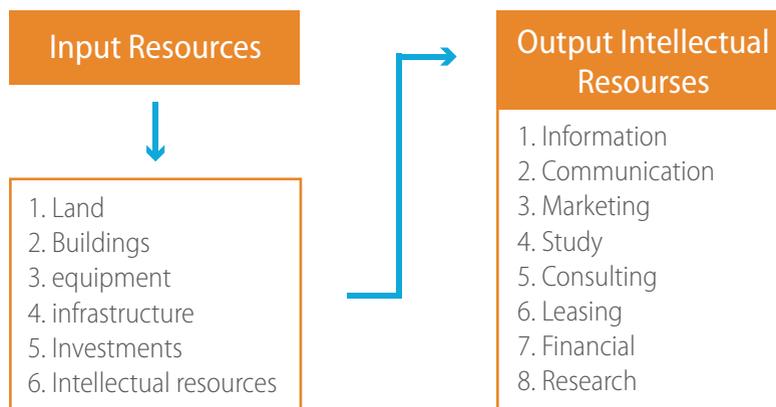
- a) Exemption from income tax (valid);

- b) Exemption from paying import duty (valid);
- c) Product sales proceeds in foreign currency are exempt from obligatory sale (valid);
- d) Export-import operations payments shall be done in up to 150 calendar days (valid);
- e) Paying VAT with a tax anticipation bill during import of new installations, equipment and completing articles – 720 calendar days, materials – 180 days (invalid);
- f) Financial support:
  - Full or partial (up to 50%) interest-free crediting (invalid);
  - Full or partial interest compensation (invalid);
  - Accelerated fixed assets depreciation (invalid).

Blocking the activity of technoparks has become normal practice.

Technoparks have demonstrated their effectiveness in shortening the research-production-consumption cycle. Under technopark conditions, 3 to 5 years are required to develop a new product and commercialise it, and another 2 to 3 years are needed to return the funds spent on its development. The territorial closeness of institutions with different profiles (universities, private industrial enterprises, and state institutions) in the park have a positive effect on the activities of these entities by promoting more close ties between research and production, and increasing investment effectiveness. The firms included in technoparks allocate funds to equip educational institutions, and attract university students and post-graduates to work in their laboratories (Fig. 1).

**Figure 1**



Key advantages of technoparks:

- Integration of different stages of the innovation process;
- Industry gains fast access to new developments;
- More rapid implementation and dissemination of innovations (novelties);
- Seamless interaction between educational, research and industrial developers in shaping engineering progress;
- Conditions and opportunities are created for establishing new kinds of businesses and production, and inventing;
- Production gains access to consultants and laboratories; and
- Students have an opportunity to acquire both theoretical and practical knowledge.

A special management body is established to manage a technopark. Its functions are as follows:

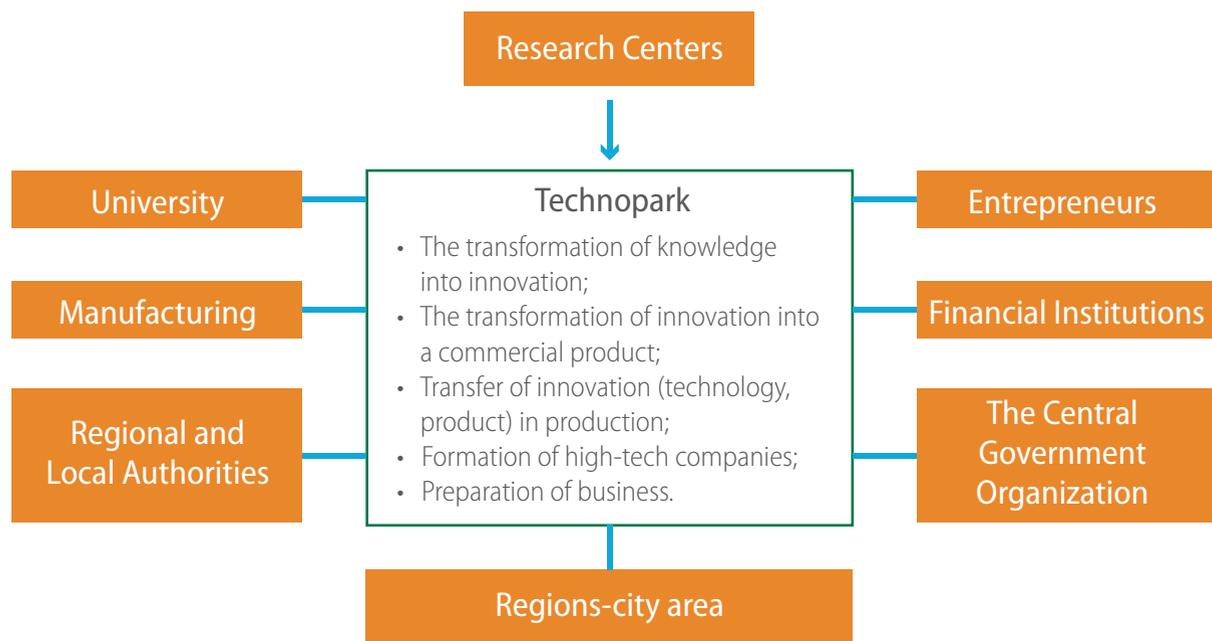
- Determining the technopark functional structure;
- Admitting new firms to the technopark;

- Accommodating firms in available premises and granting them land lots for greenfield development in the technopark territory;
- Monitoring the activity of certain firms to check whether it conforms to technopark functioning objectives as a whole, and evacuating a firm beyond technopark limits if it fails to meet the technopark profile; and
- Setting up venture firms and funds within technopark limits.

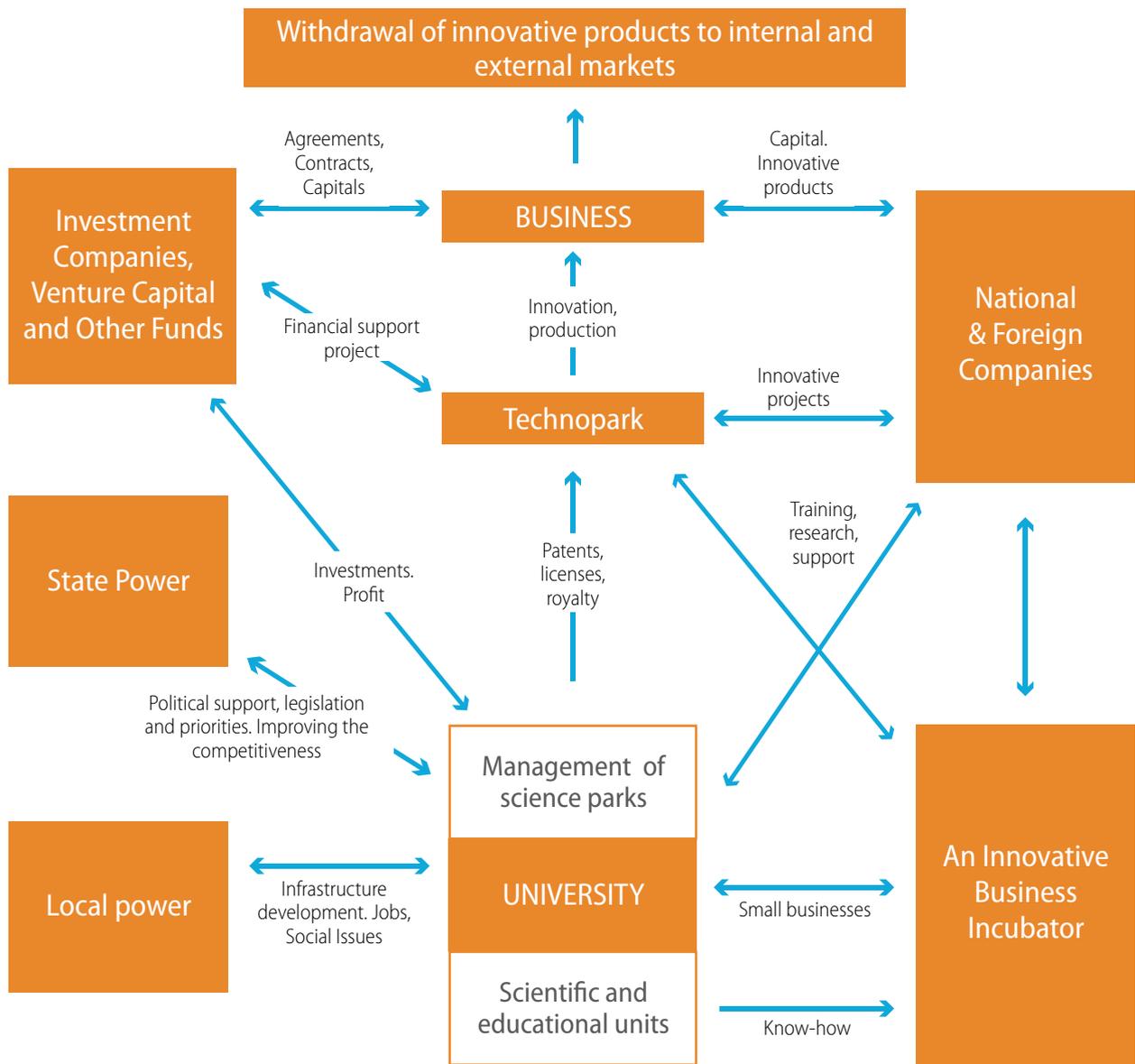
The technoparks are financed by firms that operate as technopark members; by state and regional subsidies, and bank credits; by income of own enterprises, universities, and revenue from selling technological solutions to state institutions and private firms, students' tuition payment, sponsor support, and other sources of funding.

Technoparks are managed by state and local authorities based on adopted legislative acts, financing and development programs, and by direct participation. The government develops large-scale technopark support programs, and promotes research and production cooperation. Fig. 2 is a basic technopark diagram. Fig. 3 shows the technopark structure.

**Figure 2** Basic scheme of Technopark



**Figure 3** Technopark Structure



**Technopolises.** The structure of a technopolis is similar to that of a technopark; however, it is located within the limits of a concrete residential locality whose development is ensured by the technopolis. A technopolis is an integrated research and production complex built in a separate town. Technopolises can originate in both newly developed towns and old reconstructed ones. Establishment of technopolises has an organising effect on the development of those regions where they are located. They promote the following:

- Boost innovation activity;
- Form an innovation infrastructure;
- Speed up commercialisation of novelties;
- Structural change of production;

- Create new jobs;
- Streamline innovation activity mechanisms;
- Reinforce research-intensive industrial development;
- Extend personnel professionalism;
- Raise the innovative level of the economy.

The site of technopolises should meet the following requirements:

- Identification of regions, which can be used for developing research-intensive production units;
- Formulation of objectives and tasks for development of such production units, and industrial development of the region;
- Planning, building and maintaining the industrial site, the utilities and water supply, residential area, roads, etc.
- Elaborate the legal basis (laws) for creating favourable conditions for financing commercial enterprises and other services required for technopolis development;
- All-round state support by introducing a preferential taxation system; developing the appropriate infrastructure; and financial aid to commercial enterprises that support development of hi-tech industries; and
- Presence of R&D institutes and a university, which are instrumental in effecting and coordinating R&D, and training highly qualified specialists.

Emphasis is placed on a condition of locating technopolises on a compact site. This is required for convenient accommodation of specialists and service personnel.

In the West, a technopolis is considered a research centre of regional importance, which deals with problems in introducing advanced technologies, and is a nucleus for international scientific cooperation with an organised service and an interesting cultural life. In the U.S.A., technopolises have been established in over half of the states.

Japan boasts an intensive development of technopolises with a special program called Technopolis, which comprises the following key components:

- nationwide programs for developing research-intensive industries and principally new technologies;
- programs for encouraging small research firms and development of small venture firms;
- a national and regional development plan;
- creating a nationwide information network system (INS); and
- creating international associations in R&D.

**Innovation centres — business incubators.** World practice demonstrates a variety of options of organising interaction between research and production. Such collaboration is built around the following:

- research laboratories;
- exhibition and retail complexes, banks, exchanges, etc.;
- major corporations.

This results in a variety of names, (i.e. academic centres, business and innovation centres, and incubators).

Their formation is based on the principle of joint usage of intellectual, material and financial resources.

An incubator is a complex multifunctional system. It ensures favourable conditions for effective operation of unseasoned small innovation firms, which implement interesting scientific ideas. Such firms in incubator centres are provided with many innovation services, in particular, as follows:

- rental of premises;
- rental of research and technological equipment for a definite period;
- consultancy on economic and legal issues;

- financial services;
- appraisal of innovation projects (engineering, ecological, and commercial); and
- informational and advertising support.

Practice shows that, in a competitive environment, far more small innovation firms survive in incubators rather than outside of them.

The activity of incubators is effective. Their development requires no budget financing (probably except for minimal funds in the form of start-up capital). An incubator, as a rule, maintains itself on a self-financing basis. Its interest is that small innovation structures become profitable as soon as possible, namely, an incubator is guaranteed a significant share in their future profits.

Business incubators are operating successfully in Germany, Poland, Slovakia, and Czech Republic. The experience of foreign countries shows that incubators can be of three kinds.

1. Non-profit ones are those that operate by attracting funds of local administration bodies. The latter are interested in creating jobs and regional economic development. Such incubators receive payment from occupants, which is much lower (by 50%) than the average nationwide one. This is sufficient to support the core personnel working in the incubator.
2. Profit ones are those that do not grant benefits when they lease their property. These mainly are business incubators, the numbers of which are growing. They offer occupants a variety of services for the usage of which they receive payments.
3. Incubators, which operate at academic institutes and higher educational institutions. They act as a connecting link in developing innovations between research institutions and private businesses, and effectively support enterprises aimed at mastering the manufacture of hi-tech products, (i.e. provide consultancy by research workers, a research and laboratory base, computers, and the option of using a library).

In Ukraine, business incubators have also been set up at some higher educational institutions and in the regions (with support of governmental programs of foreign countries).

Thus, on the initiative of the local state administration to support innovation activities in the capital, the Kyiv innovation business incubator has been organised. It includes the following: the business incubator per se as the management body, coordination bodies for ensuring collaboration with the local administration; independent centres, which service incubator firms, and the firms themselves. Incubator firms are involved in innovative design and enjoy all the benefits extended by the business incubator (preferential rental of premises, and receiving services). They are located in the business incubator premises, though the term of their residence in the business incubator is limited to two to three years.

Innovation business incubators function at the technical universities in L'viv, Dnipropetrovsk and Kyiv. In 1996, a Ukrainian-Canadian business centre was established in Ivano-Frankivsk. Its key functions are those of a business incubator.

**Problems and prospects in the innovation area in Ukraine.** According to data in the report of the World Economic Forum on Global Competitiveness, Ukraine ranked 73<sup>rd</sup> among 144 countries in 2012-2013.

The key problems in the innovation area are as follows:

- no budget support of innovation projects and absence of effective tax incentives for investing in new technologies;
- low level of development of the innovation activity infrastructure;
- low innovation culture, and lack of awareness of the core role of intellectual property in development of the economy; and
- absence of appropriate financial institutions for supporting implementation of innovation projects.

According to the information of Ukrainian National News of 15.08.2013, enterprises located in technoparks worldwide

account for over 90% of the national export of software and IT services.

“Today, technoparks worldwide are the most significant kind of IT company organisation. Presently, enterprises located worldwide in technoparks account for over 90 % of the national export of software and IT services (e.g., Kyiv, Kharkiv, L'viv and other cities). Such technoparks are located almost across the entire territory of the country. Technoparks are integrated R&D centres with a developed infrastructure, advanced means for RED in electronics and the capability of speedy implementation of advanced technologies and know-how in production”, the IT Association notes.

In general, the goal of building technoparks is to stimulate on their sites the establishment of new national companies, as well as of subsidiaries and branches of major world producers of software, telecom equipment and electronics, whilst attracting foreign portfolio investments in IT industry development.

The Verkhovna Rada of Ukraine has registered a draft law on implementing the national Technopolis project. It provides for creating an infrastructure for innovative development and high technologies.

The draft law is aimed at creating conditions for boosting intellectually-intensive business within the national Technopolis project in Ukraine, attracting direct foreign investments, and introducing advanced technologies and superior world experience. We hope that this law will promote attraction of foreign investors and those companies that do not produce their software products in Ukraine. This draft law has identified the following priority regions: Kyiv, Kharkiv, Dnipropetrovsk, Odesa, and L'viv.

The effective laws of Ukraine [On Innovation Activity](#), [On Higher Education](#), [On Education](#) and [On Scientific and Technological Activities](#) shall set up the base for creating innovation enterprises at state HEI and budget research institutions. This will ensure real implementation of state sector R&D results in production.

However, the innovation activity of Ukrainian HEI in the IT industry is yet only at the formation stage.

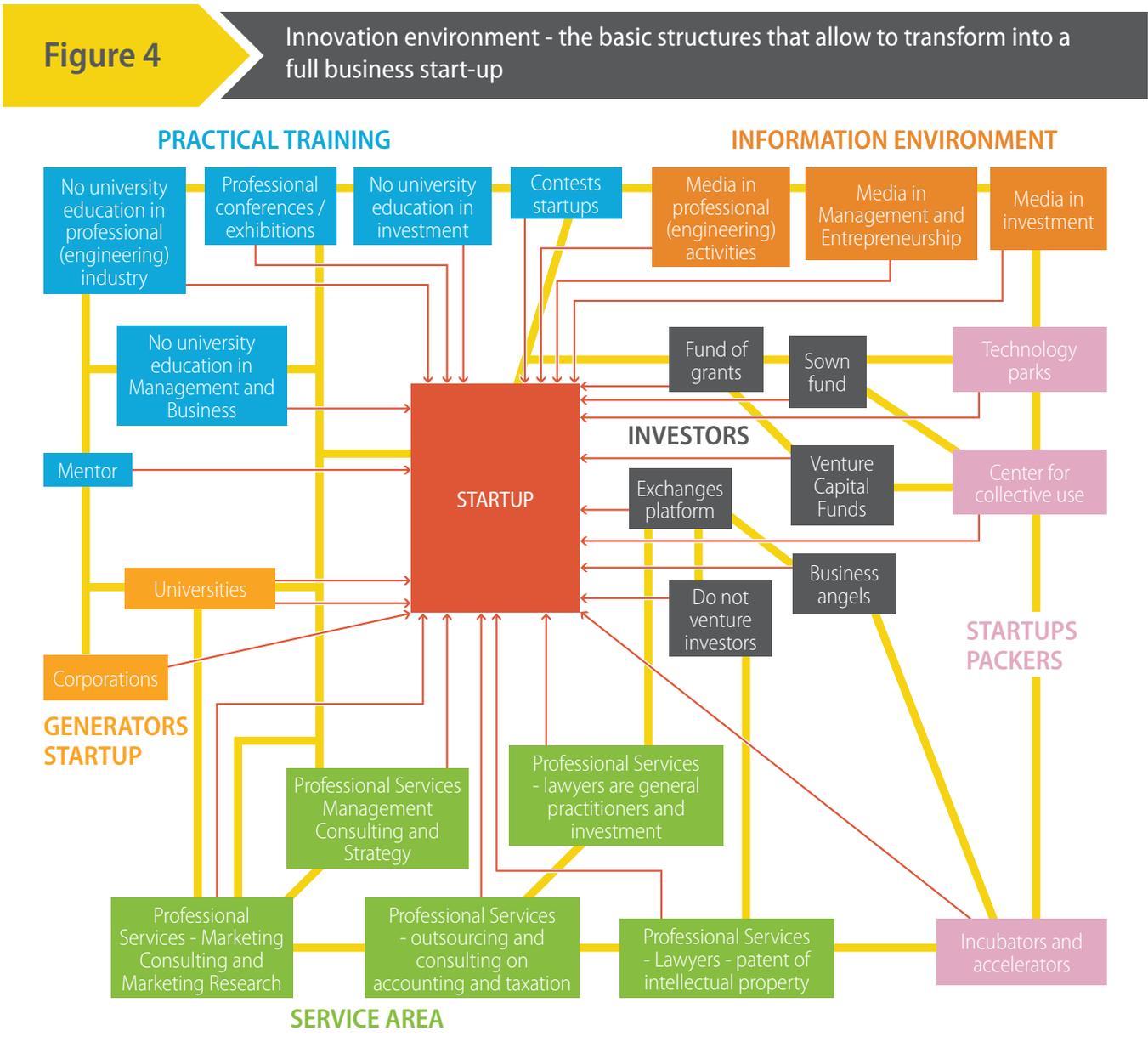
**A model of an innovation environment** with basic structures, which allow transforming a start-up to a full-fledged business, is shown in Fig.4, where:

- Non-university education in a professional (engineering) industry allows acquiring competence in those branches where innovation entrepreneurs have no special expertise. For instance, for scientists, this can be a business course, and for managers – a management program.
- Mentors ensure transfer of business skills to start-up companies. Experienced business persons offer their expertise to start-up business teams in exchange for time and a share in the business they consult.
- Professional conferences/exhibitions ensure substantially the media function in real time. All event participants are gathered in one place and are potentially open for communication. The main function of such events is establishing a wide circle of contacts among ecosystem members. Competitive bids will allow projects to find investors or position a participating team as ready for implementing challenging projects.
- The media in the professional (engineering) industry performs two tasks in innovation ecosystem processes, viz. propaganda and the marketing channel.
- Universities produce knowledge and specialists. These functions are important because they ensure emergence of new ideas and qualified employees. Often it is a cradle of start-ups. Their teams are formed of both students and members of the university academia.
- Corporations are centres of generating ideas in major companies. They are producers of scientific knowledge, which is transformed further to products. Corporations are the consumers of innovations. They act as producers of innovations and buyers of innovative ideas in the open market to offer a finished product later for the market.
- Professional consultancy services act less perceptibly than mentors; however, their services are important and have their own place in the innovation environment.
- Exchanges and alternative entities are required for locating registered businesses to promote their attractiveness to a wide circle of investors. Divisions with special conditions for innovation companies can also be created.
- Non-venture investors are casual participants of the venture innovation market. They attempt to diversify their

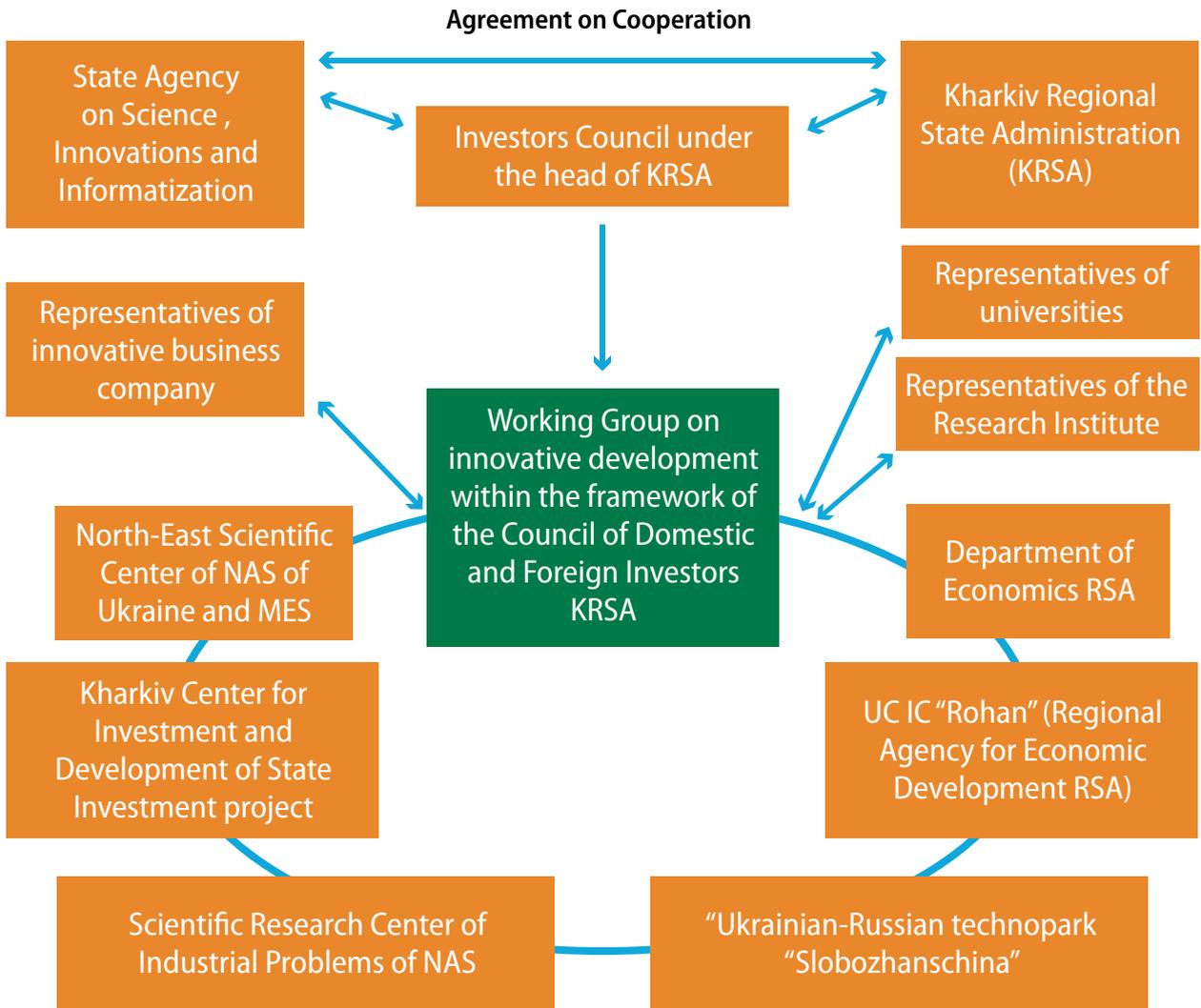
contributions. This allows transferring their profits from traditional industries or natural resource rent to modern industries.

- Venture funds are investors capable of managing high-risk investments by employing both expertise and a special approach to allocation of funds.
- Business angels are private investors who perform the role of funds in those cases when companies are small, or when the representatives of such companies would prefer being in personal contact with persons who finance.
- Technoparks offer infrastructure solutions for engineering companies and help new businesses become solvent companies with steady increase of payments to the local budget.
- Incubators and accelerators act in the interest of entities, in the territories of which they are located. They create jobs and generate tax base growth.

Fig. 5 shows the model of interaction of the Kharkiv OSA, Derzhinformnauka and regional institutions for the purpose of establishing the Regional Innovation and Investment system.



**Figure 5** Model of interaction of Kharkiv Regional State Administration, SASII and regional institutions in order to develop regional innovation and investment systems



# SECTION 1

## Universal structural model of organising innovation and business activities of IT students

For in-depth comprehension of innovation activity and entrepreneurship processes, it is necessary to define a universal structure of the model of organising the innovation and business activity of IT students with a description of all feasible kinds of interaction.

### 1. Introduction

The model gives a general idea of all possible combinations of structural solutions on interaction of universities with innovation structures (at the regional and national levels), IT companies and other effectual entities (governmental, non-governmental and public) of innovation activities and entrepreneurship. In general, the model describes the possible processes and interactions between all model objects. The model cannot be used as an effective one. The model gives a generalising concept and a unified nomenclature system for all separate models described in other sections.

#### Objective

The universal structural model of organizing the innovation and business activity of IT students allows describing at a general level all the possible kinds of interaction between all the entities and subjects of such activity. It also gives the general definition of processes, which are basic ones for all possible structural objects. Their features are given for implementation at different entities and levels, viz. regional and national. The main objective of developing a universal model is describing all feasible variants of interaction between all innovation activity and entrepreneurship entities.

#### a) the purpose of the model is as follows:

- Identifying all possible entities of innovation activity and entrepreneurship (university, substantially different innovation structures, IT companies, governmental and non-governmental organisations, and investment structures);
- Identifying basic processes, which can be present in any entity (such as education, support, financing, and intellectual property protection);
- Identifying all possible kinds of interaction between structural entities (presence, absence, and distinctions);
- Making general conclusions on factors affecting the effectiveness of a structural decision;
- Determining the possibility of the university's formation of substantially different own innovation structures, or the possibility of being a co-founder or participant of external innovation structures.

#### b) target audience

The universal model can be interesting, primarily, for the administrative staff of universities, innovation structures at the regional and state level, and for instructors and researchers. This model can help make systemic conclusions about comprehending how to effectively organise interaction between all possible innovation activity and entrepreneurship entities.

### 1.2. Area of activity

The universal model demonstrates all the possible activity processes, and hence, embraces all possible areas of activity. The generalisation is done in such a manner that accounts for the possibility of forming new governmental and regional innovation structures, and even establishing new kinds of innovation structures.

**a) define what kind of results will be obtained**

The result of developing a universal model is systemising notions, processes and entities of innovation activity and entrepreneurship of IT students; and presenting a complete inventory of the possibilities of their interaction at the regional and state levels.

**b) explain what the suggested model will do (what it will not do if required)**

The universal model offers a basis for developing a multitude of separate models, which partially embrace entities and processes affecting the innovation activity and entrepreneurship of IT students. This mode per se cannot be implemented and used as an effective one.

**c) define accurately applicable advantages, objectives and tasks as far as possible:**

This subsection will define the generalised advantages, objectives and tasks for general entities:

### **s.1. For the University**

**General objectives:**

- To increase significantly the number of developed innovation products and services by involving students, post-graduates, instructors and researchers;
- To increase significantly the number of new enterprises set up with participation of students;
- To improve IT education quality;
- To improve quality of innovation projects;
- To create conditions for self-development of innovation and entrepreneurship movement among the youth; and
- To receive extra off-budget funds.

**General tasks:**

- To organise a university's innovation structure, which would implement to the utmost all processes;
- To involve university students, post-graduates, instructors and researchers, and external experts in the education process;
- To initiate events (workshops, trainings, competitions, conferences, etc.), which would boost the level of innovation and business training;
- To assign responsible persons in departments who would be engaged in innovation work with students;
- To create an expert council on innovation issues in the university;
- To set up a database of innovation projects;
- To set up engineering sites for communication of students and professionals in different IT branches;
- To work out and approve a complete package of statutory documents for governing interactions with external innovation structures, IT companies and other entities who will be involved in innovation and entrepreneurship processes; and
- To establish a system for registering information on new enterprises set up by students.

**General advantages:**

- Increased effectiveness of using own resources;
- Improving job placement for graduates and the level of their competitiveness in the labour market;
- Improving the qualification of faculty members;
- Increasing the number of developed innovation products and services;
- Improving the quality of developed innovation products and services;
- Increasing the amount of attracted off-budget funds; and
- Increasing the regional, national and international ratings of the university.

## s.2. For IT Company

### General objectives:

- To increase the competitiveness of own products;
- To create conditions for sustainable development of the company by engaging qualified specialists and introducing developments in prospective IT areas;
- To increase the volume of funding by selling own products and services;
- To take an appropriate place in the regional and national ecosystem of IT development and introduction.

### General tasks:

- To establish inner resources, which can be used in the company's innovation activity;
- To establish priority development lines when developing new products and services;
- To establish processes and innovation activity entities, in which the company can participate;
- To establish the list of competencies required for a university graduate to work henceforth with innovation products; and
- To maintain an innovation spirit in employees.

### General advantages:

- Developing premium quality competitive innovation products;
- Hiring professional workers;
- Gaining extra profits; and
- Increasing the influence on IT development in the region and nationwide.

## s.3. For an innovation structure

### General objectives:

- To boost the innovative activity and entrepreneurship of IT students;
- To streamline the mechanism of developing new innovation products and services;
- To gain extra profit;
- To integrate and combine different approaches and innovation activity and entrepreneurship entities; and
- To organise innovation processes in the country pursuant to international requirements and standards.

### General tasks:

- To elaborate a complete package of statutory documentation governing IS activities;
- To organise interaction with all model entities;
- To plan effective usage of resources;
- To popularise and boost innovation activities and entrepreneurship;
- To hold training;
- To conduct appraisal;
- To organise all kinds of requisite support;
- To identify sources of financing;
- To attract financing;
- To protect intellectual property assets; and
- To analyse statistical data.

### General advantages:

- Increasing the number of participants in innovation activities and entrepreneurship at all levels of interaction;

- Increasing the number of innovation products and services, and improving their quality;
- Gaining extra profits;
- Creating an effective system for development of innovation and entrepreneurship; and
- International recognition.

### 1.3. Definitions and abbreviations

U – University

IS – Innovation Structure

ITC – IT company

SI – State Institution

I – Investor

NGO – Non-government Organisation

E – Education

S – Support

F – Financing

IPP – Intellectual Property Protection

### 1.4. References

Innovation activities in Ukraine are governed by the following documents:

#### Laws of Ukraine:

- **On Innovation Activity** (VRU of 04.07.02 No.40/IV); presents the terminology and key aspects of state governance of innovation activities; gives a characteristic of the legal status of innovation projects, products, innovation enterprises and the methodology of their state registration, and also the features of financial support and international collaboration in innovation activities, <http://zakon2.rada.gov.ua/laws/show/40-15>;
- **On Scientific and Scientific-Technical Activities** (No.1316-IV/2003); determines the organisational, legal and financial grounds of functioning and development of research and engineering, <http://zakon2.rada.gov.ua/laws/show/1977-12>;
- **On the Priority Directions of Innovation Activity in Ukraine** (No.443-IV/2003); the law sets up a legal framework for concentrating state resources on the principal lines of research and engineering upgrading of production, providing the domestic market with competitive and research-intensive products, and entering the world market with these products, <http://zakon2.rada.gov.ua/laws/show/3715-17>;
- **On the Special Regime of Activity of Technological Parks** (No.3333-IV/2006); determines the legal and economic basis of introducing and functioning of a special regime of innovation activity of technological parks, <http://zakon2.rada.gov.ua/laws/show/991-14>;
- **On Scientific and Technical Information**, <http://zakon2.rada.gov.ua/laws/show/3322-12>;
- **On Scientific and Scientific-Technical Appraisal**, <http://zakon2.rada.gov.ua/laws/show/51/95-%D0%B2%D1%80>;
- **On Property** (No.697-XII), <http://zakon4.rada.gov.ua/laws/show/697-12>;
- **On State Regulation of Technology Transfer** (No.143-V), <http://zakon4.rada.gov.ua/laws/show/143-16>;
- **Civil Code of Ukraine** (Chapter IV Intellectual Property Rights), <http://zakon4.rada.gov.ua/laws/show/435-15>.

#### Decrees of the President of Ukraine:

- of 30.12.2005 No.1873/2005 **On Establishing the State Agency of Ukraine for Investments and Innovations**, <http://zakon4.rada.gov.ua/laws/show/1873/2005>;
- of 11.07.2006 No. 606/2006 **On the Decision of the Council of National Security and Defence of Ukraine of 6 April 2006 On the State of the Research and Technology Area and Measures for Ensuring Innovation Development in Ukraine**, <http://zakon4.rada.gov.ua/laws/show/606/2006>.

Resolution of the Verkhovna Rada of Ukraine On Observing the Legislation on Development of the Research and Technological Potential and Innovation Activity in Ukraine (No.1786-VI) <http://zakon4.rada.gov.ua/laws/show/1786-15>.

Orders of the MESU:

- On Approving the Provisions on the Procedure of Effecting Innovation Education Activities (of 07.11.00. No. 522), <http://zakon2.rada.gov.ua/laws/show/z0946-00>.
- On Approving the Provisions on a Pilot General Education Institution (of 20.02.02. No. 114), <http://zakon4.rada.gov.ua/laws/show/z0428-02>.
- On Approving the Provisions on Monitoring Execution of Innovation Projects as per the Priority Lines of Activity of Technological Parks (of 17.04.03. No. 245) <http://zakon2.rada.gov.ua/laws/show/z0575-03>.

The activity of higher education institutions is governed basically by the following laws:

- Law of Ukraine On Higher Education. This law has no provisions on innovation and innovative research; however, Section 10 deals with research and research-and-engineering activities in an HEI. The section considers the goals and tasks of research and research-and-engineering activities in an HEI, and the organisation and management of research and research-and-engineering activities, <http://zakon4.rada.gov.ua/laws/show/2984-14>.
- Law of Ukraine On Education <http://zakon4.rada.gov.ua/laws/show/1060-12>;
- Law of Ukraine On Scientific and Scientific-Technical Activities; determines the organisational, legal and financial framework of functioning and development of research and engineering; creates conditions for scientific and research-and-engineering activities, and ensures society and state needs in technological development, <http://zakon2.rada.gov.ua/laws/show/1977-12>.

The following laws of Ukraine govern the activities of scientific parks:

- On Scientific Parks, <http://zakon4.rada.gov.ua/laws/show/1563-17>;
- On Investment Activities, <http://zakon4.rada.gov.ua/laws/show/1560-12>;
- On Scientific and Scientific Technical Activities <http://zakon2.rada.gov.ua/laws/show/1977-12>;
- On Innovation Activities, <http://zakon2.rada.gov.ua/laws/show/40-15>;
- On State Regulation of Technology Transfer, <http://zakon2.rada.gov.ua/laws/show/143-16>.

The nomenclature of statutory acts to be used when drafting documents for state registration of a legal entity and for business activities of a legal entity:

- Civil Code of Ukraine, <http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?page=1&nreg=435-15>;
- Business Code of Ukraine, <http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=436-15>
- Law of Ukraine On Business Associations, <http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?page=1&nreg=1576-12>
- Law of Ukraine On State Registration of Legal entities and Natural Persons-Entrepreneurs, <http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=755-15>
- Law of Ukraine, On the State Budget of Ukraine for 2011. <http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=2857-17>
- Requirements to writing the name of a legal entity or its segregated division, <http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=z0792-04>
- Classifier of kinds of economic activity (CKEA), <http://www.asmap.org.ua/info/kved.doc>

## 2. Overview of models

This section is a brief presentation of the model context and its structure, and describes the model prehistory. The section also summarises the deficiencies and benefits of the model chosen. This can also pertain to the technical and economic substantiation.

It also describes how the model should offer solutions in Ukraine.

The model description must be given within model solution limits. This should be realised by a high data flow level and establish the model context.

To organise innovation activities and entrepreneurship at any entity, the following general processes can be distinguished:

### 1. Education process (E), has three general components:

E<sup>1</sup> – learning to create novelties;

E<sup>2</sup> – learning to start up one's own business;

E<sup>3</sup> – learning to attract funds.

With E<sup>1</sup>, a student must master the approaches to developing principally new products and services; to search for and analyse information on IT and research priority lines; master the skills of wording, describing and presenting one's own ideas, and distinguish among erroneous statements and proposals. During such education, the student should be motivated for creative activities and a desire to set up one's own business – a company – either personally or with a group of associates.

With E<sup>2</sup>, a student must learn to set up different kinds of legal entities for entrepreneurship both in Ukraine and abroad; to distinguish the advantage of different legal entities, and to choose the most effective scheme of registering a legal entity.

With E<sup>3</sup>, a student must learn how to search for sources of financing his/her innovation project; how to present information to investors; what to place emphasis on during interviews and negotiations with investors; how to carry oneself with an investor during financing, and how to return investments with different kinds of investing.

Process E can be implemented in different forms as follows:

- Educational subjects in training areas;
- Regular courses (with/without issuing a state certificate);
- One-time seminars;
- Periodic events (conferences, forums, etc.);
- On-line learning.

This list is not exhaustive and can be supplemented.

### 2. Process Support (S), which has three components:

S<sup>1</sup> – organisational;

S<sup>2</sup> – economic;

S<sup>3</sup> – legal.

With S<sup>1</sup>, a student will receive organisational support, involving the following:

- Providing sites for various events (tuition, discussion, development, and so forth);
- Organising meetings and various events;
- Organising joint activities of students in groups;
- Organising the activities of students and all those who desire to participate (post-graduates, instructors, researchers, investors, and so forth);
- Organising interaction with experts (in economy and engineering);

- Organising interaction between all structural entities of the model;
- Resolving possible conflicts, which can occur during joint work.

With  $S^2$ , a student will receive economic support, involving the following:

- Performing required calculations within the business model;
- Estimating requisite resources at all different stages of implementing an investment project;
- Assistance in preparing innovation products and services for participation in competitions, exhibitions, etc.;
- Accountancy services for calculating different taxes and payments when setting up a separate enterprise;
- Forecasting the financial attractiveness of an innovation project; and
- Economic appraisal of an innovation project.

### 3. The process of financing (F), which has three general components:

$F^1$  – own;

$F^2$  – external;

$F^3$  – public.

With  $F^1$ , a student should receive funds of an innovation structure for development of his/her own innovation project, and it makes no difference where from an IS acquired these funds. For instance, a process of own financing can be organised even in the university. A certain sum can be allotted from off-budget funds for financing innovation projects.

With  $F^2$ , a student can receive funds from a source outside the university or IS. In other words, this should be a source having no connection to a student's activities, viz. physical person – a business angel, a legal entity – bank, a venture fund, and so forth.

With  $F^3$ , a student can receive public funding (as a rule, this is free contribution).

A variety of forms of financing can be used at different stages of implementing an innovation project.

### 4. The Intellectual Property Protection process (IPP), which has three general components:

IPP<sup>1</sup> – filing;

IPP<sup>2</sup> – implementation;

IPP<sup>3</sup> – motivation.

With IPP<sup>1</sup>, a student will receive assistance in filing an intellectual property asset (consulting, filling in forms, drafting the description, mailing for filing, etc.).

With IPP<sup>2</sup>, a student will receive assistance in implementing the filed intellectual property. This implies searching for potential customers, organising the implementation process, monitoring actions of competitors, and so forth.

With IPP<sup>3</sup>, a student will receive encouraging and motivational support. For instance, participate in competitions, exhibitions, and experience sharing workshops. A student should receive incitements (bonuses, and so forth) for his/her innovation activities

### The universal model includes the following general entities:

**1. University (U) – an educational institution, which trains IT students, and has post-graduates, instructors, researchers and an administration.**

The University has the right to set up its own structural innovation units (institutes, centres and departments) and be a co-founder of a separate innovation structure (Technopark, all but impossible because of an outdated regulatory framework; or a Scientific Park).

If required, the University can act as initiator of a state experiment in establishing new innovation structures (e.g., a new kind of institution built around a state private partnership).

In the model, when the University is a co-founder of an innovation structure, it is designated by the same colour as the University.

A University (U) can have various structural divisions participating in the innovation and entrepreneurship activities of IT students, post-graduates, and instructors.

The most widespread implementations are as follows:

U: IPP<sup>1</sup>, IPP<sup>2</sup> – intellectual property protection department

U: E<sup>2</sup>, S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup> – business incubator

U: E<sup>1</sup>, S<sup>1</sup>, F<sup>2</sup> – technopark

IS<sub>U</sub>: S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>, F<sup>1</sup>, F<sup>2</sup>, F<sup>3</sup> – scientific park.

## **2. Innovation structure (IS) is a separate legal entity that completely or partially puts into effect processes related to innovation activities.**

An innovation structure can have a variety of process components. The most widespread ones are as follows:

IS: E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup> – training centre

IS: S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>, F<sup>2</sup> – business incubator

IS: E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>, F<sup>2</sup> – IT park

IS: IPP<sup>1</sup> – patent bureau

IS: S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup> – consulting centre

IS: S<sup>1</sup>, F<sup>1</sup>, F<sup>2</sup> – technology transfer centre

## **3. IT Company (ITC) is a separate legal entity that develops innovation products or participates in any innovation-related process.**

## **4. State institution (SI) is a state body that governs or affects innovation or business processes in a region or nationwide in the IT industry.**

Examples:

Regional state institution – Department for Innovative Development of Industry and Transport with the Kharkiv Oblast State Administration - <http://kharkivoda.gov.ua/ru/mainmenu/index/id/96>

National State Institution – Ministry of Education and Science of Ukraine - <http://www.mon.gov.ua/>;

State Agency for Science, Innovations and Informatisation of Ukraine - <http://dknii.gov.ua/>

## **5. Non-government organisation (NGO) – an organisation with a status of a public organisation that can influence innovation and/or business processes in a region or nationwide in the IT industry.**

Example:

Regional NGO – SA Agency for European Innovations (L'viv) - <http://www.aei.org.ua/>;

National NGO – IT Association of Ukraine - <http://www.itukraine.org.ua/>;

European Business Association - <http://www.eba.com.ua/>.

## **6. Investor (I) – a person or an organisation who can invest (contribute funds) in introducing an innovation product / services.**

Example:

I at a national level - <http://eastlabs.co/>, <http://www.taventure.com/>, <http://dekartacapital.com/>, <http://aventurescapital.com/>.

By their status, entities can be regional or national. Besides, they can be categorised by regional features and form clusters.

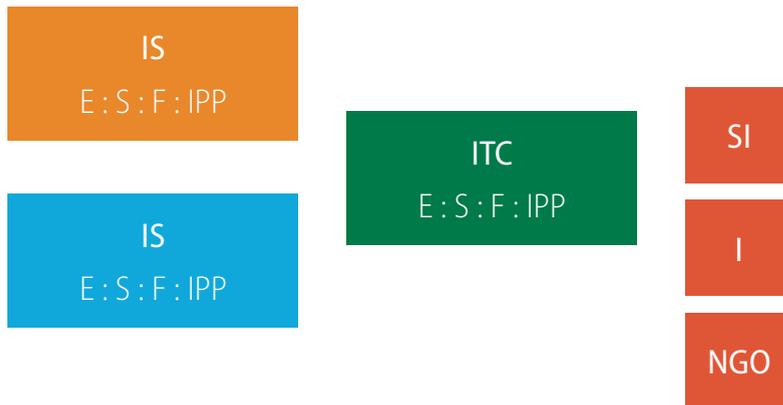
In Ukraine, there are two such clusters, one in Kharkiv <http://intellectronics.com.ua/clasterikt/clasterictstrategy>, and the other in L'viv <http://it-bpo.lviv.ua/>

In time, regional entities can become nationwide ones.

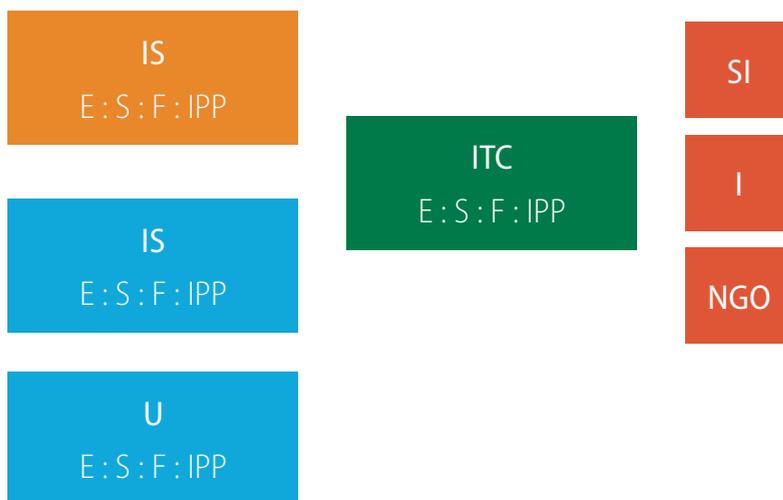
**Figure 6**

Universal structural model of innovation and entrepreneurship activities of IT - students (USMOIEA)

### NATIONAL LEVEL



### REGIONAL LEVEL



## 2. Model architecture

Fig. 6 shows the architecture of a universal model.

This universal model shows all possible entities with all feasible processes.

The entities can interact with each other or integrate similar processes (e.g., **U** has **E**<sup>1</sup> and **IS** has **E**<sup>1</sup>. Then, if **IS** conducts training, **U** can send its students to **IS**, there by saving funds for conducting similar learning sessions, and vice versa), or either they can complement one another with the processes they lack (e.g., **U** has **E**<sup>1</sup> but no **E**<sup>2</sup>, and **IS** has **E**<sup>1</sup>, **E**<sup>2</sup>, **E**<sup>2</sup>, then **U**, after **E**<sup>1</sup>, can send its students for **E**<sup>2</sup> and **E**<sup>3</sup> to **IS**).

The same processes **E**, **S**, **F**, and **IPP** can take place at entities **SI**, **I**, **NGO**. As a rule, such entities have not all kinds of processes, but only selective ones, which have a direct relation to the given entity. For instance, **SI** (Ministry of Education and Science of Ukraine) has processes **S1** and **F1**; **I** (<http://eastlabs.co>) has processes **E**<sup>2</sup>, **E**<sup>3</sup>, **S**<sup>1</sup>, **S**<sup>2</sup>, **S**<sup>3</sup>, **F**<sup>1</sup>, **F**<sup>2</sup>, **IPP**<sup>1</sup>, and **IPP**<sup>2</sup>.

## 2.1. Infrastructure services

Infrastructure services should be described for the chosen model.

In each of the specified model entities, obligatory infrastructure services shall be the following ones:

- Informing all those interested in the entity activity;
- Processing requisite input data for entity operation;
- Setting up interaction with other model entities;
- Analysing output data obtained as a result of entity operation; and
- Partially or fully providing processes E, S, F, and IPP.

## 2.2. SWOT analysis

This section presents SWOT analysis of the model. Explain the variants, the positive and negative features, and evaluate which variant is most feasible. It is desirable to describe the influence of each variant on other model components.

Table 2 shows generalised model indicators.

**Table 2**

### SWOT analysis of Universal Structural Model of Organising the Innovation Activity and Entrepreneurship (USMOIAE)

SWOT	Positive Impact	Negative Impact
Inner environment	Strengths	Weaknesses
Student	<ol style="list-style-type: none"> <li>1. Starting own business</li> <li>2. Better quality of training</li> <li>3. Teamwork experience</li> <li>4. Experience of working with real projects</li> <li>5. Preferential conditions of using resources</li> <li>6. Reputation</li> <li>7. New professional links</li> </ol>	<ol style="list-style-type: none"> <li>1. No social or financial motivation</li> <li>2. Poor business training</li> <li>3. Lack of professional IT knowledge</li> <li>4. Absence of teamwork experience</li> <li>5. Lack of understanding of current IT trends</li> <li>6. Very aggressive policy of ITC with regard to hiring</li> <li>7. Constant distraction for training</li> </ol>
U	<ol style="list-style-type: none"> <li>1. Extra off-budget funds</li> <li>2. Own innovation products and services</li> <li>3. Better quality of training students</li> <li>4. Better proficiency of instructors and researchers</li> <li>5. Actual research</li> <li>6. Optimal allocation of resources</li> <li>7. Better national and international recognition</li> </ol>	<ol style="list-style-type: none"> <li>1. No social or financial motivation</li> <li>2. Faculty and administrative staff fail to meet current requirements</li> <li>3. Limited financial flexibility</li> <li>4. Poor technological base</li> <li>5. Lack of erudition in methods of promoting innovation products to the market</li> <li>6. Mistrust in intellectual property protection</li> <li>7. Incomprehension and unpreparedness to meet current IT development trends</li> </ol>
ITC	<ol style="list-style-type: none"> <li>1. Gaining extra profit</li> <li>2. Qualified personnel</li> <li>3. Working on current customised projects</li> <li>4. Participation in advanced IT community events</li> <li>5. Resources capabilities</li> <li>6. Optimal allocation of own resources</li> <li>7. Better national and international recognition</li> </ol>	<ol style="list-style-type: none"> <li>1. Majority of customised projects</li> <li>2. No own intellectual property</li> <li>3. Dependence on external orders</li> <li>4. Challenges in strategic business planning</li> <li>5. Staff lacks an innovation spirit</li> <li>6. Decentralised management</li> <li>7. Legislative restrictions on international ITC</li> </ol>

**Table 2****SWOT analysis of Universal Structural Model of Organising the Innovation Activity and Entrepreneurship (USMOIAE)**

SWOT	Positive Impact	Negative Impact
External environment	Opportunities	Threats
Student	<ol style="list-style-type: none"> <li>1. Gaining new knowledge and skills in innovation and business activities</li> <li>2. Gaining entrepreneurial skills</li> <li>3. Gaining extra profit</li> <li>4. Protection of own intellectual property</li> <li>5. Receiving loans and preferences</li> <li>6. Participation in IT events (conferences, exhibitions and competitions)</li> <li>7. Competitiveness in the labour market</li> </ol>	<ol style="list-style-type: none"> <li>1. Poor innovation concept</li> <li>2. Prototype incompleteness</li> <li>3. Lack of time</li> <li>4. Lack of experience</li> <li>5. Inability to work in a team</li> <li>6. Incomprehension of business legal framework</li> <li>7. Wrong strategy of attracting funding</li> <li>8. Break-up of project team</li> </ol>
U	<ol style="list-style-type: none"> <li>1. Increasing number of innovation products</li> <li>2. Improving innovation quality</li> <li>3. Increasing the number of students, post-graduates, instructors and researchers involved in innovation activities</li> <li>4. Receiving new orders for R&amp;D</li> <li>5. Gaining new partnership relations</li> <li>6. More effective allocation of resources</li> <li>7. Streamlining promotion of innovation products to the international market</li> </ol>	<ol style="list-style-type: none"> <li>1. No option of own funding</li> <li>2. No motivation</li> <li>3. Outflow of professional staff</li> <li>4. Reporting complexity</li> <li>5. Conservative education</li> <li>6. Degrading standard of knowledge of school students</li> <li>7. Low paying capacity of national customers</li> </ol>
ITC	<ol style="list-style-type: none"> <li>1. Acquiring new sources of profit</li> <li>2. Hiring more qualified personnel</li> <li>3. Acquiring skilled development teams</li> <li>4. Developing new products and services</li> <li>5. Entrance to new markets</li> <li>6. Receiving new orders</li> <li>7. Better recognition</li> </ol>	<ol style="list-style-type: none"> <li>1. Lack of resources</li> <li>2. Time shortage</li> <li>3. Dependence on legislation</li> <li>4. Corruption</li> <li>5. Problems in dealing with U</li> <li>6. Problems in dealing with SI</li> <li>7. Fierce competition</li> </ol>

### 3. Model structure

This section should provide sufficient information for the implementation team.

The model can be used as a basis for creating a concrete model with account of all kinds of interaction, and advantages and deficiencies systemically presented in the universal model.

#### 3.1. Model methods and standards

The model developed should have a clear name and have references to other models. A brief description of the model can be appended here to help readers not familiarized with the model.

A more detailed overview of the model is given in paragraph 2.

This is a universal structural model of organising the innovation activity and entrepreneurship of IT students (USMOIAE). This model is a basis for creating other models. The entities and processes described in the model give an insight into organisation of innovation and business activities at a university at the regional and national levels.

## 3.2. Documenting standards and system of notation

This section should explain all naming conventions used. It should contain naming conventions for processes, and probably, other structures.

The common entities of the model are as follows:

University – U

Innovation structure – IS

Innovation structure set up with university participation - ISu

IT company – ITC

State institution – SI

Investor – I

Non-government organisation – NGO

The general processes of the model are as follows:

Education – E, has three components:

E<sup>1</sup> – learning to create novelties;

E<sup>2</sup> – learning to start up one's own business;

E<sup>3</sup> – learning to attract funds.

Support – S, has three components:

S<sup>1</sup> – organisational;

S<sup>2</sup> – economic;

S<sup>3</sup> – legal.

Financing – F, has three components:

F<sup>1</sup> – own;

F<sup>2</sup> – external;

F<sup>3</sup> – public.

Intellectual Property Protection – IPP, has three components:

IPP<sup>1</sup> – filing;

IPP<sup>2</sup> – implementation;

IPP<sup>3</sup> – motivation.

The name of a certain model (excluding the universal model) consists of the names of those structural entities, which are obligatory in this specific model in sequence from the regional level to the national one.

Example.

The model containing the University and a regional innovation structure set up with participation of the university (e.g., Scientific Park) can have the name **UISu**:

Everything at the regional level is indicated before the symbol ':'. Everything at the national level is indicated after symbol':'.

The model containing the University and a national innovation structure (e.g., Technology Transfer Centre) will be named **U:IS**.

To distinguish the models, lower case letters are used for adding names to processes obligatory for the model.

For instance, the University has implemented only the process Intellectual Property Protection (IPP), and the Scientific Park has implemented the following processes: Support (S), Financing (F), and the national Innovation Structure has

implemented the process Education (E).

Then the name of the model will be  $U_{IPP}IS_{usf}:ISe$

For more detail, indicate the components of each process (they all have three components each).

Then the name will be  $Uipp^{12}ISus^{23}f:ISe^2$

### 3.3. Pending issues

This section shall present detailed information on the problems identified, which are pending on the date of issuing this document.

The universal model cannot be implemented in full scope in real life because there are structural entities, which can duplicate processes at different levels. With time, new entities can appear, which potentially can combine within their framework the features of several entities (e.g., an IT company and innovation structure, or a state institution and investor).

A universal statutory framework cannot be created for a universal model because separate entities of the model have a different legal status, are governed by different legislative acts and are subordinated in a different manner.

# SECTION 2

## MODELS OF ORGANISING INNOVATION ACTIVITIES AND ENTREPRENEURSHIP OF IT STUDENTS

The models of organising innovation activities and entrepreneurship of IT students describe the conditions for improving the entrepreneurial and innovative activities of students by bringing them together in teams for developing innovative IT products or services with further establishment of legal entities whose activities will be focused on operating in the IT products market in Ukraine.

### Model Science Park – Innovation Structure – University

Ue<sup>123</sup>s<sup>1</sup>ipp<sup>1</sup> ISe<sup>123</sup>s<sup>123</sup>f<sup>3</sup>ipp<sup>23</sup> NGOs<sup>1f23</sup> If<sup>2</sup> SIs : NGOs<sup>1f23</sup> If<sup>2</sup> SIn<sup>1</sup>

#### 1. Introduction

The model describes that the university has an innovation structure (IS) in the form of a Science Park (SP) and the university is the founder of SPu. Students collaborate via the university IS with the SP for commercialisation of innovation activity deliverables starting from launching concepts to developing a finished product.

The model can be used as an active one. It has been introduced at the Kharkiv National University of Radioelectronics.

#### Objective

a) the objective of the model is as follows:

Formalising students' entrepreneurial and innovation activity given that an SP is present, viz.:

- Generating a successful concept and its appraisal;
- Assistance in building a project team and helping it function;
- Assistance in project management – guidance;
- Assistance in developing a project business plan;
- Assistance in searching for investors;
- Assisting students in establishing a legal entity for entrepreneurship;
- Assistance in developing a competitive innovation IT product, including holding technological trainings; and
- Recommendations on creating conditions for boosting the entrepreneurial and innovation activity of university students with the help of IS–SP.

This is achieved by bringing together students in teams for developing innovative IT products or services, and establishing legal entities (LE) whose activity will be focused to operating in the market of producing own IT products in Ukraine. The LE can be part of an SP and/or receive consultancy services in legal issues and legal support, services in acquiring special expertise and skills, marketing, attracting investors, conducting different appraisals, technical assistance, market introduction of IT products, etc.

b) target audience

The model can be interesting for administrators of HEI and regional IS, as well as for instructors, researchers, and students. The model can help draw systemic conclusions on how to set up effective interaction between an IS, a university, students, investors and all possible entities of innovation activity and entrepreneurship.

## 1.2. Field of application

The field of application of the model integrates tutorial, research, entrepreneurial and innovation activities of an HEI student, University and SP.

### a) determine what kind of results will be obtained

The model output will be new LE (IT companies).

### b) explain what the model proposed will do (will not do, if required)

The application of the model will help increase the number of LE (IT companies).

### define more precisely the advantages, objectives and tasks:

This subsection will describe the general advantages, objectives and tasks for general entities:

### s.1. For the University

#### General objectives:

- Develop own IT products;
- Increase significantly the number of developed innovation products and services with involvement of students, post-graduates, instructors and researchers. For instance, the possibility of engaging instructors to work on real projects in an IS where they will gain expertise and practical skills. Engage mentors among instructors and HEI professionals to work in an IS;
- Increase considerably the number of new enterprises set up with participation of students; and
- Improve the level of IT training:
  - Managing training
  - Professional and skill development of specialists required for implementing HEI-based SP projects;
  - Acquiring via SP and other business entities hands-on training facilities for IT students;
- Improve the quality of innovation projects:
  - Managing project appraisal;
- Receive extra off-budget funds (dividends from SP operation).

#### General tasks:

- As co-founder, the university participates in organising an IS – SP;
- For remaining tasks, refer to the description of the universal model (USMOIAE).

#### General advantages:

refer to the description of the universal model (USMOIAE).

### s.2. For IT Company

#### General objectives, tasks and advantages:

refer to the description of the universal model (USMOIAE).

### s.3. For IS – SP

#### General objectives:

- Developing new kinds of innovation products and their commercialisation;
- organising and ensuring production of research-intensive and competitive in the domestic and foreign markets innovation products;
- Information-methodical, legal and consultancy support of SP founders and partners, and supporting patenting/licensing;

- Involving students, graduates, post-graduates, academic researchers and personnel of a higher education institution and/or academic institution in developing and executing SP projects;
- Promoting development of small innovation entrepreneurship and its support;
- Managing training, and professional and skill development of specialists required for developing and executing SP projects;
- Attracting and utilising risk (venture) capital in one's activity, and supporting research-intensive production;
- Protecting and representing interests of SP founders and partners in governmental agencies and local self-administration bodies, as well as in relations with other business entities when organising and executing SP projects within the scope set forth in the SP constituent documents;
- Extending international and domestic collaboration in science-and-technological and innovation activities, and promoting attraction of foreign investments.

#### **General tasks:**

refer to the description of the universal model (USMOIAE).

#### **General advantages:**

refer to the description of the universal model (USMOIAE).

### **1.3. Definitions and abbreviations**

This section should define all terms and abbreviations used in the document.

The model uses the abbreviations presented in the universal model (USMOIAE).

### **1.4. References**

For the statutory support of innovation activity in Ukraine, refer to the description of the universal model (USMOIAE).

## **2. Model overview**

The model is linked directly to the activity and services of an SP, which is an IS. Hence, for a more detailed examination of the model, one should ascertain what the goal of an SP is, what services the SP offers for collaboration, with whom the SP can collaborate, and so forth.

An SP is set up as a LE on the University's initiative by pooling the contributions of founders for organising, coordinating, and supervising the process of developing and executing SP projects.

The goal of an SP is development of scientific-and-technological and innovation activities, effective and efficient employment of available academic potential, and material and technical base for commercialising research results and introducing them to domestic and foreign markets.

SP has the right to enlist the services of Ukrainian and foreign professionals, and independently determine the forms, amount and kinds of labour remuneration.

Innovation and investment project activities are executed both independently and jointly based on separate partnership agreements.

SP determines the priority lines of its innovation activities to meet the priority lines of development of science and technology, and innovation activity in Ukraine, for instance:

- Information and communication technologies, and robotics.
- Power engineering and energy effectiveness.
- Nanotechnologies.
- Environmental protection.
- Introducing advanced technologies in the biomedical industry.

**To implement this model, the requisite entities are as follows:**

1. University with actualised processes E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, S<sup>1</sup>, IPP<sup>1</sup>.
2. Regional IS – SP with actualised processes E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>, F<sup>1</sup>, IPP<sup>2</sup>, IPP<sup>3</sup>.
3. National and regional NGO – with actualised processes S<sup>1</sup>, F<sup>23</sup>.
4. National and regional investors – with actualised processes F<sup>2</sup>.
5. National and regional-level state institutions – with actualised processes S<sup>1</sup>.

All these entities are integrated with the help of appropriate processes.

Table 3 shows processes and involved entities.

**The sequence of actions in a model is as follows:**

1. A University is cofounder of an IS in the form of an SP.
2. Process participants can be students, post-graduates, instructors, University researchers, mentors, experts and IT company employees, further referred to as Participants.
3. A student generates a concept.
4. With this concept, the student addresses the IS with a request to appraise the concept for competitiveness, feasibility, novelty, etc.
5. After the appraisal has been performed and a positive reference has been received, the student becomes a member for developing one's own concept in an IS.
6. The Participants start working on the concept within the University IS. Students and post-graduates work independently or under the guidance of mentors. They can be instructors and researchers of the University; instructors and researchers of other HEIs, employees of IT companies, and professionals in different industries.
7. At the stage of working on the concept, the IS expects to obtain a competitive IT product.
8. For commercialising the start-up concept, the Student who is implementing the concept should set up a legal entity as an enterprise of any form of property or become a private entrepreneur.
9. The established LE should conclude a cooperation agreement with the SP.
10. The SP shall attract investors, provide assistance in development and professional consulting, and collaborate with legal entities on the startup concept. Gradually, it shall transform a startup to a finished product. This product will be positioned in the market, promoted and sold.
11. The finished product sales proceeds shall be allocated among legal entities who participated in its development and the SP pursuant to the cooperation agreement.
12. The University, as the founder, receives dividends.

**Table 3** Model processes and entities

Processes	Entity U	Entity IS-SP	Entity SI	Entity I	Entity NGO
E <sup>1</sup>	Student should be able to develop new products and services.	Student should be able to describe and present one's own concepts			
E <sup>2</sup>	Student should be able to start one's own business	Student should be able to distinguish among the advantages of different legal entities, and choose the most effective scheme of registering a legal entity			
E <sup>3</sup>	Student should be able to present information to investors, and apply investment regulations and return investments.	Student should know how to search for project funding sources.			
S <sup>1</sup> organisational support	Student should be provided with support: <ul style="list-style-type: none"> <li>• In managing the activities of students and all those willing to participate (post-graduates, instructors, researchers, investors, and others).</li> </ul>	Student should be provided with support in the following: <ul style="list-style-type: none"> <li>• Receiving premises for different events (training, discussion, development, and so forth);</li> <li>• Organising meetings and different events;</li> <li>• Managing combined efforts of students in teams;</li> <li>• Managing engagement with experts;</li> <li>• Managing interaction with all model entities;</li> <li>• Resolving possible conflicts during joint activities.</li> </ul>	Student should be provided with support: <ul style="list-style-type: none"> <li>• In organising meetings and different events.</li> </ul>		Student should be provided with support: <ul style="list-style-type: none"> <li>• In organising meetings and different events.</li> </ul>
S <sup>2</sup>		Student should be provided with economic support, namely: <ul style="list-style-type: none"> <li>• Making relevant business model estimates;</li> <li>• Estimating requisite resources at different stages of implementing the innovation project;</li> <li>• Preparing innovation products and services for participating in competitions, exhibitions, etc.;</li> <li>• Accountant services in taxation;</li> <li>• Estimating the financial attractiveness of the innovation project;</li> <li>• Economic appraisal of the innovation project.</li> </ul>			
S <sup>3</sup>		Student should be provided with legal support			

**Table 3**

**Model processes and entities (Continued)**

Processes	Entity U	Entity IS-SP	Entity SI	Entity I	Entity NGO
F <sup>1</sup>		Student should receive funds from IS – SP for development of own innovation project.			
F <sup>2</sup>					Student should receive funds external with respect to the university and IS (business angel, bank, venture fund, NGOs, etc.)
F <sup>3</sup>					Student should receive public funding as donations
IPP <sup>1</sup>	Student should be provided with support in filing IP subject-matter				
IPP <sup>2</sup>		Student should be provided with support in introducing filed IP.			
IPP <sup>3</sup>		Student should receive encouragement and means of motivation.			

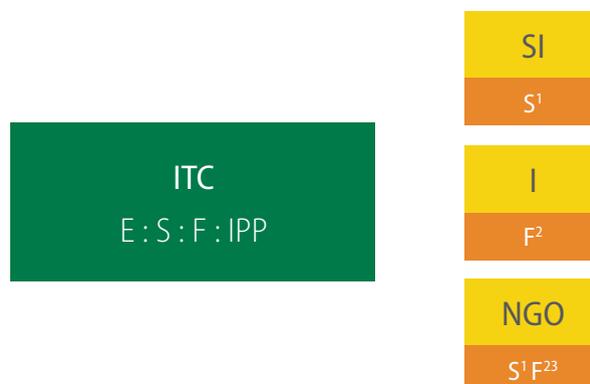
### Model architecture

The model architecture is shown in Fig. 7.

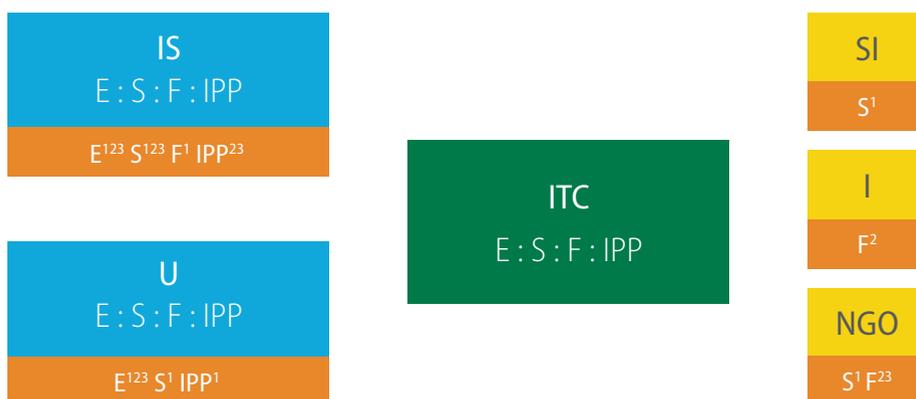
**Figure 7**

**Model Science Park – Innovative structure – University**  
 $Ue^{123} s^1 ipp^1 ISe^{123} s^1 fipp^{23} NGOs^1 f^2 SIs^1 : NGOs^1 f^2 SIs^1$

#### NATIONAL LEVEL



## REGIONAL LEVEL



### 2.1. Infrastructure services

Infrastructure services should be described for the model chosen.

For each model entity, the requisite infrastructure services are described in the universal model (USMOIAE).

The IS infrastructure is linked to the SP activity, viz.:

- Developing new kinds of innovation products, their commercialisation, management and product manufacture;
- Consultancy support on informational, methodical, legal, and patenting/licensing issues for Founders and SP partners;
- Coordinating the research, innovation, production and commercial activities of business entities;
- Providing services in examination of intellectual property subject-matter, development of business and marketing plans, and informational and consultancy support in technology transfer;
- Enlisting the services of professionals and experts in implementing SP projects;
- R&D activities and providing services in coupling their deliverables to production;
- Attracting foreign partners to actualise joint projects;
- Attracting investors and utilising venture capital to actualise projects;
- Managing training, professional and skill development of specialists required for implementing University-based SP projects;
- Providing hands-on training facilities for IT students via business entities;
- Leasing office and production and technical facilities owned by an SP;
- Organising and participating in exhibitions, presentations, auctions, seminars, symposiums, and competitions;
- Printing and distributing printed and electronic editions, and publishing activities;
- Protecting and representing the interest of Founders and SP partners in public administration agencies and local self-administration bodies.
- An SP has the right to operate both in Ukraine and abroad pursuant to contracts concluded or otherwise as envisaged by the law. An SP can conduct joint activities with other LE to achieve common goals.

### 2.2. SWOT analysis

Table 4 shows the overall features of the model.

**Table 4**
**SWOT Analysis for the Science Park – Innovation Structure – University model**

SWOT	Positive Impact	Negative Impact
Internal environment	Strengths	Weaknesses
HEI	<ol style="list-style-type: none"> <li>1. Receiving dividends and profit via the SP.</li> <li>2. Developing own IT products.</li> <li>3. Improving the qualification of instructors by engaging them to work on real projects to acquire experience and practical skills.</li> <li>4. Improving tuition of students by engaging them to work on real projects.</li> <li>5. Support from University administration, promoting effective SP operation.</li> <li>6. Improving the educational level of IT students.</li> <li>7. Commercialising existing innovation activity results and developing a new IT product.</li> <li>8. Option of using university facilities for allocation at the SP.</li> <li>9. Qualified academic researchers.</li> <li>10. University's organisational support of intellectual property protection.</li> <li>11. Managing training, professional and skill development of specialists required for implementing projects.</li> <li>12. Possibility of allocating a share of profits for supporting and developing innovation projects, and manufacturing innovation products and delivering services.</li> </ol>	<ol style="list-style-type: none"> <li>1. Vague procedure of engaging unpaid instructors, mentors, consultants, and so forth for working on a start-up in an IS – SP.</li> <li>2. Funding model for IT in the SP site.</li> <li>3. Red tape.</li> <li>4. IT salaries of SP personnel are non-competitive.</li> <li>5. Limited financial resources.</li> <li>6. Lack of qualified workers in the innovation field.</li> <li>7. Lack of modern equipment for producing hi tech products.</li> <li>8. Ineffective extension of research results.</li> <li>9. Distrust in protection of intellectual property rights. Scientists fear to transfer their research results to start-ups and spin-offs. No interest on the part of researchers to commercialise results via the university innovation structure because of the specific features of Ukraine's legislative system.</li> <li>10. No strategic planning because it is impossible to foresee the availability of new innovation products.</li> </ol>
Student	<ol style="list-style-type: none"> <li>1. Developing own IT products.</li> <li>2. Opportunity of working on a real project.</li> <li>3. Setting up one's own business while studying at the University.</li> <li>4. Preferential conditions for using resources.</li> <li>5. Receiving consultations.</li> <li>6. Students and young researchers gain hands-on skill in developing innovation products.</li> <li>7. Cooperation while developing IT products or services.</li> </ol>	<ol style="list-style-type: none"> <li>1. No social or financial motivation to work on startups.</li> <li>2. Lack of professional knowledge.</li> <li>3. No experience in setting up and running one's own business.</li> <li>4. No provisions for receiving assistance from existing infrastructure services.</li> <li>5. Poor criteria of assessing research results.</li> <li>6. Vague motivation factors for task group participants at the early stages of investigating an innovation product.</li> <li>7. Vague provisions of funding the early stages of developing an innovation product.</li> <li>8. Option of discontinuing the development process.</li> </ol>
Company	<ol style="list-style-type: none"> <li>1. Possibility of involving mature teams for working on a start-up.</li> <li>2. Managing start-up appraisal.</li> <li>3. Financial and resource potential of companies – SP partners and founders.</li> <li>4. Appraisal of an innovation product for determining its commercialisation potential.</li> <li>5. Guaranteed funding of participants for developing an innovation product.</li> </ol>	<ol style="list-style-type: none"> <li>1. Vague startup funding mechanism (at the early stage, it is difficult to estimate the cost).</li> <li>2. Continual change of start-up business plan.</li> <li>3. No strategic planning.</li> <li>4. No motivation for qualified professionals to act as experts and mentors in students' startups.</li> <li>5. No innovation culture to transfer research developments to companies.</li> </ol>

**Table 4****SWOT Analysis for the Science Park – Innovation Structure – University model**

SWOT	Positive Impact	Negative Impact
External environment	Opportunities	Threats
HEI	<ol style="list-style-type: none"> <li>1. Collaboration with other SP.</li> <li>2. Attractiveness of SP for state orders for delivering goods; job performance and delivering services is considered a priority.</li> <li>3. Collaboration of an HEI with a customer or user of an innovation product.</li> </ol>	<ol style="list-style-type: none"> <li>1. No mechanism of receiving dividends by universities who are not founders of an SP.</li> <li>2. No state financial support of SP activities.</li> <li>3. Political instability in the country.</li> <li>4. Demand for innovation proposals in the country is limited.</li> <li>5. Poor solvency of domestic consumers of innovation products.</li> </ol>
Student	<ol style="list-style-type: none"> <li>1. Transparent procedure of registering an LE.</li> <li>2. Acquiring intellectual property rights to an IT product.</li> <li>3. Full or partial (about 50 %) interest-free state budget loans for projects.</li> <li>4. Compensation of interest paid by project executors to commercial banks for loans.</li> </ol>	<ol style="list-style-type: none"> <li>1. Taxation changes.</li> <li>2. Changes in legal entity registration laws.</li> <li>3. No motivation and desire to set up own business due to the social status.</li> </ol>
Company	<ol style="list-style-type: none"> <li>1. Involving IT companies and their representatives in working on a start-up.</li> <li>2. Participation of foreign partners and investors, and exemption from paying import duty on equipment, completing articles and materials required for SP projects.</li> </ol>	<ol style="list-style-type: none"> <li>1. Economic crisis.</li> <li>2. Expectation of speedy results.</li> <li>3. Startup investment mechanisms.</li> <li>4. No motivation for Ukrainian enterprises to act as an SP founder or partner.</li> <li>5. No innovation companies desiring to collaborate with universities.</li> <li>6. Limited funding starting from an innovation concept and up to its development.</li> <li>7. No interest of financial institutions to support innovation projects.</li> </ol>

### 3. Model structure

To implement this model, a separate LE – SP should be set up as an IS, one of the founders being a University. An appropriate statutory framework should be developed for functioning of such an LE. A system of interaction of SP with other model entities should be developed.

#### 3.1 Model methods and standards

A more detailed overview of the model is given in subsection 2.

#### 3.2 Document management standards and notation system

The naming and designation of processes and entities comply with the universal model – USMOIAE.

#### 3.3 Pending issues

A mechanism has not been identified for motivating and attracting students for working on start-ups in the University, and then in an SP.

Non-transparent criteria of choosing experts and mentors.

# Model of Crowd Funding a Start-up in a University

Ue<sup>123</sup>s<sup>13</sup>ipp<sup>1</sup> ISipp<sup>123</sup> I<sub>r</sub><sup>3</sup> : I<sub>r</sub><sup>3</sup>

## 1. Introduction

The model provides that the University will have an organisational unit responsible for innovation and research activities. Students will collaborate with the Charity Fund via this University unit to receive funding for commercialising innovation activity results, starting from implementing concepts and up to developing a finished product.

The model can be used as an effective one because Ukrainian HEIs, as a rule, collaborate with Charity Funds.

### Objective

The model provides that an HEI has an Innovation Structure and that an HEI cooperates with a Charity Fund.

To commercialise innovation activities starting from a concept and start-up, and up to developing a finished product, the Student who will address the HEI Innovation Structure via a Charity Fund will receive funds from benefactors.

#### a) the objective of the model is as follows:

Formalising students' entrepreneurial and innovation activities provided a University has an organisational unit involved in innovative research activities, viz.:

- Generating a feasible concept and its appraisal;
- Assistance in building a project team and supporting its work;
- Assistance in project management – guidance;
- Assistance in developing a project business plan;
- Assistance in searching for investors;
- Assisting students in setting up a legal entity for entrepreneurship; and
- Assistance in developing a competitive innovation IT product, including technological trainings.

This can be achieved by bringing together students in teams or attracting individual students to development of innovation IT products or services, followed by setting up legal entities (LE) if required, and receiving funding from benefactors within the University Innovation Structure for implementing one's own innovation project. The students in the University acquire knowledge in course units or special courses, seminars and so forth in the following subjects: development of a new IT product or service; economics, marketing, management; entrepreneurship and innovation activities; and legislation.

Besides, a student can address the University's innovation research unit on conducting different kinds of appraisals and seek the following kinds of assistance: technical, filing applications for intellectual property rights, searching for benefactors, market introduction of the IT product, and so forth.

#### b) target audience

The model can be interesting for HEI and charity fund administrators, as well as for instructors, researchers and students. The model can help drawing systemic conclusions on how to organise effectively interaction between the university, students, and benefactors.

## 1.2. Field of activity

#### a) define what kind of results will be obtained

The model can be used for integrating education, research, and entrepreneurial and innovation activities of an HEI student, and the University and Charity Fund. The model output will be new LE (IT companies).

b) explain what the model suggested will do (what it will not do, if required)

Using the model will contribute to increasing the number of LE (IT companies).

c) define accurately applicable advantages, objectives and tasks as far as possible:

### s.1. For the University

**General objectives:**

- Developing new kinds of innovation products and ensuring their production;
- Developing own IT products;
- Increasing significantly the number of developed innovation products and services by attracting students, post-graduates, instructors and researchers. For instance, the option of enlisting instructors to work in an IS on real projects for them to acquire expertise and practical skills. Attracting mentors among instructors and HEI professionals to work in an IS;
- Coordinating research, innovation, production and commercial activities focused on supporting the concept and up to developing a finished product;
- Enlisting the services of professionals and experts from HEI and different IT companies for participating in project implementation;
- Conducting R&D activities and offering services in coupling their deliverables to production with involvement of an HEI;
- Increasing significantly the number of new enterprises set up by students;
- Improving the quality of instruction of students in IT areas:
  - Managing training for professional and skill development of specialists required for implementing HEI-based projects;
- Improving the quality of innovation projects:
  - Organising project appraisal;
- Extending charitable fund activities, namely, searching for and attracting benefactors;
- Receiving extra funding if the Student and University have common intellectual property rights to the developed innovation products.

**General tasks:**

- University's participation in managing activities between an IS and the Charity Fund;
- For remaining tasks, refer to the description of the universal model (USMOIAE).

**General advantages:**

refer to the description of the universal model (USMOIAE).

### s.2. For IT Companies

**General objectives, tasks and advantages:**

refer to the description of the universal model (USMOIAE).

### s.3. For an innovation unit of the University

**General objectives:**

- Developing new kinds of innovation products, managing their commercialisation, managing and ensuring production of research-intensive and competitive innovation products in domestic and foreign markets;
- Information-and-methodical and legal support, and consultancy for HEI students, and offering patenting/licensing services;

- Attracting students, graduates, post-graduates, researchers and workers of a higher educational institution and/ or research institution to developing and executing projects;
- Promoting development of small innovation entrepreneurship and supporting it.

#### General tasks:

refer to the description of the universal model (USMOIAE).

#### General advantages:

refer to the description of the universal model (USMOIAE).

### 1.3. Definitions and abbreviations

The model uses the abbreviations given in the universal model (USMOIAE).

CF – Charity Fund

### 1.4. References

For the legislative support of innovation activities in Ukraine, refer to the description of the universal model (USMOIAE).

Besides, the following laws govern the activities of charity funds:

- On Charity and Charity Organisations  
<http://zakon1.rada.gov.ua/laws/show/5073-17>;
- Civil Code of Ukraine (Article 131, Article 144),  
<http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?page=1&nreg=435-15>;
- Law of Ukraine On State Registration of Legal Entities and Physical Persons-Entrepreneurs,  
<http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=755-15>;
- Tax Code of Ukraine (Article 197.)  
<http://zakon1.rada.gov.ua/laws/show/2755-17>.

## 2. Model overview

The model is directly linked to the activities and services of the University's Innovation research structure. The IS offers the following services: information-and-methodical and legal support, and consultancy for HEI students, offering patenting/licensing services, and searching for benefactors via charity funds;

To implement the model, the requisite entities are as follows:

1. University with actualised processes  $E^1$ ,  $E^2$ ,  $E^3$ ,  $S^1$ ,  $S^3$ ,  $IPP^1$ .
2. University IS with actualised processes  $IPP^1$ ,  $IPP^2$ ,  $IPP^3$ .
3. National and regional investors with actualised process  $F^3$ .

Appropriate processes integrate all these entities.

University processes are described in the universal model (USMOIAE).

University IS processes:

$IPP^1$  – the student should receive adequate assistance in filing IP subject-matter.

$IPP^2$  – the student should receive assistance in introducing filed IP subject-matter.

$IPP^3$  – the student should be provided with encouragement and motivational means.

The sequence of actions in the model is as follows:

1. The HEI has an Innovation Structure and this HEI cooperates with a Charity Fund.
2. The process participants can be students, post-graduates, instructors, HEI researchers, mentors, experts and professionals of IT companies, further referred to as Participants.

3. A student generates a concept.
4. With this concept, the student addresses the Innovation Structure with a request to conduct an appraisal of the concept for competitiveness, feasibility, novelty, and so forth.
5. Having received an appraisal and a positive reference, the student becomes a member of the Innovation Structure to work on their concept.
6. The Participants start working on the concept within the framework of the HEI Innovation Structure. Students and post-graduates work independently or under the guidance of mentors who can be instructors and researchers of the HEI, and instructors and researchers of other HEI, workers of IT companies, and professionals from other industries.
7. While working on the concept, benefactors are attracted to the innovation structure. They transfer donations to the Charity Fund account. These donations are intended for supporting the activities of the innovation structure, mentors, experts, and so forth.
8. Provided the start-up performance is effective, to commercialise the startup concept the Students involved in implementing the concept should set up an LE as an enterprise of any form of property or become private entrepreneurs (PE) for further targeted investment without involving the HEI Innovation Structure.
9. At this stage, the role of the HEI Innovation structure, viz. forming business-ready teams – legal entities – for working independently in the market with involvement of investors.

At the initial stage, investors act as benefactors. Later on, if the start-up will be competitive, the benefactors, assisted by the HEI Innovation structure, gain access to start-ups – legal entities – and start investing in their activities on predefined terms and conditions pursuant to the law.

10. The HEI Innovation structure shall receive donations via the Charity Fund.

## Model architecture

The model architecture is shown in Fig. 8.

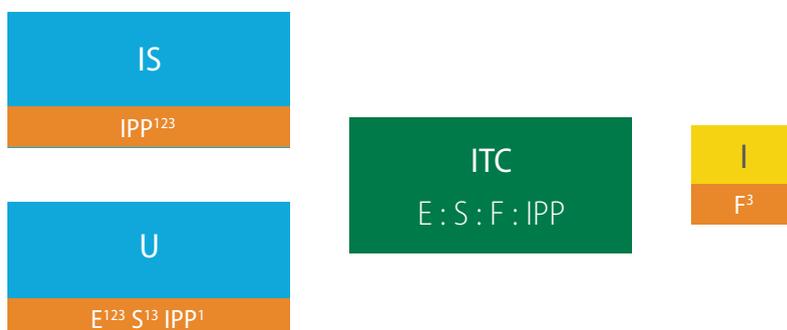
**Figure 8**

Crowdfunding start-ups in the University  
 $Ue^{123}S^{13}ipp^1 ISipp^{123} I^3: I^3$

### NATIONAL LEVEL



### REGIONAL LEVEL



## 2.1. Infrastructure services

For each of the model entities, the requisite infrastructure services are described in the universal model (USMOIAE).

The IS activities are described in the universal model (USMOIAE). Besides, the University IS should collaborate with Charity Funds to search for benefactors at both the national and regional levels.

## 2.2. SWOT analysis

The SWOT table for the universal model (USMOIAE) shows generalised features of the model for the University and Students. For the Company, Table 5 below shows other positive and negative features.

**Table 5** SWOT analysis for the model of a Crowd Funding Start-up at the University

SWOT	Positive Impact	Negative Impact
Internal environment	Strengths	Weaknesses
HEI	See SWOT for USMOIAE	See SWOT for USMOIAE
Student	See SWOT for USMOIAE	See SWOT for USMOIAE
Company	<ol style="list-style-type: none"> <li>1. Opportunity of involving business-ready teams for working on a start-up.</li> <li>2. Managing start-up appraisal.</li> <li>3. Guaranteed funding of participants for developing an innovation product.</li> </ol>	<ol style="list-style-type: none"> <li>1. Vague start-up funding mechanism (at the early stage, it is difficult to estimate the cost).</li> <li>2. Continual change of start-up business plan.</li> <li>3. No strategic planning.</li> </ol>
External environment	Opportunities	Threats
HEI	See SWOT for USMOIAE	See SWOT for USMOIAE
Student	See SWOT for USMOIAE	See SWOT for USMOIAE
Company	<ol style="list-style-type: none"> <li>1. Participation of foreign partners and investors.</li> </ol>	<ol style="list-style-type: none"> <li>1. Economic crisis.</li> <li>2. Expectation of speedy results.</li> <li>3. Start-up investment mechanisms.</li> <li>4. No mechanism of attracting investors to charity funds for further collaboration with the University.</li> <li>5. Limited funding starting from an innovation concept and up to its development.</li> <li>6. No interest of financial institutions to support innovation projects in the University.</li> </ol>

### **3. Model structure**

This section should provide sufficient information for the implementation team.

To implement the model, an existing IS should be used or the one created in the University. An appropriate statutory framework should be developed for operation of such an IS. It is necessary to develop a system of IS and Charity Fund engagement to attract benefactors via the Charity Fund to support the innovation activities of University students starting from the concept and up to its commercialisation, i.e. developing a finished innovation product.

#### **3.1. Model methods and standards**

A more detailed overview of the model is given in Section 2.

#### **3.2. Document management standards and notation system**

The naming and designation of processes and entities comply with those in the universal model – USMOIAE.

#### **3.3. Pending issues**

The mechanism of motivating and attracting students to work on startups in the University has not been defined.

# Model of National Centre for Transfer of IT Innovations

Ue<sup>123</sup>s<sup>1</sup>ipp<sup>1</sup>:ISe<sup>3</sup>s<sup>1</sup>NGOs<sup>1</sup>

The model being suggested does not exist presently. Its implementation calls for establishing a National Centre for Transfer of IT Innovations.

## 1. Introduction

The model envisages that information on the University's innovation products will be disseminated via the technology transfer network. To ensure more effective performance, a National Centre for Transfer of IT Innovations should be established. The University should create conditions for dealing with such a centre.

The model is a special one because it does not exist presently and calls for establishing a new national innovation structure. Establishing such a centre will allow improving the quality of IT innovations and increase the number of innovations, which will be submitted to international technology transfer networks.

### Objective

#### a) describe the purpose of the document:

A model of a national centre for transfer of IT innovations has been developed. It comprises the following requisite entities: university, national innovation structure (ITC) and non-government organisation (technology transfer network - TTN). The key objective of developing such a model is streamlining transfer of information about domestic innovations to international technology transfer networks.

This is achieved by doing to the following:

- U should actualise all E processes, including those instructing how to use TTN, and how to prepare information therefor;
- U assigns a separate unit or appoints a person responsible for dealing with ITC and TTN;
- Preparing innovation projects shall be oriented to TTN;
- A unified national innovation structure is established – ITC – for coordinating efforts among all entities; and
- Performing integration at the level of S1 processes between U, IS (ITC) and NGO (TTN).

#### b) target audience

The model can be interesting, primarily, for students who will enjoy new opportunities for promoting their own innovations, administrators of universities and national innovation structures, as well as for instructors and researchers. This model can help build a national system for speedy and effective transfer of IT innovations and integrating them in international TTNs.

## 1.2. Field of application

The model field of application is managing acquisition, processing and transfer of information about innovation developments from U to international TTNs. To actualise such activities, the following processes are requisite:

- U – E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, S<sup>1</sup>, IPP<sup>1</sup>;
- : IS – E<sup>3</sup>, S<sup>1</sup>;
- : NGO – S<sup>1</sup>.

#### a) determine what kind of results will be obtained

Model key performance results are as follows:

1. Increasing the number and improving the quality of innovation projects, which represent Ukraine in international TTN.

2. Establishing a new national innovation structure.
3. Offering the students more opportunities for actualising their creative potential.
4. More effective usage of universities' in-house resources.
5. Increasing the international significance of Ukrainian universities.

**b) explain what the model proposed will do (will not do, if required)**

The model allows improving the performance of the existing state technology transfer system. The feature of such an effort is that a national centre for transfer of IT innovations can be established. The model has no effect on the quality of developing innovation projects at the university level. The model generalises, streamlines and speeds up the processes of innovation transfer at the state and international levels.

**c) define more precisely the advantages, objectives and tasks:**

### **s.1. For the University**

**General objectives:**

- Increase the effectiveness of in-house business processes related to innovation activities;
- Streamline introduction of innovations of university students and academic researchers to international TTNs; and
- Find more partners and investors to implement innovation projects.

**General tasks:**

- Appoint a responsible person for dealing with ITC;
- Elaborate and approve statutory documents for regulating innovation transfer activities;
- Introduce to the curriculum information about TTN; and
- Keep a record of innovations transferred to TTN and analyse their results.

**General advantages:**

- Increasing the effectiveness of using own resources;
- Increasing the number of developed innovation products and services;
- Improving the quality of developed innovation products and services;
- Increasing the amount of attracted off-budget funds; and
- Increasing the regional, national and international ratings of the University.

### **s.2. For IT Companies**

**General objectives:**

- Increase the competitiveness of own products; and
- Increase the attractiveness of the company in the international market.

**General tasks:**

- Define in-house resources, which can be used in the company's innovation activities;
- Identify how to participate in the TTN; and
- Support an innovation spirit in the workers.

**General advantages:**

- Developing premium quality competitive innovation products;
- Gaining extra profit; and
- Extending international ties.

### s.3. For the Innovation Structure - ITC

#### General objectives:

- Streamline the mechanism of developing new innovation products and services;
- Derive extra income;
- Integrate and combine different approaches and innovation and entrepreneurship entities;
- Manage innovation processes in the country in compliance with international requirements and standards.

#### General tasks:

- Elaborate a complete package of statutory documents for regulating IS activities;
- Manage interaction between all model entities;
- Plan efficient usage of resources; and
- Analyse statistical data.

#### General advantages:

- Increasing the number of participants of innovation activities and entrepreneurship at all interaction levels;
- Increasing the number and improving the quality of innovation products and services;
- Gaining extra profit;
- Establishing an effective system for development of innovation activities and entrepreneurship; and
- Becoming recognised at the international level.

## 1.3. Definitions and abbreviations

The model uses the abbreviations specified in the universal model.

The following abbreviations have been introduced:

ITC – Innovation Transfer Centre,

TTN – Technology Transfer Network.

## 1.4. References

- Law of Ukraine On Innovation Activities  
<http://zakon1.rada.gov.ua/laws/show/40-15>
- Law of Ukraine On State Regulation of Technology Transfer Activities  
<http://zakon4.rada.gov.ua/laws/show/143-16>

## 2. Model overview

Technology transfer implies transfer of skills, knowledge, technologies, expertise, product prototypes and so forth between governments and other institutions with a view to ensure technological advances. Technology transfer makes it more accessible to users, promotes application and reproduction of technologies, and allows developing new products, processes, materials and services.

Technology transfer is the basic form of promoting innovations. It comprises the following:

- Patent assignment;
- Licensing of patents;
- Trading without patent inventions;
- Transfer of engineering documentation;
- Transfer of know-how;
- Transfer of technological information, followed by purchasing or renting (leasing) installations and equipment;
- Information exchange during personal contacts at seminars, symposiums, exhibitions, etc.;

- Research and development;
- Exchange of researchers and professionals;
- Conducting different joint development and research campaigns; and
- Setting up joint ventures.

Since 2008, Ukraine has in place the national project National Technology Transfer Network - <http://nttn.org.ua/>

The national technology transfer network (further, TTN) has been built according to the methodology and model of European network relay centres (Innovation Relay Centres - IRC network; since 2008, EEN), the Russian TTN (RTTN) and the Ukrainian TTN (UTTN).

The project is focused on building a network of consolidated information resources of state, public and private innovation structures in Ukraine, and enterprises, institutions and organisations in the technology transfer and integration network in the European TTC EEN.

The key tasks of the national TTN are as follows:

- Technology and transfer between R&D institutes and the industry;
- Searching for partners and investors for cooperating in development and implementation of R&D efforts in high tech areas in both Ukraine and abroad; and
- NTTN interaction with international technology transfer networks.

Hence, the immediate issue is establishing a national technology transfer centre focused to IT innovations. Such a centre could be part of the national network.

The task of the centre would be coordinating and supporting innovations from universities to improve the quality of innovation projects to meet all the requirements of international technology transfer networks.

To implement such a model, the requisite entities are as follows:

1. University with implemented processes E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, S<sup>1</sup>, IPP<sup>1</sup>.
2. National innovation structure – ITC – with implemented processes E<sup>3</sup>, S<sup>1</sup>.
3. Nongovernment organisation – TTN – with implemented process S<sup>1</sup>.

All these entities are integrated by using process S<sup>1</sup>.

S<sup>1</sup> stands for organisational support. For entity U, it is realised by collecting information using TTN forms. Besides, access to ITC and TTN is provided, the best quality innovation proposals are screened, consulting is provided, interaction with ITC and TTN is maintained, and the status of innovations in TTN and the output is tracked.

For entities IS and NGO, process S<sup>1</sup> means collecting information on innovations from U or directly from students and transferring it to international TTNs, consulting, and analysing the information collected.

Entity U should also implement the following processes:

- E<sup>1</sup> – students should know how to develop innovations, at least in the form of innovation proposals;
- E<sup>2</sup> – students should know what kinds of enterprises can be set up for implementing innovations, what the essence of investing is, and how to develop a business plan for innovations;
- E<sup>3</sup> – the student should know how to search for investors, and what means of attracting funds exist;
- IPP<sup>1</sup> – the student should receive assistance in filing one's own intellectual property at both the national and international levels.

Entity IS should have in place process E<sup>3</sup> to teach all those interested in rules of searching for information in TTNs, and how to deal with partners and investors in TTNs.

The sequence of actions in the model is as follows:

1. The University has its own innovative structure, which implements processes  $E^1$ ,  $E^2$ ,  $E^3$ ,  $S^1$ , and  $IPP^1$ .
2. Students, post-graduates, instructors, and researchers after (or without) training develop an innovation proposal.
3. An appraisal of the innovation proposal is done at U.
4. If the proposal is a promising one, it is developed to a full-fledged project, and intellectual property subject-matter is submitted for state registration.
5. The finished innovation project is submitted to the ITC.
6. At ITC, the innovation project is also appraised and checked for compliance to TTN requirements.
7. ITC can directly receive innovation proposals from students.
8. After ITC, the validated innovation project is submitted to the national TTN, and further to international TTNs.
9. U, ITC and the national TTN continually monitor the status of the innovation in the network and the results of its implementation (e.g. setting up a new innovation-type enterprise).

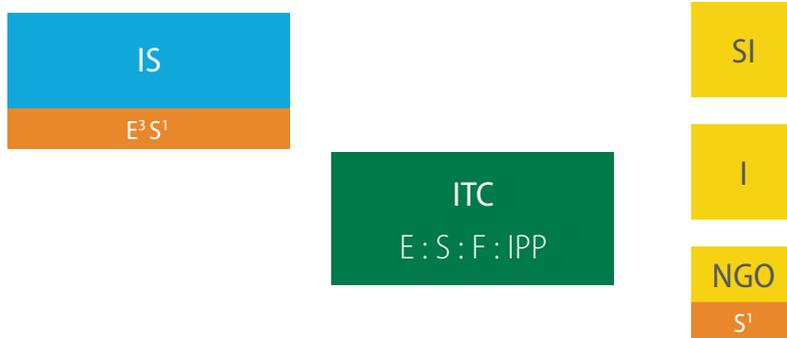
## Model architecture

The model architecture is shown in Fig. 9.

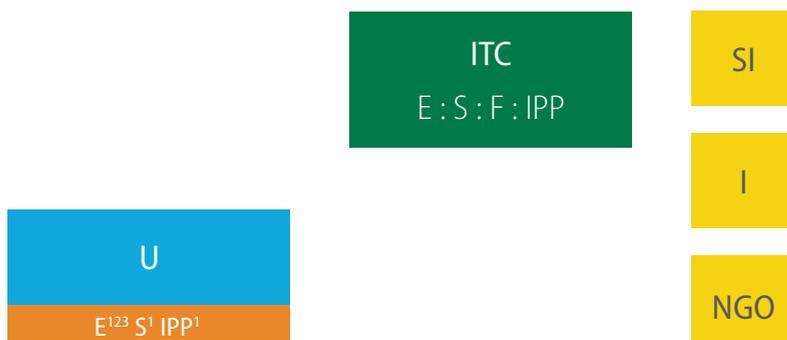
**Figure 9**

Model of National Centre for Transfer of IT Innovations  
 $Ue^{123}s^1ipp^1 : ISe^3s^1NGOs^1$

### NATIONAL LEVEL



### Регіональний рівень



## 2.1. Infrastructure services

Infrastructure services should be described for the model chosen.

For the ITC, the requisite infrastructure services are as follows:

- Elaborating requirements to assessing and submitting information about an innovation project;
- Providing consultancy services on methodological, legal and, patenting/licensing issues;
- Coordinating interaction between all innovation activity entities;
- Searching for partners for joint implementation of innovation projects;
- Enlisting the services of professionals and experts to project efforts;
- Attracting foreign partners to implement joint projects;
- Attracting investors and utilising venture capital to project efforts;
- Submitting information to the national technology transfer network;
- Collecting and analysing statistical information on innovation projects; and
- Organising and participating in national exhibitions, presentations, auctions, seminars, workshops and competitions.

## 2.2 SWOT analysis

Table 6 shows the generalised features of the model of the National Centre for Transfer of IT Innovations.

**Table 6**

**SWOT analysis for the model National Centre for Transfer of IT Innovations**

SWOT	Positive Impact	Negative Impact
Internal environment	Strengths	Weaknesses
Student	<ol style="list-style-type: none"> <li>1. Good IT training</li> <li>2. Inner motivation to set up one's own business</li> <li>3. Working in promising IT areas</li> <li>4. Social awareness</li> <li>5. Opportunity of getting extra material gain</li> </ol>	<ol style="list-style-type: none"> <li>1. No social and financial incentives</li> <li>2. Constant drawing away for studies</li> <li>3. Poor training in entrepreneurship</li> <li>4. No experience in teamwork</li> <li>5. Incomprehension of modern IT trends</li> </ol>
U	<ol style="list-style-type: none"> <li>1. Extending national and international recognition</li> <li>2. Own innovation products and services</li> <li>3. Improving students' tuition</li> <li>4. Improving the qualification of instructors and researchers</li> <li>5. Real academic research</li> </ol>	<ol style="list-style-type: none"> <li>1. Limited financial flexibility</li> <li>2. Lack of erudition in introducing innovation products to the market</li> <li>3. Mistrust in intellectual property protection</li> <li>4. Bureaucratic red-tape in all processes</li> <li>5. Incomprehension and unpreparedness to meet modern IT development trends</li> </ol>
IT Company	<ol style="list-style-type: none"> <li>1. Improving national and international recognition</li> <li>2. Working on advanced customised projects</li> <li>3. Participation in forefront IT community events</li> <li>4. Resources options</li> <li>5. Optimal usage of own resources</li> </ol>	<ol style="list-style-type: none"> <li>1. Majority of projects are customised ones</li> <li>2. No own intellectual property</li> <li>3. Dependence on external orders</li> <li>4. Challenges in strategic business planning</li> <li>5. No innovative spirit in workers</li> </ol>

**Table 6****SWOT analysis for the model National Centre for Transfer of IT Innovations**

SWOT	Positive Impact	Negative Impact
External environment	Opportunities	Threats
Student	<ol style="list-style-type: none"> <li>1. Acquiring new knowledge and skills in innovation activities and entrepreneurship</li> <li>2. Gaining entrepreneurial skills</li> <li>3. Receiving extra profit</li> <li>4. Protecting own intellectual property</li> <li>5. Receiving loans and preferences</li> </ol>	<ol style="list-style-type: none"> <li>1. Poor innovation concept</li> <li>2. Incomplete prototype</li> <li>3. Wrong fund attraction strategy</li> <li>4. Project team breakup</li> <li>5. Lack of time</li> <li>6. Lack of experience</li> </ol>
U	<ol style="list-style-type: none"> <li>1. Simplifying ways of introducing innovation products to the international market</li> <li>2. Increasing number of innovation products</li> <li>3. Improving innovation quality</li> <li>4. Increasing the number of students, post-graduates, instructors, and researchers involved in innovation activities</li> <li>5. Getting new R&amp;D orders</li> <li>6. Gaining new partnership relations</li> </ol>	<ol style="list-style-type: none"> <li>1. No opportunity of own financing</li> <li>2. No motivation</li> <li>3. Brainwashing</li> <li>4. Involved reporting</li> <li>5. Conservative education</li> </ol>
IT Company	<ol style="list-style-type: none"> <li>1. Getting new income sources</li> <li>2. Getting new products and services</li> <li>3. Entry to new markets</li> <li>4. Getting new orders</li> <li>5. Bigger publicity</li> </ol>	<ol style="list-style-type: none"> <li>1. Lack of resources</li> <li>2. Dependence on legislation</li> <li>3. Corruption</li> <li>4. Problems in dealing with U</li> <li>5. Problems in dealing with SI</li> </ol>

### 3. Model structure

The implementation of the model calls for establishing a national centre for IT innovation transfer. A statutory framework should be developed for operation of such an ITC. A system for interaction of ITC with U and TTN should be developed.

#### 3.1. Model methods and standards

A more detailed model overview is given in section 2.

The model is intended for optimising technology transfer processes across the country. This calls for establishing a national centre for IT innovation transfer. It will coordinate acquisition and analysis of information on innovation projects with account of IT specific features.

#### 3.2. Document management standards and notation system

The naming and designation of processes and entities comply with the universal model – USMOIAE.

The following abbreviations have been introduced:

ITC – innovation transfer centre;

TTN – technology transfer network.

#### 3.3. Pending issues

Many different legal entities participate in developing innovation products. Hence, ITC subordination is unclear.

The mechanisms of funding ITC have not been identified.

A challenge is determining a unified system of criteria for appraising innovation projects for their further transfer to international TTNs.

# Model University — Innovation Structure — External Science Park

Ue<sup>123</sup>s<sup>1</sup>ipp<sup>1</sup> ISus<sup>123</sup>f<sup>2</sup>If<sup>12</sup>SI<sup>s</sup>1: ISe<sup>123</sup>s<sup>123</sup> If<sup>12</sup>SI<sup>s</sup>1ipp<sup>1</sup>

## 1. Introduction

The model envisages that the University is not a founder of a Science Park; however, it has an Innovation Structure, which is experienced in working with the Virtual Innovation Space.

The Students collaborate via the Virtual Innovation Space with an external Science Park to commercialise innovation activities starting from a startup concept and to developing a finished product.

The model can be used as an effective one after a stable version of the Virtual Innovation Space has been put into operation.

### Objective

a) the objective of the model is as follows:

To formalise students' innovative activities and entrepreneurship without having an own Science Park, viz.:

- Developing a concept and its appraisal;
- Assistance in teambuilding and project teamwork;
- Assistance in project management;
- Assistance in developing a project business plan;
- Assistance in searching for investors;
- Helping students in creating a legal entity for entrepreneurship;
- Assistance in developing a new innovation competitive IT product, including technological trainings; and
- Recommendations on creating conditions for boosting the entrepreneurial and innovation activity of students of universities, which do not have their own Science Parks.

This can be achieved by creating conditions for actualising the entrepreneurial and innovation potential of IT students by gathering students in teams for developing innovation IT products or services for further setup of legal entities whose efforts are focused to working in the market of producing own IT products in Ukraine. The set up legal entities can receive consultancy services in legal issues and legal support. They can also be provided with services in acquiring special expertise and skills in marketing and attracting investors, conducting different appraisals, receiving technical assistance, and introducing IT products to the market from Science Parks, which have been set up by other Universities.

The model considered can be interesting for administrators of HEIs and regional innovation structures, as well as for instructors, researchers and students. This model can help draw systemic conclusions on how to manage effectively interaction between an innovation structure (VIS), Science Park, university, students, investors and all possible entities of innovation activities and entrepreneurship.

b) target audience

The model can also be interesting for administrators of HEI and regional innovation structures, as well as for instructors, researchers and students. This model can help draw systemic conclusions on how to manage effectively interaction between an innovation structure (VIS), Science Park, university, students, investors and all possible entities of innovation activities and entrepreneurship.

## 1.2. Field of application

The model can be used for integrating education, research, and the entrepreneurial and innovation activities of an HEI student, the University and an external Science Park.

**a) determine what kind of results will be obtained**

The model output will be new legal entities (IT companies).

**b) explain what the model proposed will do (will not do, if required)**

Using the model will increase the number of legal entities (IT companies).

**c) more precisely the advantages, objectives and tasks:**

This subsection will define the general advantages, objectives and tasks for general entities:

### **s.1. For the University**

**General objectives:**

- Developing own IT products;
- Managing project appraisal;
- Enlisting the services of instructors to work in an Innovation Structure (VIS) on real projects for them to gain expertise and acquire hands-on skills;
- Attracting mentors among HEI instructors and professionals to work in an Innovation Structure (VIS).

**General tasks:**

- Participation of a university, which is not a founder of the Science Park;
- For the remaining tasks, refer to the description of the universal model (USMOIAE).

**General advantages:**

refer to the description of the universal model (USMOIAE).

### **s.2. For IT Companies**

**General objectives, tasks and advantages:**

refer to the description of the universal model (USMOIAE).

### **s.3. For the Science Park**

**General objectives:**

- Developing new kinds of innovation products, commercialising them, managing and ensuring the production of research-intensive and competitive products in the domestic and foreign markets of innovation products;
- Information-and-methodical and legal support and consultancy for Science Park workers, and providing patenting / licensing support;
- Attracting students, graduates, post-graduates, researchers and workers of a higher educational institution and/or academic institution to developing and executing Science Park projects (collaboration with the help of an innovation structure (VIS));
- Promoting the development of small innovation entrepreneurship and its support;
- Managing training, professional and skill development of specialists required for developing and implementing Science Park projects (collaboration with the help of an innovation structure (VIS));
- Attracting and utilising risk (venture) capital for one's activities, and support of research-intensive production;
- Protecting and representing the interests of Science Park workers in state administration agencies and local self-administration bodies, as well as in dealing with other business entities when managing and executing Science Park projects within a scope set forth in the constituent documents of the Science Park; and
- Extending international and domestic cooperation in technological and innovation activities, and supporting attraction of foreign investments;

**General tasks:**

refer to the description of the universal model (USMOIAE).

**General advantages:**

refer to the description of the universal model (USMOIAE).

### 1.3. Definitions and abbreviations

This section should define all terms, abbreviations and acronyms used in the document.

The model uses abbreviations in compliance with the universal model (USMOIAE).

The following abbreviation is introduced:

VIS - virtual innovation space.

### 1.4 References

For the statutory support of innovation activities in Ukraine, refer to the description of the universal model (USMOIAE).

## 2. Model overview

The model is directly linked to the activities and services of the Innovation Structure (VIS) and the Science Park. Therefore, for a more detailed examination of the model, it is necessary to ascertain the goal of the Innovation Structure (VIS), and what services the Innovation Structure (VIS) can offer for collaborating with the Science Park.

The purpose of Innovation Structure (VIS) and Science Park interaction is advancement of research-and-technological and innovation activities, effective and optimal employment of the available academic potential, the material-and-technical base for commercialising research output and introducing it to the domestic and foreign markets.

Interaction of the Innovation Structure (VIS) with the Science Park shall determine the priority lines of innovation activities, which comply with the priority lines of advancement of research and technology, and innovation activities in Ukraine, for example:

- Information and telecom technologies, robotics;
- Power engineering and energy effectiveness;
- Nanotechnologies;
- Environmental control; and
- Introducing advanced technologies to the bio medical industry.

To implement such a model, the requisite entities are as follows:

- University with actualised processes E1, E2, E3, S1, IPP1.
- National innovation structure — Virtual Innovation Space with actualised processes E1, E2, E3, S1, S2, S3.
- Regional innovation structure — business incubator with actualised processes S1, S2, S3, F2.
- National and regional investors with actualised processes F1, F2.
- State regional level institutions with actualised processes S1, IPP3.
- State national level institutions with actualised processes S1, IPP3.

All these entities are integrated by means of appropriate processes.

Table 7 shows processes and participating entities.

**Table 7**
**Model processes and entities**

Processes	Entity U	Entity ISu	Entity IS	Entity SI	Entity I
E <sup>1</sup>	Student should know how to develop new products and services.		Student should be able to describe and present one's own concepts.		
E <sup>2</sup>	Student should know how to start one's own business.		Student should be able to distinguish among the advantages of different legal entities, and choose the most effective scheme of registering a legal entity.		
E <sup>3</sup>	Student should know how to present information to investors, and employ the rules of investing and returning investments.		The student should know how to search for project financing sources.		
S <sup>1</sup>	Student should receive support in the following: Managing the efforts of students and all those who want to participate (post-graduates, instructors, researchers, investors, and others).		Student should be provided with support in the following: <ul style="list-style-type: none"> <li>• Receiving premises for different events (training, discussion, development, and so forth);</li> <li>• Organising meetings and different events;</li> <li>• Managing combined efforts of students in teams;</li> <li>• Managing engagement with experts;</li> <li>• Managing interaction with all model entities;</li> <li>• Resolving possible conflicts during joint activities.</li> </ul>	Student should be provided with support: <ul style="list-style-type: none"> <li>• In organising meetings and different events</li> </ul>	
S <sup>2</sup>		Student should receive economic support, viz.: <ul style="list-style-type: none"> <li>• in making relevant estimates in the business model;</li> <li>• in economic appraisal of the innovation project.</li> </ul>	Student should be provided with economic support, namely: <ul style="list-style-type: none"> <li>• Making relevant business model estimates;</li> <li>• Estimating requisite resources at different stages of implementing the innovation project;</li> <li>• Preparing innovation products and services for participating in competitions, exhibitions, etc.;</li> <li>• Accountant services in taxation;</li> <li>• Estimating the financial attractiveness of the innovation project;</li> <li>• Economic appraisal of the innovation project.</li> </ul>		
S <sup>3</sup>		Student should receive legal support.	Student should receive legal support.		

**Table 7**
**Model processes and entities (Continued)**

Processes	Entity U	Entity ISu	Entity IS	Entity SI	Entity I
F <sup>1</sup>					Student should receive funding from I to develop one's own innovation project
F <sup>2</sup>		Student should receive funding, which is external with regard to the university and IS (business angel, bank, venture fund, NGO, etc.)			Student should receive funding, which is external with regard to the university and IS (business angel, bank, venture fund, NGO, etc.)
IPP <sup>1</sup>	Student should receive adequate support in filing IP subject-matter.				
IPP <sup>3</sup>				Student should receive encouragement and means of motivation to participate in regional and national competitions.	

The sequence of actions in the model is as follows:

1. The University has access to the VIS via the HEI Innovation Structure, which consults on the opportunities and rules of using the VIS.
2. The process participants can be students, post-graduates, instructors, University research workers, mentors, experts and professionals from IT companies, further referred to as Participants.
3. The Student generates a concept.
4. The Student is registered in the Innovation Structure (VIS) and files a request for appraisal of the concept on its competitiveness, feasibility, novelty, and so forth.
5. After the appraisal has been completed and a positive referral has been received, the Student is awarded the status of the author of the concept in the Innovation Structure (VIS) and starts working on the concept.
6. While working on the concept, the Innovation Structure (VIS) potential is used to build a project team and manage relations with the Science Park.
7. To commercialise the start-up concept, the Students who are working on implementing the concept should set up a legal entity as an enterprise of any form of property or become a private entrepreneur.
8. The registered legal entity should conclude a cooperation agreement with the Science Park.
9. The Science Park shall attract investors, assist in development and provide professional consulting, and collaborate

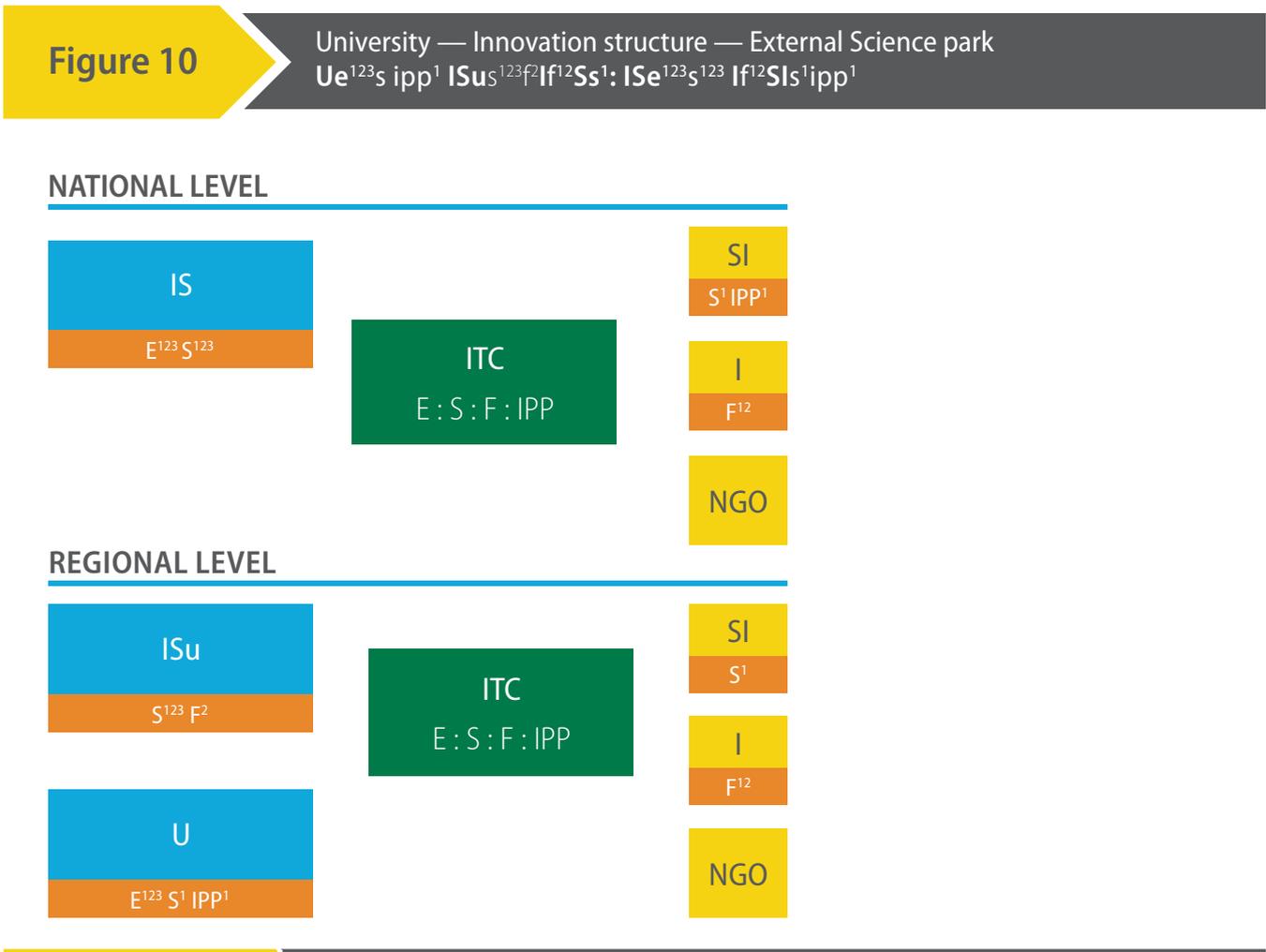
with legal entities on the startup concept. Gradually, it transforms the start-up to a finished product. This product shall be positioned in the market, promoted and sold.

10. The finished product sales proceeds are allocated among the legal entities who participated in its development, and the Science Park in compliance with the cooperation agreement.

11. The HEI, which founded the Science Park, will receive dividends.

## Model architecture

The model architecture is shown in Fig. 10.



## 2.1. Infrastructure services

For each of the specified model entities, the requisite infrastructure services are described in the universal model (USMOIAE).

The infrastructure of Innovation Structure services is related to the activities of the Virtual Innovation Space, namely:

- Working on real projects;
- Consultancy by mentors, professionals and experts;
- Assistance in setting up a legal entity;
- Consultancy on information, methodological, legal, and patenting/licensing issues in the Science Park;
- Protection and representation of interests in state administration agencies and local self-administration bodies via the Science Park;

- Services in expert examination of intellectual property subject-matter, development of business plans and marketing plans, information and consultancy support in technology transfer in the Science Park;
- Assistance in searching for investors via the Science Park;
- Access to resources of the Virtual Innovation Space and Science Park;
- Participation in exhibitions, presentations, auctions, seminars, symposiums, and competitions organised by the Science Park.
- Dissemination of information about the startup in printed editions and the electronic media with the help of the Science Park service.

## 2.2. SWOT analysis

**Table 8**

SWOT analysis for the model University – Innovation Structure – External Science Park

SWOT	Positive Impact	Negative Impact
Internal environment	Strengths	Weaknesses
HEI	<ol style="list-style-type: none"> <li>1. Opportunity of engaging students and instructors to work on real projects to acquire expertise and hands-on skills.</li> <li>2. Managing start-up appraisal.</li> <li>3. Students and instructors can set up their own business.</li> </ol>	<ol style="list-style-type: none"> <li>1. Vague motivation factors to work on a start-up in an HEI.</li> <li>2. No means of motivation to engage unpaid instructors, mentors, experts, and so forth to work on a start-up in an HEI.</li> <li>3. No strategic planning.</li> <li>4. Red tape.</li> </ol>
Student	<ol style="list-style-type: none"> <li>1. Offering equal opportunities to all students in all HEIs across Ukraine.</li> <li>2. Developing own IT products.</li> <li>3. Managing start-up appraisal.</li> <li>4. Students can set up their own business while studying at an HEI.</li> </ol>	<ol style="list-style-type: none"> <li>1. Vague motivation factors for students to work on a start-up in an HEI.</li> <li>2. Red tape.</li> <li>3. Continual change of startup business plan.</li> </ol>
Company	<ol style="list-style-type: none"> <li>1. Possibility of involving mature teams for working on a start-up.</li> <li>2. Managing start-up appraisal.</li> </ol>	<ol style="list-style-type: none"> <li>1. No transparent mechanism for identifying priorities.</li> <li>2. Model of financing for an IT company in conditions of virtual participation in a Science Park.</li> <li>3. Red tape.</li> </ol>
External environment	Opportunities	Threats
HEI	<ol style="list-style-type: none"> <li>1. Collaboration with the Science Park.</li> <li>2. Engaging IT companies and their representatives to work on a start-up.</li> </ol>	<ol style="list-style-type: none"> <li>1. Legislative changes.</li> <li>2. Taxation changes.</li> <li>3. Start-up investing mechanism.</li> <li>4. Economic depression.</li> </ol>
Student	<ol style="list-style-type: none"> <li>1. Acquiring intellectual property to an IT product.</li> <li>2. Collaboration with the Science Park.</li> </ol>	<ol style="list-style-type: none"> <li>1. Legislative changes.</li> <li>2. Taxation changes.</li> <li>3. Start-up investing mechanism.</li> <li>4. Economic depression.</li> </ol>
Company	<ol style="list-style-type: none"> <li>1. Engaging HEI representatives and students to work on a start-up.</li> </ol>	<ol style="list-style-type: none"> <li>1. Legislative changes.</li> <li>2. Taxation changes.</li> <li>3. Startup investing mechanism.</li> <li>4. Economic depression.</li> </ol>

### **3. Model structure**

To implement the model, it is necessary to ensure access via the Innovation Structure (VIS) to the Science Park whose founder is not the University. A legal entity should be set up based on the Innovation Structure (VIS). A relevant statutory framework should be developed for operation of such a Legal Entity. It is necessary to work out a system of interaction of the Innovation Structure (VIS) with other entities in the model.

#### **3.1. Model methods and standards**

A more detailed overview of the model is given in section 2.

#### **3.2. Document management standards and notation system**

Naming and designation of processes and entities complies with the universal model — USMOIAE.

The Virtual Innovation Space has been introduced additionally. It provides the option of linkage with an external Science Park.

#### **3.3. Pending issues**

Vague mechanism of motivating and engaging students to work on startups in the University, and then with the help of the Innovation Structure (VIS) in the Science Park.

Non-transparent criteria of choosing experts and mentors.

# Model of a University's Innovation Structure

$Ue^{13s^{12}} f^{1ipp^{123}} ISe^{1s^{12}f^{1ipp^{12}} ITCe^1 : Ue^{13s^{12}} f^{1ipp^{123}} ISe^{1s^{12}f^{1ipp^{12}} ITCe^1$

The model being suggested is presented as a University's Innovation Structure.

**Name** Model of a university's innovation structure (MUIS)  
 $Ue^{13s^{12}} f^{1ipp^{123}} ISe^{1s^{12}f^{1ipp^{12}} ITCe^1 : Ue^{13s^{12}} f^{1ipp^{123}} ISe^{1s^{12}f^{1ipp^{12}} ITCe^1$

**Keywords** Model, university, innovation structure, IT company

## 1. Introduction

The model MUIS provides that the university (U) has an Innovation Structure (ISu), which is responsible for education, support, and innovation activity funding. The students or young researchers of the U cooperate via the Innovation Structure with innovation consumers (government customers, IT enterprises, and non-government organisations).

### Objective

The model component entities are the U, the university's innovation structure (ISu), a non-government organisation, state institutions and IT companies. The key objective of building the model is providing space for developing and ensuring the entrepreneurship and innovation activities of students and young researchers in a U.

The model developed solves the following tasks:

- Analysis of innovation needs;
- Monitoring innovation needs and research;
- Creating conditions for executing an innovation project;
- Developing methods for individual focused training of project participants;
- Consultancy in innovation product commercialisation;
- Logistical support of innovation activities of students and young researchers;
- Attracting qualified employees of other enterprises, organisations and institutions;
- Organising and managing advertising activities;
- Developing collaboration with higher education institutions, research-and-design organisations and other scientific and educational institutions; and
- Extending international research-and-technological cooperation with educational institutions, organisations, institutions and organisations.

The target audience of the model is students, workers of universities, instructors, and academic researchers interested in developing IT innovation products.

### 1.2. Field of activity

The field of activity of the model comprises managing, developing and ensuring the entrepreneurship and innovation activities of students and young researchers in the U.

The following processes are requisite for implementing such activities:

- $U - E^1, E^2, E^3, S^1, S^2, IPP^1, IPP^2, IPP^3$
- $: ISu - E^1, S^1, S^2, IPP^1, IPP^2;$
- $: ITC - S^1.$

#### a) determine what kind of results will be obtained

The main results of model functioning are as follows:

- Funding and conducting innovation activities;
- Commercialisation, management and making products at own or subsidiary production facilities;
- Coordination of research, innovation and commercial activities;
- Logistical support of innovation activities of students and young researchers;
- Consulting innovation activity participants;
- Access to innovation structure resources; and
- Participation in exhibitions, presentations, auctions, seminars, symposiums, and competitions organised by a U.

#### b) explain what the model proposed will do (will not do, if required)

The model will increase the effectiveness of innovation activities in a university, and streamlines and encourages innovation activity processes.

#### c) define more precisely the advantages, objectives and tasks:

The objectives, tasks and advantages of each model entity are as follows:

### s.1. For the University

#### General objectives:

- Increasing the effectiveness and improving the quality of innovation activity processes in the university;
- supporting and developing the innovation activities of university students and workers.

#### General tasks:

- Identify the lines of activity and ways of increasing the effectiveness and quality of innovation activity processes;
- Develop procedures for supporting and developing innovation activities;

#### General advantages:

- Increasing the effectiveness and improving the quality of innovation activity processes;
- Increasing the number of innovation products and services;
- Improving the regional, national and international ratings of the university.

### s.2. For the University's Innovation Structure

#### General objectives:

- Improving the quality of training of innovation project participants;
- Coordinating research, innovation and commercial activities;
- Commercialisation, management and sales of innovation products.

#### General tasks:

- Identifying the areas and methods of improving the quality of training for innovation projects participants;
- Identifying the methods of coordinating research, innovation and commercial activities;
- Developing procedures for commercialisation, management and sales of innovation products.

#### General advantages:

- Individual focused training of project participants;
- Engagement of U workers in task teams for developing innovation projects;
- Commercialisation, management and making products at own or subsidiary production facilities;
- Attracting partners to execute joint projects; and

- Logistical support of innovation activities of students and young researchers.

### s.3. For an IT Company

#### General objectives:

- Using innovation products and services for increasing the effectiveness of production processes and improving product quality.

#### General tasks:

- Identify innovation products and services for increasing the effectiveness of production processes and improving product quality

#### General advantages:

- Developing quality innovation products;
- Gaining extra profits.

## 1.3. Definitions and abbreviations

The model uses the universal model abbreviations.

## 1.4. References

Universal model for managing the innovation activities and entrepreneurship of IT students.

## 2. Model overview

The model is directly linked to the U's activities and services. Let us examine the links of the innovation structure as part of the university.

The University's innovation structure is built as a structural unit of the university by merging and reorganising existing units with a relevant profile, or by establishing a new structural unit for managing, coordinating, and monitoring project development and execution.

The aim of the ISu is developing research-and-technological and innovation activities for effective and efficient employment of available research potential, the logistics framework, and commercialisation and coupling of research output.

ISu defines the priority lines of innovation activities and focuses on improving the quality of training for participants of innovation projects; coordinates research, innovation and commercial activities; and commercialises, manages and ensures the sale of innovation products.

The following entities are requisite for implementing such activities:

1. The university with actualised processes – E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, S<sup>1</sup>, S<sup>2</sup>, IPP<sup>1</sup>, IPP<sup>2</sup>, IPP<sup>3</sup>.
2. The university's innovation structure – E<sup>1</sup>, S<sup>1</sup>, S<sup>2</sup>, IPP<sup>1</sup>, IPP<sup>2</sup>.
3. The IT Company – S<sup>1</sup>.

Process S<sup>1</sup> links model entities, allowing analysis of the external innovation environment to identify the requisite lines of innovation activities. S<sup>1</sup> is organisational support of innovation activities in U and ISu. Entity ITC holds organisational arrangements for assisting in defining the priority lines of ISu innovation activities.

Entity U provides the following processes:

E<sup>1</sup> – the student should be trained in the approach to develop innovation products and services; searching for and analysing information on priority areas in IT and research; skills in expressing, describing and presenting one's own concepts, and identify erroneous statements and proposals;

E<sup>2</sup> – the student should know what kinds of enterprises can be set up for implementing an innovation, what does investment imply, and how to develop an innovation business plan;

E<sup>3</sup> – the student should learn how to search for innovation project sources of funding, and how to present information to investors

S<sup>1</sup> – the student should be provided with organisational support;

S<sup>2</sup> – the student should be provided with economic support

IPP<sup>1</sup> – the student should receive assistance in filing one's own intellectual property at both the state and international levels.

IPP<sup>2</sup> - the student should receive support in introducing filed intellectual property.

IPP<sup>3</sup> - the student should be provided with encouragement and motivation.

Entity :ISu should have actualised processes E1, S1, S2, IPP1, IPP2.

E<sup>1</sup> – should be trained in approaches to developing innovative products and services; searching for and analysing information on priority areas in IT and research; skills in expressing, describing and presenting one's own concepts, and distinguish erroneous statements and proposals;

S<sup>1</sup> – the student should be provided with organisational support;

S<sup>2</sup> – the student should be provided with economic support

IPP<sup>1</sup> – the student should receive assistance in filing one's own intellectual property at both the state and international levels.

IPP<sup>2</sup> – should receive support in introducing filed intellectual property.

The sequence of actions in the model is as follows:

1. The university has its own innovation structure for implementing processes E1, S1, S2, IPP1, and IPP2.
2. Students, post-graduates, and university workers define the lines of innovation activities. ISu holds consultations on topicality of the innovation line and builds a task group.
3. At the following stage, the research team activities are supported organisationally and economically.
4. The research team implements the innovation project with the support of ISu in utilising project deliverables.
5. The finished innovation project is transferred to the ISu.
6. ISu files the intellectual property developed at both the state and international levels and introduces into practice, if required, the deliverables of the filed intellectual property.

## Model architecture

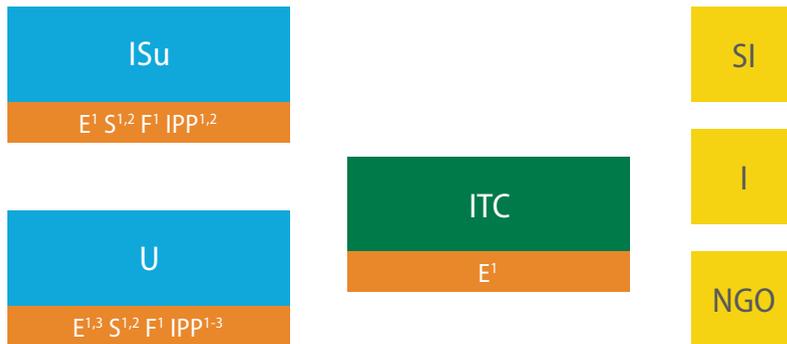
The model architecture is shown in Fig. 11.

**Figure 11**

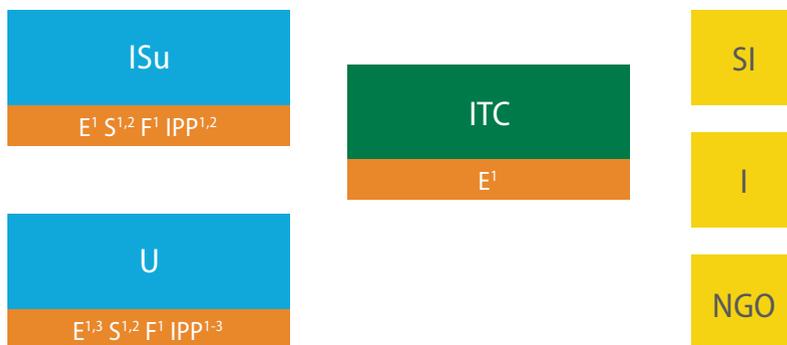
Model innovative university structure

$Ue^{13}s^{12}s^{1ipp^{123}} ISe^{1s^{12}s^{1ipp^{12}} ITCe^1 : Ue^{13}s^{12}s^{1ipp^{123}} ISe^{1s^{12}s^{1ipp^{12}} ITCe^1$

### NATIONAL LEVEL



### REGIONAL LEVEL



## 2.1. Infrastructure services

Infrastructure services should be described for the model chosen.

For ISu, the requisite infrastructure services are as follows:

- Innovation space analysis;
- Managing production of innovation products;
- Commercialising the innovation product;
- Coordinating the research, innovation, and production activities of task groups;
- Analysing the innovation appeal of the product;
- Engaging professionals and experts in project implementation activities;
- R&D efforts and delivering services in coupling their output to production;
- Managing individual focused training of project participants;
- Organising and participating in exhibitions, presentations, auctions, seminars, symposiums, and competitions; and
- Producing and distributing printed editions and electronic media, and publishing activities.

## 2.2. SWOT analysis

**Table 9** SWOT analysis for MUIS

SWOT	Positive Impact	Negative Impact
Internal Environment	Strengths	Weaknesses
Student	<ol style="list-style-type: none"> <li>1. Administrative support in the process of developing an innovation project</li> <li>2. Funding innovation product development</li> <li>3. Gaining hands-on experience in developing innovation products</li> <li>4. Cooperation in the process of developing IT products or services</li> <li>5. Filing intellectual property at both state and international levels</li> </ol>	<ol style="list-style-type: none"> <li>1. High risk of receiving development results</li> <li>2. Limited rights to ownership of innovation activity results</li> <li>3. Financial and administrative dependence on the university</li> <li>4. Absence of external extra funding</li> </ol>
U	<ol style="list-style-type: none"> <li>1. Engaging co-workers in task groups</li> <li>2. Innovation product analysis to determine the possibility of its commercialisation.</li> <li>3. Logistics and administrative support of innovation project development, and manufacturing innovation products and delivering services.</li> <li>4. Receiving an innovation product or service</li> </ol>	<ol style="list-style-type: none"> <li>1. Vague motivation factors for task group members at early stages of investigating the innovation product.</li> <li>2. Vague conditions of engaging co-workers.</li> <li>3. Vague financing conditions at early stages of innovation product development.</li> <li>4. Centralised management by one structure</li> <li>5. Development process can be terminated</li> <li>6. No transparent mechanism for setting priorities</li> </ol>
ITC	<ol style="list-style-type: none"> <li>1. Increasing effectiveness of production processes and product quality</li> <li>2. Developing quality innovation products</li> <li>3. Acquiring extra profits</li> </ol>	<ol style="list-style-type: none"> <li>1. University can abandon its rights to usage of the innovation product</li> </ol>
External Environment	Opportunities	Threats
Student	<ol style="list-style-type: none"> <li>1. Participation in exhibitions, presentations, auctions, seminars, symposiums, and competitions</li> <li>2. Opportunity of publishing effort results in printed editions and the electronic media</li> </ol>	<ol style="list-style-type: none"> <li>1. Subordination to the university's innovation structure</li> <li>2. Limited rights to publish effort results</li> </ol>
U	<ol style="list-style-type: none"> <li>1. Engaging employees of IT companies and their representatives in the project.</li> <li>2. Cooperation with the customer or user of an innovation product</li> <li>3. Acquiring intellectual property rights</li> </ol>	<ol style="list-style-type: none"> <li>1. Changes in laws governing structure organisation</li> <li>2. Taxation changes</li> <li>3. Innovation projects investment mechanisms</li> <li>4. Economic depression</li> <li>5. Geared up expectation of results</li> <li>6. No motivation to develop innovation products</li> </ol>
ITC	<ol style="list-style-type: none"> <li>1. Opportunity of entering new markets with innovation products</li> </ol>	<ol style="list-style-type: none"> <li>1. Economic depression</li> </ol>

### **3. Model structure**

This section should provide adequate information for the implementation task force.

An ISu should be created to actualise the model. The university's innovation structure is created as a structural unit of the university by merging and reorganising existing units having a relevant profile, or by creating a new structural unit for managing, coordinating, and monitoring project development and execution.

A statutory framework should be built for functioning of such an ISu. A system of interaction of ISu with U and ITC should be developed.

#### **3.1. Model methods and standards**

A more detailed overview of the model is given in subsection 2.

The model is intended for promoting technological and innovation activities, effective and reasonable employment of the available research potential, logistics framework, and commercialising and introducing research deliverables. This calls for setting up an ISu.

#### **3.2. Document management standards and notation system**

The naming and designation of processes and entities comply with those in the universal model – USMOIAE.

#### **3.3. Pending issues**

The U and ISu interaction mechanism has not been defined.

The curriculum content for E1, E2, and E3 has not been defined.

The regulations and demands to S1 and S2 have not been defined.

# Model Science Park– Innovation Office – University

Ue<sup>12s<sup>13f1</sup></sup>ipp<sup>12</sup> ISUe<sup>23s<sup>123f123</sup></sup> NGO<sup>f3</sup> Is<sup>2f1</sup> SIs<sup>1</sup> : ISs<sup>123f1</sup> NGO<sup>f3</sup> Is<sup>2f1</sup> SIs<sup>1f1</sup>

This is a description of conditions for boosting business park performance by creating a specialised structure – an innovation office – in the university. The functioning of a business incubator in the science park can boost the entrepreneurial and innovation activity of students. Science park activities are geared to commercialising the university's intellectual property, cooperating with companies with a view to developing innovation products, setting up joint ventures (spinoffs) and attracting investments to business incubator projects.

**Name** Science Park – Innovation Office – University  
Ue<sup>12s<sup>13f1</sup></sup>ipp<sup>12</sup> ISUe<sup>23s<sup>123f123</sup></sup> NGO<sup>f3</sup> Is<sup>2f1</sup> SIs<sup>1</sup> : ISs<sup>123f1</sup> NGO<sup>f3</sup> Is<sup>2f1</sup> SIs<sup>1f1</sup>

**Keywords** Model, university, innovation office, science park, business incubator, startup, spinoff, IT company, education, support, funding, intellectual property protection

## 1. Introduction

The model stipulates that the university has an innovation structure as a science park, and that the university is its founder. The model foresees the IT business incubator operation within the framework of the science park and the university's innovation office to engage IT students more effectively to entrepreneurial and innovation activities, as well as for commercialising HEI research developments and innovation IT products.

The model has been introduced in part at the National University L'viv Polytechnic, in particular, an Innovation Office has been set up at the L'viv Polytechnic. A strategy for the Innovation Office of the L'viv Polytechnic and a long-term plan of its operation has been developed.

### Objective

#### a) the purpose of the model is as follows:

To boost the performance of science parks in Ukraine by involving the university's Innovation office and the IT business incubator in their operations. The implications of this are as follows:

- Encouraging the innovation activities of students at universities by engaging them in producing innovation products within the science park;
- Enhancing cooperation of the university and companies by engaging companies as science park founders and partners;
- Commercialising university's research developments with the help of the university's Innovation office;
- University's participation in forming the science park statutory fund by contributing thereto property rights to intellectual property subject-matter; and
- Increasing the value of companies by attracting research developments, intellectual property subject-matter, a highly qualified workforce, and so forth.

This objective is achieved by integrating the theoretical instruction and hands-on training components, including execution of IT projects in students' teams on order of enterprises (at both the regional and national levels); delivering consultancy services on starting one's own business, technology transfer, and on intellectual property matters with involvement of the business indicator and innovation office; establishing legal entities – science park partners and legal entities – within the business incubator.

#### b) target audience

The model is intended for administrators of HEIs, national and regional innovation structures, instructors, academic researchers, students, owners of property and copyright to intellectual property subject-matter, and managers of IT companies. The model helps to build a scheme of cooperation between the university and IT company within the

science park, and of the university with national innovation structures via the university's Innovation office. It also provides possible ways of boosting the effectiveness of students' entrepreneurial and innovation activities.

## 1.2. Field of activity

The field of application of the model covers integration of the educational, research, and entrepreneurial and innovation activities of an HEI student, the university's Innovation office, and the business incubator and Science Park.

### a) determine what kind of results will be obtained

The output of the model will be highly qualified IT professionals with in-depth training in innovation and entrepreneurship, on the one hand, and legal entities (startups, spinoffs, etc.), which make innovation products, on the other hand.

### b) explain what the model proposed will do (will not do, if required)

The model supports improving the quality of training IT professionals in Ukraine; close cooperation between research, education and business in developing hi-tech products; and increasing the share of innovation products with high VAT in Ukraine's GDP.

### c) define more precisely the advantages, objectives and tasks:

This subsection shall outline the general advantages, objectives and tasks for general entities:

## s.1. For the University

### General objectives:

- Gaining profit by commercialising intellectual property (including research output);
- Improving the qualification of the academic teaching staff by engaging them in executing IT industry projects at science park partner companies;
- Improving the quality of training in IT areas by involving the theoretical (new subjects related to entrepreneurial and innovation activities) and hands-on (participating in executing science park projects) components of professional training; and
- Improving different-level university ratings by achieving the above goals and promoting brand recognition by making innovation products at the companies of the science park whose cofounder is the university.

### General tasks:

- Act as cofounder of a regional innovation structure – a Science Park;
- Set up a department in the university for cooperation with the IS – an Innovation Office;
- Establish a business incubator at the ISu;
- For remaining tasks, refer to the description of the universal model (USMOIAE).

### General advantages:

- Opportunity of acting as cofounder/co-owner of profit-making legal entities within the framework of the science park;
- Commercialisation of university's research developments by licensing property rights in intellectual property subject-matter, and setting up spinoffs, startups, etc.;
- Distributing information about university's R&D deliverables via the Innovation Office to attract potential customers of research-intensive products; and
- Other advantages described in the universal model (USMOIAE).

## s.2. For an IT Company

### General objectives:

- Increasing the market value of companies by engaging highly qualified professionals and the intellectual property

- of partners and science park founders;
- Access to highly qualified workers by employing university graduates who have acquired extra theoretical tuition and hands-on training in the science park; and
- Reducing risks when investing resources in innovation projects by executing such projects in a science park, with attraction of resources of the university's innovation office, or by further purchasing of successful startups.

#### General tasks:

- Act as cofounder or partner of a regional innovation structure – a Science Park;
- Allocate resources (human, financial, etc.) for administering the academic activity of students;
- Deliver consultancy services within the framework of the ISu business incubator; and
- For remaining tasks, refer to the description of the universal model (USMOIAE).

#### General advantages:

- Preferences (zero import duty rates, no obligatory sale of currency income, favourable rental payment rates, attracting credit funds on preferential conditions, etc.) envisaged by the Law of Ukraine On Science Parks;
- Possibility of receiving information about the scientific developments of the university's academic researchers by cooperating with the Innovation Office. This can be a source of concepts for participating in potential startups and spinoffs;
- Possibility of addressing one's own business needs by placing orders in a science park, and thus reducing product costs;
- Reducing expenses on improving the level of training of candidates for working in the company;
- Improving the qualification of company employees by executing hi-tech science park projects and cooperating with the university's innovation office; and
- Other advantages described in the universal model (USMOIAE).

### s.3. For the Innovation Structure – Science Park

#### General objectives:

- Development of research-and-technological and innovation activities in the university;
- Effective and reasonable employment of the existing research potential and logistics framework for commercialising research deliverables;
- Improving the performance of science park partners by fostering an innovation culture and increasing the competitiveness of associated knowledge-based enterprises and institutions;
- Other general objectives are described in the universal model (USMOIAE) and the Science Park– Innovation Structure – University model.

#### General tasks:

- Managing the flow of knowledge and technologies among universities, R&D institutes, and companies and markets;
- Promoting establishment and growth of innovation-based companies by moving them to a business incubator and transferring parts of assets to them;
- Providing specially equipped premises, equipment and other extra services (including organisational and consultancy ones);
- For remaining tasks, refer to the description of the universal model (USMOIAE).

#### General advantages:

- Improving the effectiveness of training in innovation and entrepreneurship by integrating theoretical studies (seminars, trainings, consulting, etc.) and hands-on training components (science park projects, making innovation IT products, launching and development of startups, etc.);

- Commercialising university's intellectual property by cooperating with the Innovation Office and via the activity of joint ventures (spinoffs);
- Streamlining the process of transforming an innovation concept to a successful business project; and
- Preferences for founders and partners envisaged by the Law of Ukraine [On Science Parks](#).

### 1.3. Definitions and abbreviations

The model uses the universal model abbreviations (USMOIAE).

The following abbreviations have been added:

SP – Science Park

IO – Innovation Office

BI – Business Incubator

### 1.4. References

For the statutory support of innovation activities in Ukraine, refer to the description of the universal model (USMOIAE).

## 2. Model overview

The model is intended for forming an effective system of relations between enterprises (companies), university students /scholars, the university and its representative in Innovation activities – Innovation offices and the Science Park with its business incubator component.

The model is linked directly to the Science Park activities and services. It is an innovation structure and Innovation office, which ensures university interaction with innovation structures and the technology transfer process, and with the business incubator that operates within the Science Park. Hence, let us consider the key functions and fields of activity of the above structures.

The Science Park is a legal entity founded on the initiative of a higher education institution by pooling the contributions of founders for administering, coordinating, and monitoring the process of development and execution of science park projects. The purpose of creating science parks is to develop the research-and-technological and innovation activities in higher education institutions. The partners of a science park are business entities who have concluded a partnership agreement with the science park. Thereat, pursuant to the Law of Ukraine On Science Parks, one of the main functions of science parks is “engaging students, graduates, post-graduates, academic researchers and workers of a higher education institution in developing and executing science park projects; promoting the development of and support of a small innovation enterprise; administering training, professional development and advancement of specialists required needed for developing and implementing science park projects.” These functions fully comply with the key objectives of the present Tempus project. Hence, it would be reasonable to establish the developed models of interaction of the university and companies, and the models of encouraging the innovation activities of students in universities on the concept of activities of a science park, with a HEI being one of its founders.

The science park sources of financing are as follows: the resources of the statutory and other funds of the science park; science park financial receipts from its activities; investments in the science park; donations for science park development and execution of its projects; state and local budget funds; customers' funds; as well as other receipts not prohibited by the laws of Ukraine.

The following entities are requisite for executing the model:

1. University with actualised processes  $H^1, H^2, F^1, S^1, S^3, IPP^1, IPP^2$ , with processes  $S^1, S^3, IPP^1$  and  $IPP^2$  being actualised within the Innovation office framework.
2. Regional IT company, with actualised processes  $E^1, S^1, S^3, F^1, IPP^3$ .
3. Regional Innovation Structure – Science Park, one of the cofounders of which is the University with actualised processes  $E^2, E^3, S^1, S^2, S^3, F^1, F^2, F^3$ .
4. National and regional non-government organisations, with actualised process  $F^3$ .

5. National and regional investors, with actualised processes  $S^2$  and  $F^1$ .
6. National and regional governmental institutions, with actualised processes  $S^1$  (regional level) and  $S^1, F^1$  (national level).

Optional model entities are as follows:

1. National IT companies.
2. National Innovation Structure, the interaction with which is effected via the Innovation Office (primarily, with processes  $S^1, S^2, S^3, F^1$ ).

All these entities are integrated with the help of relevant processes. Table 10 shows the participating processes and entities.

**Table 10** Model processes and entities

Processes	Entity Y	Entity ISu	Entity ITC	Entity SI	Entity I	Entity NGO
H <sup>1</sup>	The student should have a command of advanced IT technologies and realise the prospects of their development		The student should be able to develop innovative products and services, and express and present one's own concepts			
H <sup>2</sup>	The student should know the basics of economic theory, entrepreneurship, and tax legislation	The student should be able to identify the advantages of different legal entities, choose the most effective scheme of legal entity registration; and know the provisions of current legislation in entrepreneurship and accountancy				
H <sup>3</sup>		The student should know the principles of investment activities; the classification and principles of searching for sources of project funding; and the basics of dealing with investors				
S <sup>1</sup>	The student should be supported in the following: <ul style="list-style-type: none"> <li>• Setting up relations with experts;</li> <li>• Setting up relations with a science park.</li> </ul>	The student should be supported in the following: <ul style="list-style-type: none"> <li>• Be provided with premises for setting up one's own business;</li> <li>• Organising meetings and different events;</li> <li>• Managing team work on science park projects;</li> <li>• Managing interaction with experts;</li> <li>• Resolving possible conflicts during joint activities.</li> </ul>	The student should be supported in the following: <ul style="list-style-type: none"> <li>• Be provided with premises for different events;</li> <li>• Organising meetings and different events;</li> <li>• Managing team work on ITC projects;</li> <li>• Managing interaction with experts.</li> </ul>	The student should be supported in the following: <ul style="list-style-type: none"> <li>• Organising meetings and different events.</li> </ul>		

**Table 10**
**Model processes and entities**

Processes	Entity Y	Entity ISu	Entity ITC	Entity SI	Entity I	Entity NGO
S <sup>2</sup>		The student should be provided with economic support: <ul style="list-style-type: none"> <li>• Making requisite business model estimates;</li> <li>• Evaluating requisite resources at different stages of executing an innovation project;</li> <li>• In preparing innovation products and services for participating in competitions, exhibitions and so forth;</li> <li>• Accountant taxation services;</li> <li>• Estimating the financial appeal of an innovation project;</li> <li>• Economic appraisal of an investment project.</li> </ul>			The student should be provided with economic support: <ul style="list-style-type: none"> <li>• Estimating the financial attractiveness of an innovation project;</li> <li>• Economic appraisal of an investment project.</li> </ul>	
S <sup>3</sup>	The student should receive legal advice in intellectual (IP) property protection	The student should receive legal advice in startup business operations	The student should receive legal advice The company can finance innovation projects from its own funds		Investors finance	
F <sup>1</sup>	The university can finance innovation projects from off-budget funds	The student can receive science park funds for developing their own innovation project (startup)		National SI can finance innovation projects from the budget	innovation projects with their own funds	
F <sup>2</sup>		For developing their own innovation project (startup), the student can receive investors' funds found with the help of the science park				
F <sup>3</sup>		For developing their own innovation project (startup), the student can receive public funding organised by the science park				The student can receive public funding as donations
IPP <sup>1</sup>	The student should receive assistance in filing IP					
IPP <sup>2</sup>	The student should be supported in introducing filed IP and technology transfer					
IPP <sup>3</sup>			The company organises and supports encouragement and motivation actions in the IP (contests, competitions, seminars, and so forth)			

The sequence of actions in the model is as follows:

1. The Science Park, with the University as one of its founders, has a business incubator in its structure, and the university creates an innovation office in its structure for interacting with an IS;
2. The role of the innovation office is information support and to promote the university's innovation activities; transfer of research output and technological developments of the university's researchers to national and international markets; legal advice and technological support in intellectual property protection;
3. The IT business incubator tasks are providing resources for startups at the early stages of their life cycle to support their financial independence;
4. The author of the concept (or the invention assignee) address the science park for receiving initial consultancy services required for presenting the concept to investors (developing a business plan, technical appraisal and so forth);
5. The startup initiator (the author of the concept or property rights owner), within the IT business incubator, will be able to organise the activities of the startup office (premises, legal address, secretary, etc.) and build a project execution team;
6. Concurrently with item 5, the startup initiator will receive further consultancy services including, if needed, technology transfer for improving the investment appeal of the startup, and services in searching for and attracting investments/venture capital;
7. At stage 6, the science park (university) can invest their own resources (mainly non-financial ones, such as intellectual property, renting premises, consulting, etc.) in start-up development;
8. At stage 6, companies (not only those who founded the science park) can invest their own resources, both financial ones such as direct investments and non-financial ones such as project appraisal in startup development, and can acquire further a property share in the new company, which makes an IT innovation product, or property rights in inventions made during startup formation;
9. After the startup has acquired financial independence, the IT business incubator (and hence, the science park and its founders) can acquire a property share in the new company, which makes an IT innovation product;
10. Potential customers can address the innovation office with requests and proposals on meeting their own business needs, thus enhancing the science park innovation activities and commercialising the university's research developments;
11. IT companies can address the innovation office to search for and protect intellectual property rights; on using intellectual property owned by the science park, and for looking for promising company employees in the IT business incubator of the science park;
12. Students can address the innovation office to receive consultancy services (training) in innovation activities and entrepreneurship; engagement in executing startups/projects; gaining hands-on skills by executing projects on order of companies; and receive legal advice and technological support in intellectual property protection, and so forth.

## Model architecture

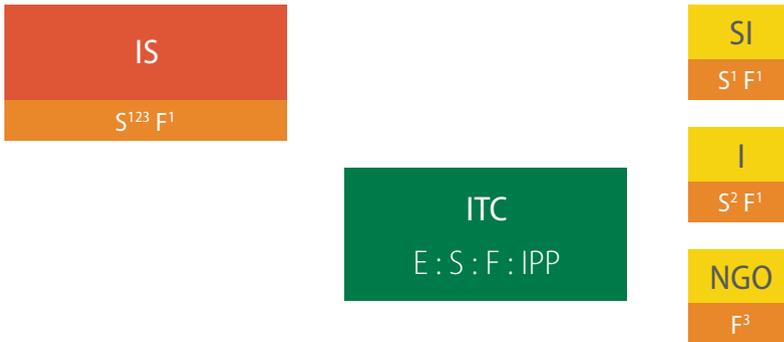
The model architecture is shown in Fig. 12.

**Figure 12**

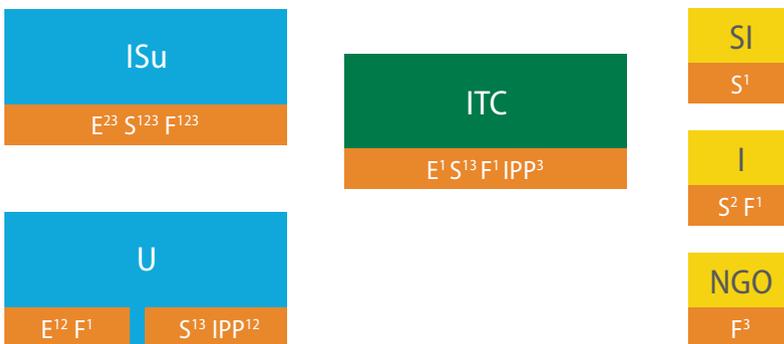
Science park - Innovation Office - University

Ue<sup>12</sup>s<sup>13</sup>f<sup>1</sup>ipp<sup>12</sup> ISUe<sup>23</sup>s<sup>123</sup>f<sup>123</sup> NGO<sup>f3</sup> Is<sup>2f1</sup> SIs<sup>1</sup>: ISs<sup>123f1</sup> NGO<sup>f3</sup> Is<sup>2f1</sup>SIs<sup>1f1</sup>

**NATIONAL LEVEL**



**REGIONAL LEVEL**



**2.1. Infrastructure services**

The infrastructure services should be described for the model chosen.

For each model entity, requisite infrastructure services are described in the universal model (USMOIAE). Also described is the infrastructure of services related to Science Park activities described in the Science Park– Innovation Structure – University model.

The key science park services and functions are as follows:

- Engaging students, graduates, post-graduates, university academic researchers and workers in developing and executing science park projects;
- Administering training, professional development and advancement of specialists needed for developing and executing science park projects;
- Developing new kinds of innovation products and their commercialisation, managing and ensuring production of research-intensive and competitive innovation products;
- Protecting and representing the interests of science park founders and partners in state administration agencies and local self-administration bodies, as well as in relations with other business entities when managing and executing science park projects;
- Legal and consultancy support for science park founders and partners, and patenting/licensing support;

Infrastructure of Innovation Office services:

- Marketing university research by forming different kinds of information resources and holding information events;
- Transfer of university research output and technological developments to national and international markets;
- Information support of university's innovation activities and technology transfer;
- Legal advice and technological support in intellectual property protection;
- Consultancy services for invention assignees, authors of research and innovation developments, and students willing to participate in science park innovation activities.

Infrastructure of Business Incubator services:

- consulting/business planning for first-time and potential entrepreneurs;
- continued support and attracting investments in start-ups;
- technology transfer, holding seminars and trainings, etc.;
- administrative and technical services (telephone, secretarial, rooms for conferences/meetings, etc.); and
- providing premises for offices on rental conditions at rates lower than market ones, and with flexible provisions for receiving additional room on demand.

## 2.2. SWOT analysis

**Table 11** SWOT analysis for Science Park – Innovation Office – University model

SWOT	Positive Impact	Negative Impact
Internal Environment	Strengths	Weaknesses
HEI	<ol style="list-style-type: none"> <li>1. Full support of university's administration in organising effective science park performance</li> <li>2. Improving IT students education quality</li> <li>3. Possibility of commercialising available intellectual property and developing innovation IT products</li> <li>4. Possibility of using university premises for accommodating the science park</li> <li>5. Extensive university's intellectual property package</li> </ol>	<ol style="list-style-type: none"> <li>1. Apprehension of researchers to transfer their own research developments to startups and spinoffs</li> <li>2. No innovation culture to transfer research developments to enterprises</li> <li>3. Researchers are more interested in publishing their research findings, rather than commercialising them</li> <li>4. Insufficient dissemination of information on R&amp;D findings among potential consumers of research-and-technological products</li> <li>5. Poorly developed criteria of evaluating R&amp;D deliverables from the viewpoint of investment attractiveness</li> </ol>
Student	<ol style="list-style-type: none"> <li>1. Acquiring hands-on experience and knowledge in innovation and entrepreneurship</li> <li>2. Developing one's own products</li> <li>3. Opportunity of receiving qualified consulting from experts and professionals of the innovation office</li> <li>4. Receiving legal advice in IP</li> <li>5. Opportunity of starting one's own business on preferential conditions within the business incubator</li> </ol>	<ol style="list-style-type: none"> <li>1. No motivation for students, graduates, post-graduates, and so forth to develop one's own business</li> <li>2. Lack of financial resources</li> <li>3. No practical experience in developing commercial products</li> <li>4. Lack of experience in professional activities</li> </ol>

**Table 11**
**SWOT analysis for Science Park – Innovation Office – University model**

SWOT	Positive Impact	Negative Impact
Internal Environment	Strengths	Weaknesses
Company	<ol style="list-style-type: none"> <li>1. Professional workers in project execution teams</li> <li>2. Financial and logistical potential of partner companies and science park founders</li> <li>3. Professionals available who can be experts and mentors in students' startups</li> <li>4. Customers in place whose needs call for innovative solutions</li> <li>5. Reducing risks when developing innovation products and conducting research and advanced development</li> </ol>	<ol style="list-style-type: none"> <li>1. No motivation for professionals to be experts and mentors in students' startups</li> <li>2. No requisite modern equipment for making hi tech products</li> <li>3. Lack of qualification of workers in innovation development</li> <li>4. No motivation for management of companies involved in outsourcing to develop innovations</li> <li>5. No motivation for supporting competing startups</li> </ol>
External Environment	Opportunities	Threats
Company	<ol style="list-style-type: none"> <li>1. Requests of SPs for government contracts on delivering products, executing work and delivering services are a priority issue</li> <li>2. Option of technology transfer to an IS and ITC at the national level</li> <li>3. Opportunity of being a founder of a legal entity and/or their associations for managing and executing science park projects</li> <li>4. Receiving investments in own innovation developments executed within an SP framework</li> </ol>	<ol style="list-style-type: none"> <li>1. Changes in current legislation on the organisation and activities of science parks or state regulation in technology transfer</li> <li>2. Lack of state financial support of science parks</li> <li>3. No innovation companies willing to cooperate with universities</li> <li>4. Failing to receive an approval of the Ministry of Education and Science of Ukraine for creating a science park</li> <li>5. No mechanism of gaining profit from an IS where U is not a founder</li> </ol>
	<ol style="list-style-type: none"> <li>1. Receiving legal advice and technical support from the university's Innovation office in protection of copyright (IP)</li> <li>2. Receiving budget funding from a national SI</li> <li>3. Attracting investments from an I at both the regional and national levels</li> <li>4. Organisational support from a national IC through cooperation with an innovation office</li> <li>5. Building an innovation project task team</li> </ol>	<ol style="list-style-type: none"> <li>1. Limited demand for innovation proposals in the country</li> <li>2. Insufficient access to resource for bridging the gap between an innovation concept and its development</li> <li>3. Limited property rights to use and dispose of technologies and IP subject-matter developed with attraction of state funds</li> <li>4. Tax legislation changes</li> </ol>
	<ol style="list-style-type: none"> <li>1. Full or partial (up to 50 %) interest-free state budget crediting of a project</li> <li>2. State compensation of interest paid by project executors to commercial banks for project crediting</li> <li>3. Attracting foreign partners and investors by exemption from import duty on equipment, completing articles and materials required for science park projects</li> <li>4. Increasing business value by attracting the intellectual property of the university and other science park partners</li> <li>5. Receiving an IP package by holding innovation concept competitions, contests and fairs</li> </ol>	<ol style="list-style-type: none"> <li>1. Changes in current legislation on the special regime of science park activities</li> <li>2. Political instability in the country</li> <li>3. No motivation for Ukrainian enterprises to be a partner or founder of science parks</li> <li>4. Poor solvency of domestic consumers of innovation products</li> <li>5. No interest of finance institutions in supporting innovation projects</li> </ol>

### 3. Model structure

The model implementation envisages that the university shall establish a Science Park as one of the founders and arrange the activities of the university's Innovation Office and the business incubator within the framework of the Science Park, and that an effective system of relations will be set up between the university and its Innovation Office, the Science Park and its business incubator and enterprises participating in the science park.

To establish a science park pursuant to the Law of Ukraine [On Science Parks](#), the following is required:

- To elaborate the statutory documents of the science park – a constituent agreement and a charter;
  - The constituent agreement on establishing a science park shall specify the obligations of the founders to establish a science park, the procedure of their joint efforts in establishing it, and the terms and conditions of transferring to the science park the property and intangible assets of the founders;
  - The science park charter shall indicate the name of the legal entity; the purpose, tasks and functions of the science park; information on the composition of founders; the size and procedure of setting up the statutory and other funds; the procedure of allocation of profits and losses; the science park management bodies and their competence; the procedure of management decision-making; the procedure of joining the science park and withdrawing from it; and the liquidation procedure, and so forth;
- To obtain an approval of the central agency of the executive body that effects the state policy in science and innovation as prescribed by the Cabinet of Ministers of Ukraine;
- Since one of the founders of the Science Park is the University, to obtain an approval of the Ministry of Education and Science of Ukraine;
- The Science Park shall acquire a legal entity status on the date of its state registration to an established procedure.

The Innovation Office is established by order of the rector. The activities of the office shall be governed by provisions, which should be worked out based on the strategy of the university's innovation office and the long-term development plan.

#### 3.1. Model methods and standards

A more detailed overview of the model is given in subsection 2.

#### 3.2. Document management standards and notation system

The naming and designation of processes and entities comply with those in the universal model – USMOIAE.

#### 3.3. Pending issues

The mechanism of motivating and engaging students to work on Science Park projects is not defined.

The format of IPP3 motivation actions and the principle of allocating property rights to IP subject-matter developed in the course of such actions are not defined.

The mechanism of protecting confidential information (NDA) when executing projects in the science park on order of ITC customers by contractors who are not ITC staff members because, as a rule, NDA are concluded between an ITC and a customer.

# Model National Innovation Structure – Regional Innovation Structure – University

$Ue^{123}s^1ipp^1 ISe^{123}s^{123}f^{12}ipp^{123} If^2 SIs^1 : ISe^{123}s^{123}f^{12}ipp^{123} If^2 SIs^1$

**Name** National Innovation Structure – Regional Innovation Structure – University  
 $Ue^{123}s^1ipp^1 ISe^{123}s^{123}f^{12}ipp^{123} If^2 SIs^1 : ISe^{123}s^{123}f^{12}ipp^{123} If^2 SIs^1$

**Keywords** Model, university, innovation structure, investor, business angel, accelerator, startup, IT company, education, support, funding, intellectual property protection

## 1. Introduction

The model envisages that the university has no separate innovation structure. However, a university's unit can perform innovation activity functions. The University cooperates with regional and national innovation structures. Students collaborate with an external innovation structure via the university's innovation unit to commercialise innovation activity deliverables, starting from launching concepts and leading up to developing a product.

The model can be used as an active one, which has been introduced in Ukraine by example of collaboration of the Kharkiv National University of Radioelectronics with the EastLabs innovation structure.

### Objective

#### a) purpose of the model is as follows:

Formalising cooperation of students engaged in entrepreneurial and innovation activities with an innovation structure external to the university, namely:

- External innovation concept appraisal;
- Assistance in building a project team;
- Assistance in project management by mentoring;
- Assistance in developing a project business plan;
- Assistance in searching for investors;
- Assisting students in establishing a legal entity for entrepreneurship;
- Assistance in developing an innovative competitive IT product, including technological trainings; and
- Recommendations on creating conditions for boosting the entrepreneurial and innovation activities of university students by collaborating with an Innovation Structure.

This is achieved by building student teams for developing IT innovation products or delivering services. Such teams will further cooperate with an external innovation structure to set up legal entities whose activities will be focused to operating in the market of producing own IT products in Ukraine. Such legal entities will be independent of the university, and the Innovation Structure will provide the following services: consultancy on legislative and legal issues, acquiring special knowledge and skills, marketing, attracting investors, conducting different appraisals, technical assistance, and promoting an IT product in the market.

#### b) target audience

The model can be interesting for HEI administrators, regional and national innovation structures, as well as for instructors, academic researchers, and students. This model can help make systemic conclusions on how to set up effective interaction between an innovation structure, the university, students, and all possible entities of innovation and entrepreneurial activities.

## 1.2. Field of activity

The field of application of the model is collaboration of an HEI or University student with a regional and/or national Innovation Structure for educational, and entrepreneurial and innovation activities.

### a) determine what kind of results will be obtained

The outcome of building the model will be new legal entities (IT companies) or funds.

### b) explain what the model proposed will do (will not do, if required)

Using the model will further the growth of innovation products globally, and increase the number of legal entities.

### c) define more precisely the advantages, objectives and tasks:

This subsection will define the overall advantages, objectives and tasks for general entities:

## s.1. For the University

### General objectives:

- Improving the HEI rating by entering the market of innovation IT products developed with participation of university students;
- Increasing significantly the number of developed innovation products and services. Engaging mentors among HEI instructors and professionals at the early stages of developing an innovation product;
- Increasing significantly the number of new enterprises established with participation of students;
- Improving IT education quality:
  - The opportunity of introducing new technologies in the education process, which were used when innovation products were developed;
- Improving the quality of innovation projects:
  - External project appraisal;
  - Setting up links with investors and business angels;
  - Presentation of students' developments in global markets; and
  - Information support of students' projects.

### General tasks:

- For the remaining tasks, refer to the description of the universal model (USMOIAE).

### General advantages:

- refer to the description of the universal model (USMOIAE).

## s.2. For an IT Companies

### General objectives, tasks and advantages:

- refer to the description of the universal model (USMOIAE).

## s.3. For the Innovation Structure

### General objectives:

- Mentoring is when professionals in different areas work with entrepreneurs. They can be technology, finance and legal professionals, and business consultants. Successful entrepreneurs are invited to work in innovation structures, and educational programs, master classes and coaching are widespread.
- Education. Besides mentoring and consultancy in a specific project, master classes, training, lectures, and workshops in allied areas are held. Hence, teams can acquire knowledge, which will be required for business development.

- Infrastructure implies innovation structures (accelerators) for supporting startups, which are often launched based on funds, business incubators and techno parks. Accelerators provide projects with office areas for operation. A team is provided with office equipment and Internet access. This conditions the local tie-in of accelerators, viz. the teams have to move to the site of executing programs.
- Information support – innovation structures are brands having connections and media influence; hence, projects can enjoy widespread press coverage as early as being involved in the program.
- Pre-seed investments are financial support required by startups for entering the program. In many innovation structures, investment partners participate at the stage of reviewing applications, and only projects that have received pre-seed investments can participate further. Pre-seed investments cover team costs of startup activities and allow ordering third-party developments for making a project prototype.
- Links with investors. Startups, which work in innovation structures, first draw the attention of investors.

**General tasks:**

- refer to the description of the universal model (USMOIAE).

**General advantages:**

- refer to the description of the universal model (USMOIAE).

### 1.3. Definitions and abbreviations

The model uses the universal model abbreviations (USMOIAE).

Innovation structures-accelerators support startups, which are often launched based on funds and business incubators. For a short time, the project team is placed in conditions allowing for accelerated development of a project or project prototype, which would be quite strong to enter the market and get investments.

The specific features of acceleration programs for startups are as follows:

- The program functions in cycles for a limited period (3 to 6 months) and a limited number of projects participate in one cycle;
- Projects are presented by small teams with an initial prototype or a formulated concept. Accelerators do not work with single entrepreneurs. Projects face strong competition for participation (within 2 % to 6 % of teams who submitted applications get into the program).
- The projects get pre-seed investments expended on supporting team activities and developing a prototype. Investments are extended in exchange for a small share in the project for the investor.
- Accelerators provide projects with strong expert support, training, connections with potential partners and investors, and media coverage.
- The program provides for intensive project involvement requiring that members work a full day on the project (a frequent requirement of many programs is quitting a full-time job).

The majority of these features are common to all business accelerators. They distinguish acceleration programs from other business support models at the early stage.

### 1.4. References

For statutory support of innovation activities in Ukraine, refer to the description of the universal model (USMOIAE).

## 2. Model overview

The model is linked directly to the activities and services of an external innovation structure. Hence, for detailed consideration of the model, it is necessary to ascertain the goal of the external innovation structure, what services does this structure offer for cooperation, with whom this structure can collaborate, and so forth

An external innovation structure can be a business incubator, a business accelerator or a venture fund. The goal of a business accelerator is to support a business at the early stage. This calls for intensive project development as fast

as possible. For rapid entrance to the market, the project is provided with investments, an infrastructure, and expert and information support. Accelerators are time-limited start-up support programs often launched based on funds, business incubators and technoparks. For a short time, the project team is placed in conditions allowing for accelerated development of a project or project prototype, which would be qualified to enter the market and get investments.

The goal of a business incubator is as follows:

- Spur the setting up of new small businesses, and improve their viability, resilience and competitiveness;
- Facilitate access to different resources;
- Intensify innovation activities;
- Open new production facilities to create new jobs;
- Shape professional business standards among small business entrepreneurs; and
- Propagate advanced domestic and foreign expertise.

An incubator's tasks are as follows:

- Renting premises and providing office services (rooms for offices, auxiliary and production premises, and exhibition areas);
- Providing different kinds of communication, and devices and office equipment for joint use;
- Providing postal and secretarial services;
- Overall and qualified servicing of small businesses at different development stages;
- Consultancy for small start-up firms on economic, legal and technological issues;
- Targeted methodical and educational support for small businesses;
- Conducting marketing research;
- Developing business plans for financial and economic activities of enterprises, and substantiating investments and searching for investors;
- Analysing the financial and economic performance of enterprises;
- Creating conditions for extending inter-regional cooperation of small businesses; and
- Holding seminars, contests, conferences, courses and other events for physical persons and legal entities with the use of advanced business training techniques.

The goal of a venture fund is investing in securities or a share in an enterprise with high or relatively high risks in anticipation of soaring profits.

The requisite entities for implementing such a model are as follows:

1. University with actualised processes  $E^1, E^2, E^3, S^1, IPP^1$ .
2. Regional and national Innovation Structure with actualised processes  $E^1, E^2, E^3, S^1, S^2, S^3, F^1, F^2, IPP^1, IPP^2, IPP^3$ .
3. National and regional investors with actualised process  $F^2$ .
4. National and regional state institutions with actualised process  $S^1$ .

All these entities are integrated by relevant processes.

Table 12 shows processes and participating entities.

The sequence of actions in the model is as follows:

1. The process participants can be students, post-graduates, instructors, University academic staff, mentors, and experts and professionals of IT companies, further referred to as Participants.
2. A student generates a concept.
3. With the concept in mind, the student addresses the Innovation Structure with a request to conduct an appraisal of the concept for competitiveness, feasibility, novelty, etc.
4. After the appraisal has been conducted and a positive reference has been received, the student shall become a

member of the team to work on his/her concept in an Innovation structure.

5. Participants submit their concept to the innovation structure, which is a regional or national business incubator.
6. If the innovation structure will support the concept, the team will start working on the concept within the Innovation Structure represented by the business incubator. Students and post-graduates work independently or under the guidance of mentors.
7. At the stage of working on the concept in the innovation structure, the outcome expected is a competitive IT product.
8. To commercialise the start-up concept, the Students engaged in implementing the concept have to set up a legal entity as an enterprise of any form of ownership or become private entrepreneurs.
9. The Innovation Structure engages investors, assists in development and professional consultations, and collaborates with legal entities on the startup concept. Gradually, it transforms a startup to a finished product. This product is positioned in the market, promoted and sold.
10. The proceeds of the finished product sales are allocated among legal entities who participated in its foundation pursuant to a contract.

**Table 12** Model processes and entities

Processes	Entity U	Entity IC	Entity SI	Entity I
E <sup>1</sup>	The student should be able to create new products and services	The student should know how to describe and present one's own concepts	The student should know how to describe and present one's own concepts	
E <sup>2</sup>	The student should be able to set up one's own business	The student should be able to distinguish the advantages of different legal entities, and choose the most effective scheme of legal entity registration		
E <sup>3</sup>	The student should be able to present information to investors, and know how to use the rules of investing and returning investments	The student should know how to present information to investors; what to stress during talks and negotiations with investors and how to carry oneself with investors during financing	The student should know how to present information to investors	
S <sup>1</sup> administrative support	The student should be supported in the following: <ul style="list-style-type: none"> <li>• Administering the activities of students and all those willing to participate (post-graduates, instructors, researchers, investors and others)</li> </ul>	The student should be provided with the following: <ul style="list-style-type: none"> <li>• An infrastructure</li> <li>• Easy access to different resources</li> <li>• Rental of a room and being provided with office services (room for an office, auxiliary and production premises, exhibition areas)</li> <li>• Different communication means, devices and joint use office equipment</li> <li>• Postal and secretarial services</li> </ul>	The student should be supported in the following: <ul style="list-style-type: none"> <li>• Administering activities</li> <li>• Access to information on regional and national innovation structures</li> <li>• Organising meetings and different events</li> </ul>	

**Table 12**
**Model processes and entities (Continued)**

Processes	Entity U	Entity IC	Entity SI	Entity I
S <sup>2</sup>		<p>The student should be provided with economic support:</p> <ul style="list-style-type: none"> <li>• All-round and qualified servicing of small businesses at different development stages</li> <li>• Consultancy services for small startup firms on economic and legal, and technological issues</li> <li>• Targeted methodical and educational support for small businesses</li> <li>• Conducting market research</li> <li>• Developing business plans for financial and business activities of enterprises, substantiating investments and searching for investors</li> <li>• Analysis of the financial and business performance of enterprises</li> <li>• Creating conditions for extending inter-regional cooperation of small businesses</li> <li>• Holding seminars, contests, conferences, courses and other business training events for physical persons and legal entities using advanced education methods</li> <li>• Financial support</li> </ul>		
S <sup>3</sup>		The student should receive legal support		
F <sup>1</sup>		The student should receive funds from an IC for development of an own innovation project		
F <sup>2</sup>		The student should receive funds from an IC for development of one's own innovation project		The student should receive funding from sources external with respect to the university or IC (business angel, bank, venture fund, NGOs, etc.)
IPP <sup>1</sup>		The student should be assisted in filing IP subject - matter		
IPP <sup>2</sup>		The student should be assisted in introducing filed IP subject-matter		
IPP <sup>3</sup>		The student should be encouraged and motivated		

# Model architecture

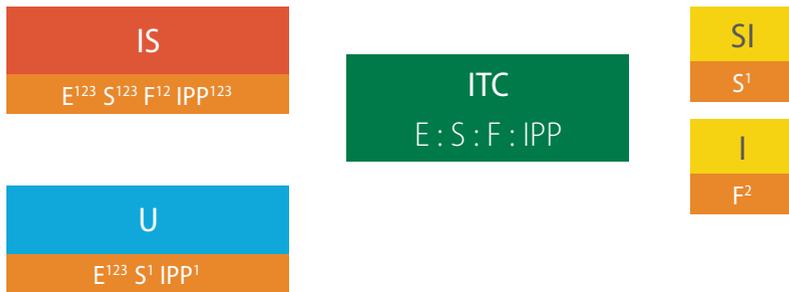
The model architecture is shown in Fig. 13.

**Figure 13** The innovative structure of the national level - Innovative structure at the regional level - University  
 $Ue^{123}s^1ipp^1 ISe^{123}s^{123}f^{12}ipp^{123} If^2 SIs^1 : ISe^{123}s^{123}f^{12}ipp^{123} If^2 SIs^1$

## NATIONAL LEVEL



## REGIONAL LEVEL



## 2.1. Infrastructure services

For each of the model entities, the requisite infrastructure services are described in the universal model (USMOIAE).

## 2.2. SWOT analysis

**Table 13**
**SWOT analysis for the model National Innovation Structure – Regional Innovation Structure – University**

<b>SWOT</b>	<b>Positive Impact</b>	<b>Negative Impact</b>
<b>Internal Environment</b>	<b>Strengths</b>	<b>Weaknesses</b>
HEI	<ol style="list-style-type: none"> <li>1. Professional development of instructors by engaging them to work on real projects to gain experience and hands-on skills</li> <li>2. Better students' education by engaging them to work on real projects</li> <li>3. Better students' IT education</li> <li>4. Qualified academic workers</li> <li>5. University's administrative support in intellectual property protection</li> <li>6. Managing training and advanced professional development of specialists required for implementing projects</li> </ol>	<ol style="list-style-type: none"> <li>1. Vague procedure of engaging instructors, mentors, consultancy experts and so forth on an unpaid basis to work on a startup in the university's innovation department</li> <li>2. Limited financial resources</li> <li>3. Lack of qualified workers in the innovation area</li> <li>4. Mistrust in protection of intellectual property rights. Apprehension of researchers to transfer their own research developments to start-ups and spinoffs</li> <li>5. No strategic planning because it is impossible to forecast availability of innovation products</li> </ol>
Student	<ol style="list-style-type: none"> <li>1. Developing one's own IT products</li> <li>2. Opportunity of working on a real project</li> <li>3. Setting up one's own business during university studies</li> <li>4. Preferential conditions for using resources</li> <li>5. Consultancy</li> <li>6. Students and young researchers acquire hands-on skills in developing innovation products</li> <li>7. Cooperation when developing IT products or services</li> </ol>	<ol style="list-style-type: none"> <li>1. No social and financial motivation to work on startups</li> <li>2. Insufficient professional knowledge</li> <li>3. No experience in setting up and doing business</li> <li>4. No conditions for receiving support from existing infrastructure services</li> <li>5. Poor criteria for assessing research output</li> <li>6. Vague motivational factors for task group members at early stages of investigating the innovation product</li> <li>7. Vague conditions for financing early stages of developing an innovation product</li> <li>8. Development process can be terminated</li> </ol>
Company	<ol style="list-style-type: none"> <li>1. Possibility of engaging mature teams for working on a startup</li> <li>2. Managing a startup appraisal</li> <li>3. Financial and resource capabilities of partner companies and SP founders</li> <li>4. Innovation product appraisal to determine the possibility of its commercialisation</li> <li>5. Guaranteed funding of participants for innovation product development</li> </ol>	<ol style="list-style-type: none"> <li>1. Vague mechanism of startup funding (difficult to estimate costs at the initial stage)</li> <li>2. Continual changes in startup business plan</li> <li>3. No strategic planning</li> <li>4. No motivation for professionals to act as experts and mentors in students' startups</li> <li>5. No innovation culture to transfer research development to a company</li> </ol>

**Table 13**
**SWOT analysis for the model National Innovation Structure – Regional Innovation Structure – University (Continued)**

SWOT	Positive Impact	Negative Impact
External Environment	Opportunities	Threats
HEI	Cooperation with regional and national innovation structures	<ol style="list-style-type: none"> <li>1. No state financial support for sustained innovation activities</li> <li>2. Political instability in the country</li> </ol>
Student	<ol style="list-style-type: none"> <li>1. Transparent LE registration procedure</li> <li>2. Acquiring intellectual property rights in an IT product</li> <li>3. Full or partial (about 50 %) interest-free loans from the state budget for projects</li> <li>4. Compensation of interest paid by project contractors to commercial banks for credits</li> </ol>	<ol style="list-style-type: none"> <li>1. Taxation policy changes</li> <li>2. Legislative changes in registering legal entities</li> <li>3. No motivation and desire to set up one's own business due to social status</li> </ol>
Company	<ol style="list-style-type: none"> <li>1. Engaging IT companies and their representatives to work on a startup</li> <li>2. Participation of foreign partners and investors, and exemption from paying import duties on equipment, completing articles and materials required for SP projects</li> </ol>	<ol style="list-style-type: none"> <li>1. Economic depression</li> <li>2. Geared up expectation of results</li> <li>3. Startup investment mechanism</li> <li>4. No motivation for Ukrainian enterprises to act as SP founder or partner</li> <li>5. No innovation companies willing to cooperate with universities</li> <li>6. Limited funding starting from an innovation concept and up to its development</li> <li>7. No interest of financial institutions to support innovation projects</li> </ol>

### 3. Model structure

To implement the model, it is necessary to develop a system of interaction of the University with innovation structures, such as regional and national business incubators.

#### 3.1. Model methods and standards

A more detailed overview of the model is given in subsection 2.

#### 3.2. Document management standards and notation system

The naming and designation of processes and entities comply with those in the universal model – USMOIAE.

#### 3.3. Pending issues

The mechanism of motivating and engaging students to work on startups in the University, and afterwards in an Innovation structure – a business incubator – has not been defined.

Not transparent criteria for screening experts and mentors.

# Model for Supporting Entrepreneurship in the University

Ue<sup>23s123</sup>ipp<sup>12f2</sup>:ISs<sup>13</sup>ipp<sup>2f3</sup>

The model describes supporting the development of innovation and entrepreneurship models within the university. The university shall support project development both via the business incubator – realised mainly under the aegis of the university – and via its own network of partners, the main ones being municipal structures.

The model provides for supporting the project innovation component by assisting the intellectual property and patenting department. The model should actualise cooperation of the business incubator with the university's innovation structures, as well as integrate the efforts of these innovation structures with national innovation structures. At the national level, a structure will be provided for managing the activities of business incubators to boost their performance and for cooperation at the international level. Besides, activities within the universities shall be governed by the structures of the Ministry for Education and Science of Ukraine.

**Name** Model for supporting entrepreneurship in the university  
Ue<sup>23s123</sup>ipp<sup>12f2</sup>:ISs<sup>13</sup>ipp<sup>2f3</sup>

**Keywords** Model, university, innovation structure, IT company, education, support, funding, intellectual property protection

## 1. Objective

This section should:

### a) describe the purpose of the document:

A universal model has been created for supporting entrepreneurship of IT students in the university. The key objective of creating the model is minimising the number of new structures being formed in the university, and extending their activities to the utmost by cooperation with regional state bodies and integration with national structures.

This can be achieved by doing the following:

- In the U, it is necessary to actualise a road map of university cooperation with municipal bodies, which would provide for funding the innovation solutions for the needs of municipal bodies proposed by the U. An example of such need could be cutting down the energy dependence on external sources;
- U compiles a complete package of documents for executing international level patent applications. Agreements with national structures are concluded to implement such patent solutions;
- U compiles a package of information materials for protection of intellectual property rights in IT projects;
- The business incubator develops a curriculum and introduces it as part of the educational process of IT students; and
- At the national level, packages of documents are prepared for governing and coordinating activities of business incubators built around universities.

### b) indicate the target audience for the document:

The model can be interesting, primarily, for students enjoying new opportunities of promoting their own innovations.

## 1.2. Field of activity

The field of activity is to integrate the efforts of existing university structures with those of regional ones to simplify the development of IT students' innovation concepts to entrepreneurship.

### a) determine what kind of results will be obtained:

Students will be provided with more options to actualise their creative potential. There will be more effective employment of resources belonging to universities and more effective utilisation of own resources in a city/region.

**b) explain what the model proposed will do (will not do, if required):**

The model will help a student in trying to develop one's own innovation concept in the U.

**c) define more precisely the advantages, objectives and tasks:**

This subsection will define the generalised advantages, objectives and tasks for general entities:

### **s.1. For the University**

**The general objectives are as follows:**

- To increase significantly the number of developed innovation products and services with engagement of students, post-graduates, instructors and researchers;
- To improve quality of innovation projects; and
- To receive extra off-budget funds.

**The general tasks are as follows:**

- To initiate events (seminars, trainings, contests, conferences, and so forth), which would extend knowledge in innovation and entrepreneurship;
- To appoint persons in departments who will be responsible for innovation activities with students; and
- To work out and approve a full package of statutory documents for governing relations with third-party innovation structures, IT companies and other entities engaged in innovation activities and entrepreneurship.

**General advantages:**

- Better effectiveness of using own resources;
- Better job placement of graduates and their competitiveness in the labour market;
- Greater number of developed innovation products and services;
- Greater amount of attracted off-budget funds; and
- Higher regional, national and international ratings of the university.

### **s.2. For an IT Company**

**The general objectives are as follows:**

- To provide conditions for sustained company developed by employing qualified specialists and developments in advanced IT areas.

**The general tasks are as follows:**

- Identify priority lines of development when creating new products and services; and
- Define the list of competencies of a university graduate for subsequently working on innovation products.

**The general advantages are as follows:**

- Employing workers with better professional qualification; and
- Enhanced influence on IT development in the region and across the country.

### **s.3. For the Innovation Structure**

**The general objectives are as follows:**

- To intensify innovation and entrepreneurial activities of IT students;
- To streamline the mechanism of developing innovation products and services;
- To integrate different approaches and innovation and entrepreneurial activity entities; and
- To manage innovation processes in the university pursuant to international requirements and standards.

**The general tasks are as follows:**

- To work out a full package of statutory documents for governing IC activities;
- To manage interaction with all model entities;
- To hold trainings;
- To conduct appraisals; and
- To protect intellectual property subject-matter.

**The general advantages are as follows:**

- Greater number of participants in innovation and entrepreneurial activities at all interaction levels; and
- Bigger number of innovation products and services, and their better quality.

### 1.3. Definitions and abbreviations

Ue<sup>23</sup>§<sup>123</sup>ipp<sup>12f</sup>: ISs<sup>13</sup>ipp<sup>2f</sup>

## 2. Model overview

The model creates conditions, in which the student focuses on innovation activities and on the place of these activities when setting up a business. This will increase the number of interested students. By integrating existing university structural units dealing with intellectual property and the patent bureau with the business incubator built around the university's educational units, and restructuring their core activities to meet educational process requirements, the student will be able to formulate one's own concepts in a form that will be comprehensible and interesting for a third-party investor.

The model provides for development of a road map for cooperation of the university and local executive authorities to address their problems or needs, and sign contracts to create conditions for funding and development of entrepreneurial activities of IT students.

Model processes:

- education;
- innovation activity development;
- support; and
- financing.

The advantage of the model is that there is no need to set up additional structural units. The core activities in developing such a model are to establish new rules for functioning of existing structural units, better coordination of students' tuition, and work out clear rules of dealing with correctly formulated students' concepts.

The model can be implemented in the majority of universities in Ukraine.

A drawback is that the model is more oriented to the regional level.

The sequence of actions in such a model is as follows:

1. The University actualises processes E<sup>2</sup>, E<sup>3</sup>, IPP<sup>1</sup>, and IPP<sup>2</sup> based on own educational and structural departments.
2. University student / worker correctly formulate one's own concept.
3. Intellectual property rights are protected.
4. Searching for an investor. If the project meets the subjects of existing agreements between the university and regional executive bodies, a demand for project financing from their funds is drawn up.
5. Support is provided for financial viability of a finished project.

## Model architecture

The architecture of the universal model is shown in Fig. 14.

The universal model shows all possible entities with all feasible processes.

The entities can interact.

**Figure 14**

Entrepreneurship support Model at the University  
 $Ue^{23}s^{123}ipp^{12f2}: ISs^{13}ipp^{2f3}$



## 2.1. Infrastructure services

The infrastructure services will be described for the model chosen.

For U, the requisite infrastructure services are as follows:

- Informing all those interested on entity activities;
- Full providing of processes  $E^{23}$ ,  $S^1$ , and  $IPP^1$ ;
- Partial providing of processes  $S^{23}$  and  $IPP^2$ ;
- Handling requisite input data/document packages for entity activities;
- Managing interaction with other model entities; and
- Analysis of output data generated by entity performance.

For  $S^1$ , the requisite infrastructure services are as follows:

- Partially providing processes  $F^1$ .

## 2.2. SWOT analysis

**Table 14**
**SWOT analysis**

SWOT	Positive Impact	Negative Impact
Internal Environment	Strengths	Weaknesses
Student	<ol style="list-style-type: none"> <li>1. Setting up one's own business</li> <li>2. Experience in working with real projects</li> <li>3. Preferential conditions for using resources</li> <li>4. New professional connections</li> </ol>	<ol style="list-style-type: none"> <li>1. Poor business training level</li> <li>2. Lack of professional expertise in IT</li> <li>3. No team work experience</li> <li>4. Very aggressive ITC policy on work engagement</li> </ol>
U	<ol style="list-style-type: none"> <li>1. Extra off-budget funds</li> <li>2. Own innovation products and services</li> <li>3. Improved students' tuition quality</li> </ol>	<ol style="list-style-type: none"> <li>1. Faculty and administrative personnel fail to meet current requirements</li> <li>2. Limited financial flexibility</li> <li>3. Lack of expertise in methods of market promotion of innovation products.</li> <li>4. Mistrust in intellectual property protection</li> <li>5. Lack of understanding and unpreparedness to meet current IT development trends</li> </ol>
ITC	<ol style="list-style-type: none"> <li>1. Qualified personnel</li> <li>2. Participation in forefront events of the IT community</li> <li>3. Resources potential</li> <li>4. Better national and international recognition</li> </ol>	<ol style="list-style-type: none"> <li>1. Majority of projects on order</li> <li>2. No own intellectual property</li> <li>3. Dependence on third-party orders</li> </ol>
External Environment	Opportunities	Threats
Student	<ol style="list-style-type: none"> <li>1. Gaining entrepreneurship experience</li> <li>2. Gaining extra profits</li> <li>3. Protection of own intellectual property</li> <li>4. Participation in IT events (conferences, exhibitions and contests).</li> <li>5. Labour market competitiveness</li> </ol>	<ol style="list-style-type: none"> <li>1. Poor innovation concept</li> <li>2. Prototype incompleteness</li> <li>3. Lack of experience</li> <li>4. Teamwork inability</li> <li>5. Incomprehension of the legal framework of entrepreneurship</li> <li>6. Break-up of project team</li> </ol>
U	<ol style="list-style-type: none"> <li>1. Expanding volume of innovation products</li> <li>2. Better innovation quality</li> <li>3. Increasing number of students, post-graduates, instructors and researchers engaged in innovation activities</li> <li>4. Getting new orders for research and development</li> </ol>	<ol style="list-style-type: none"> <li>1. No option of own funding</li> <li>2. No motivation</li> <li>3. Brainwashing</li> <li>4. Complicated reporting</li> <li>5. Conservative education</li> </ol>
ITC	<ol style="list-style-type: none"> <li>1. Getting new sources of funding</li> <li>2. Getting mature development teams</li> <li>3. Entry to new markets</li> <li>4. Getting new orders</li> <li>5. Better publicity</li> </ol>	<ol style="list-style-type: none"> <li>1. Lack of resources</li> <li>2. Little time</li> <li>3. Problems in interaction with U</li> <li>4. Problems in interaction with SI</li> <li>5. Fierce competition</li> </ol>

### **3. Model structure**

The model can be used with minimal expenditures for creating additional university departments. To create such a model, it is necessary to revamp the activities of existing structural units of the university and ensure their better coordination. Within the framework of reforming such units, it is necessary to develop a package of documents for both the educational process and transparent implementation of concepts or protoprojects. Additional training can be provided for workers of university units undergoing activity restructuring.

A requisite condition for implementing the model is concluding agreements with regional executive bodies.

#### **3.1. Model methods and standards**

A more detailed overview of the model is given in section 2.

The model is intended for introducing the innovation and entrepreneurship model among IT students. The main feature of the model is simplicity of its implementation and focus on the regional level.

#### **3.2. Document management standards and notation system**

There should be conventions on the naming of processes and possibly other structures.

Compliance to the universal model should be observed.

#### **3.3. Pending issues**

One unresolved issue is the general mechanism of gaining profit by the university with subsequent project development.

Another unresolved issue is the mechanism of cooperation of regional executive bodies with the university.

Each university should address these issues in their own manner.

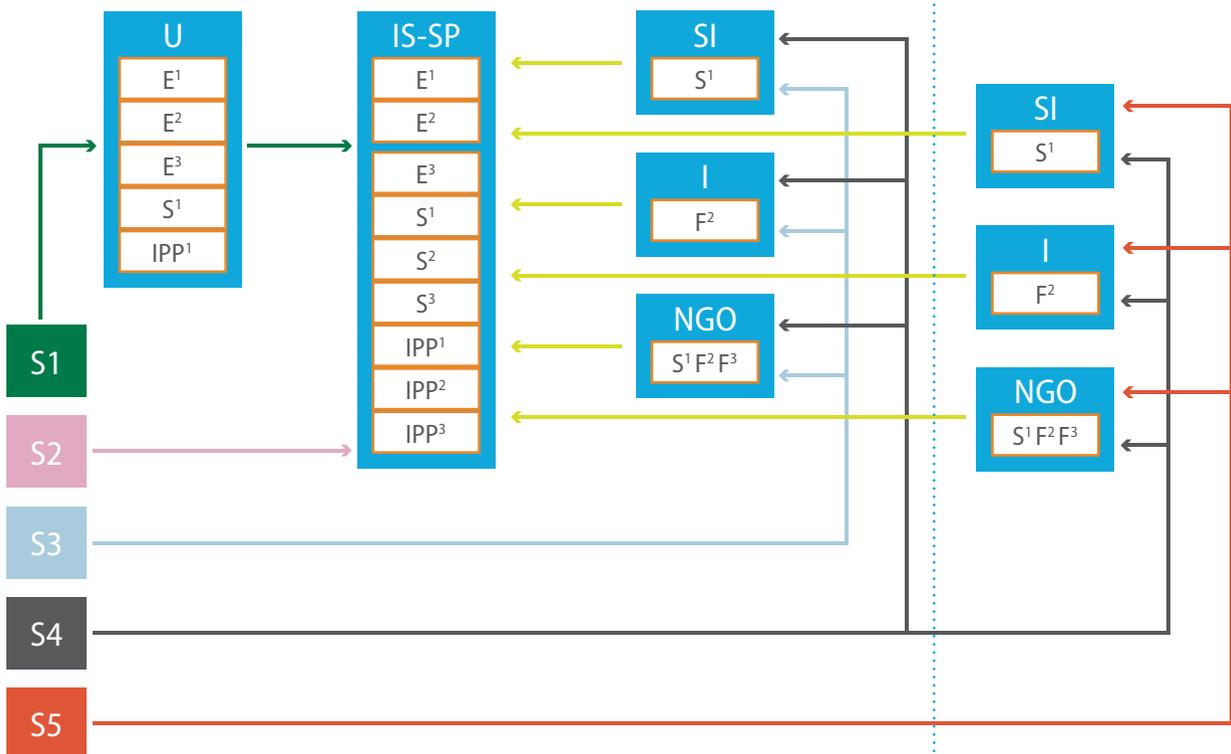
# MODEL «SCIENCE PARK – INNOVATION STRUCTURE – UNIVERSITY»

$Ue^{123}s^1ipp^1$   $ISe^{123}s^{123}f^3$   $ipp^{23}$   $NGOs^1f^{23}$   $If^2$   $SIs^1$  :  $NGOs^1f^{23}$   $If^2$   $SIs^1$

## 1. STUDENT'S ROADMAP HOW TO USE THIS MODEL

### REGIONAL LEVEL

### NATIONAL LEVEL



## 2. Roadmap description

The Roadmap S1. The student studies at the University, which is co-founder of IC (NP).

1. The student passes all processes which the university has - Education - E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>.
2. The student creates innovative products.
3. Protects Intellectual Property (if needed) - IPP<sup>1</sup>,
4. Submit proposal using template to the IS (SP) – S<sup>1</sup>.
5. Create a legal entity of any form of ownership under the law.
6. After that cooperates with SP, getting access to services of SP and choosing the services needed. E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>, IPP<sup>1</sup>, IPP<sup>2</sup>, IPP<sup>3</sup>.

To SP public and private institutions, investors may apply which in turn offer a range of their services. Only in IS (SP) student has access to the entire range of services that it needs to create innovative products.

### **The Roadmap S2. The student studies at the University, which is not a co-founder of IC (NP).**

1. The student applies to regional IS (SP), and gains access to services of IS (SP) - E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, S<sup>1</sup>.
2. The student receives the necessary support and knowledge to create innovative products.
3. Protects Intellectual Property (if needed)- IPP<sup>1</sup>, IPP<sup>2</sup>, IPP<sup>3</sup>.
4. Submit an innovative proposal using template to IS (SP) – S<sup>1</sup>.
5. After that cooperates with SP, getting access to services of SP and choosing the services needed E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>, IPP<sup>1</sup>, IPP<sup>2</sup>, IPP<sup>3</sup>.

Creation of the legal entity by student could be done at any stage of the Roadmap C2.

### **The Roadmap S2. Students of any university do not require any training. The student already has innovative products.**

1. The student creates an innovative product.
2. Protects Intellectual Property (if needed)- IPP<sup>1</sup>,
3. The student applies to regional IS (SP), and gains access to all services of IS (SP)
4. Submit a proposal using template to the regional IS(SP) – S<sup>1</sup>.
5. Creation of legal entity under the law.
6. After that the student collaborates with regional SP, getting access to all services of SP and choose all needed services E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>, IPP<sup>1</sup>, IPP<sup>2</sup>, IPP<sup>3</sup>.

### **The Roadmap S3**

The Roadmap S3 assumes that the student already has an innovative product and that they have document confirming the right to intellectual property.

The student can immediately submit an innovative proposal directly to the local governmental, non-governmental institutions and investors. If necessary, create a legal entity. After this, the student will work on the creation or improvement of his innovative products, introducing it to special market segment.

### **The Roadmap S4**

The Roadmap S4 deals with students, who have their own innovative product, document about IPP.

A student could submit their proposals directly to the National Governmental Organisations, Non-Governmental Organisations and Investors. The legal entity could be established. And then, the student could work on improvement of their innovative product and present it to the market.

### **The Roadmap S5**

The Roadmap S5 deals with students, who have their own innovative product, document about IPP.

Students could submit their proposals directly to the Regional and/or National Governmental Organisations, Non-Governmental Organisations and Investors. The legal entity could be established. And then, the student could work on improvement of their innovative product and present it to the market.

## **3. Conclusions and suggestions for Roadmap using**

The student was trained at the University of E<sup>1</sup>, E<sup>2</sup> and E<sup>3</sup>. University has courses, teachers and allocate resources (facilities, manager, etc.). Students must also pass preliminary tests for such courses.

To support students on IPP<sup>1</sup> processes the University should establish a special department that will deal with all such activities. University should make staff aware of this department.

To support the student at the University, SI the special department should be established.

For the student to be supported by the State, non State organisations and by Investors IS (SP) should be established under the law. The information materials should be prepared and media engagement is needed.

In order to get student organisation support, IS (SP) should be created. An IS (SP), should establish cooperation between IS (SP) and U, SI, I, NGO

#### **4. Recommendations for regulatory - legal support**

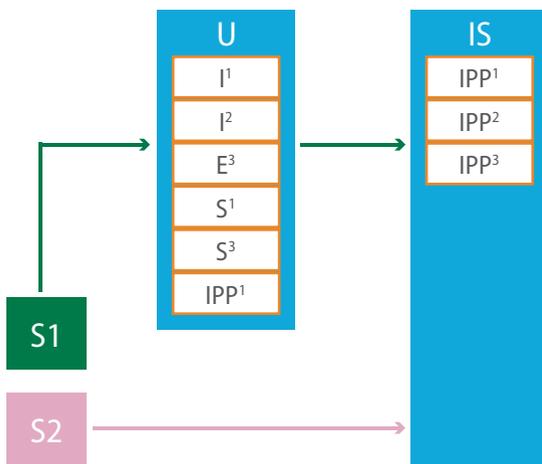
- Necessary legal support at the regional level in the University:
- Position of centre (faculty, institute) training and re-training (g Model Regulations).
- Regulations on Distance Learning (g Model Regulations).
- Regulations on registration of intellectual property (default is Regulation)
- Regulation on establishment and interaction between IS (SP) (available in the case where SP has been created as an innovative structure).

# MODEL «CROWD FUNDING A START-UP IN A UNIVERSITY»

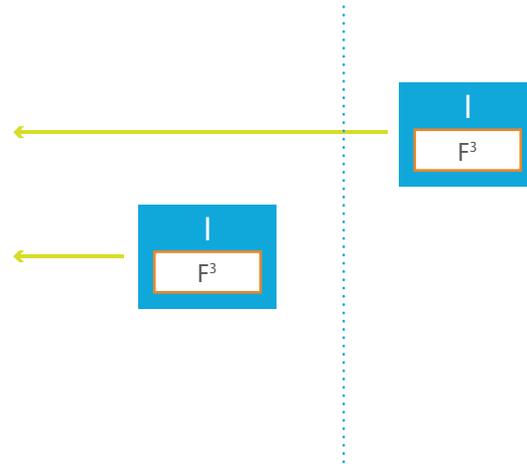
$Ue^{123}s^{13}ipp^1 ISipp^{123} I_f^3 : I_f^3$

## 1. STUDENT'S ROADMAP HOW TO USE THIS MODEL

### REGIONAL LEVEL



### NATIONAL LEVEL



**The Roadmap S1. A student studying at a University that has a division that deals with innovation and scientific activities. Innovation Unit collaborates with the Foundation through which investors /philanthropists can finance innovative projects of students.**

1. The student first passes all the courses that a university can offer him - education - E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>.
2. In the process of creating innovative products, the student can get university organisational and legal support S<sup>12</sup>. Then the student creates innovative products.
3. Protects Intellectual Property (if needed)- IPP<sup>1</sup>,
4. Applies proposal using Template to the University department IS.
5. Creation of legal entity under the law.
6. After that the student cooperates with IS, getting access to the services of IS and choose the services IPP<sup>1</sup>, IPP<sup>2</sup>, IPP<sup>3</sup>. Moreover, through IS the student could get more philanthropists investment to his project.

The IS Charitable Foundation may contact any investors/philanthropists and offer them help in funding innovative student projects.

**The Roadmap S2. A student studying at a University that does not have SP.**

1. The student applies to a University which has IS, and gains access to all services of IS - IPP<sup>1</sup>, IPP<sup>2</sup>, IPP<sup>3</sup>.
2. Student protects intellectual property rights (if needed).
3. Submits innovative proposal in the prescribed form to the IS.
4. Creates CO, should the need arise.
5. After that cooperates with IS getting in through the Foundation for investment innovation project.

## 1. Conclusions and suggestions for using the Roadmap

The student must be trained at a University E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, that has developed courses, involvement of teachers and allocate resources (facilities, manager, etc.). Students must also pass a preliminary selection of courses.

For the student receiving aid when registering for intellectual property at the University IPP<sup>1</sup>, the appropriate unit should be established to prepare the specialists of the respective qualifications.

In order to get organisational and legal support for students at the University S<sup>1</sup>, S<sup>3</sup>, it is necessary to establish an appropriate unit to establish interaction with IS.

To get support for students during the registration, the introduction of the intellectual property IPP<sup>1</sup>, IPP<sup>2</sup>, IPP<sup>3</sup>, in the IS University needs to be established and a department of experts to prepare an appropriate qualification.

In order for the student to receive financial support from investors/ philanthropists, the IS University department needs to collaborate with regional and national charities. If charitable funds are not available, they need to be created under the law. Preparing information material to engage the media is needed for establishing the interaction of IS with charitable foundations.

### 1. Рекомендації щодо нормативно - правової підтримки

Необхідна нормативно-правова підтримка на регіональному рівні в Університеті:

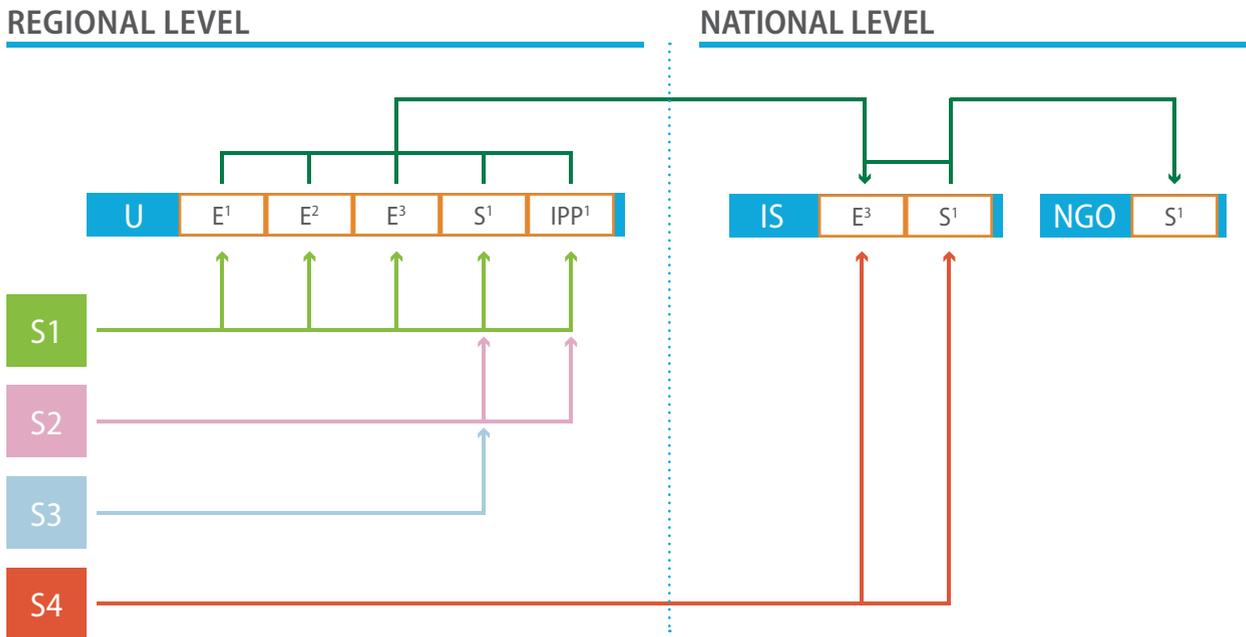
- Положення про центр (факультет, інститут) підвищення кваліфікації та перепідготовки (є Типове Положення).
- Положення про дистанційне навчання (є Типове Положення).
- Положення про реєстрацію інтелектуальної власності (є Типове Положення)
- Положення про ІС, з описом процесу взаємодії з благодійними фондами (є в тому випадку, коли ІС вже є в університеті).

Положення про благодійний фонд (є в тому випадку, коли такий фонд вже існує).

# MODEL OF THE NATIONAL CENTER FOR TRANSFER OF INNOVATION IN IT

Ue<sup>123</sup>s<sup>1</sup>ipp<sup>1</sup>:!Se<sup>3</sup>s<sup>1</sup>NGOs<sup>1</sup>

## 1. Guide for students



## 2. Guide description

### Method C1

Method C1 envisages that a student first attends a course at the university – E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>. Then, the student develops innovative products, protects intellectual property (if required) - IPP<sup>1</sup>, and submits an innovation proposal in due form to the IS (ITC) – S<sup>1</sup>. After verification and approval, the innovation proposal information is forwarded to an NGO (TTN) – S<sup>1</sup>.

### Method C2

Method C2 envisages that the student has not attended any education course and has independently developed an innovation product. Then, the student protects intellectual property (if required) - IPP<sup>1</sup> and submits an innovation proposal in due form to an IS (ITC) – S<sup>1</sup>. After verification and approval, the innovation proposal information is forwarded to an NGO (TTN) – S<sup>1</sup>.

### Method C3

Method C3 envisages that the student has not attended any education course and has no intellectual property assets for filing. The student submits an innovation proposal outright in due form to an IS (ITC) – S<sup>1</sup>. After verification and approval, the innovation proposal information is forwarded to an NGO (TTN) – S<sup>1</sup>.

## Method C4

Method C4 envisages that the student does not attend a University, and having taken an appropriate study course in an IS (ITC) – E<sup>3</sup>, submits an innovation proposal in due form to an IS (ITC) – S<sup>1</sup>. After verification and approval, the innovation proposal information is forwarded to an NGO (TTN) – S<sup>1</sup>.

### 3. Actions to be taken

For a student to attend a study course RL: UE<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, it is essential to develop courses, engage instructors and allocate assets (premises, a manager, etc.). The students should also be pre-qualified for such courses.

For a student to receive assistance when filing intellectual property RL:UIPP<sup>1</sup>, it is essential to set up the appropriate department and train specialists with adequate qualification.

For a student to receive organisational support RL:US<sup>1</sup>, it is essential to establish the appropriate department and relations with an IS (ITC).

For a student to attend a study course NL: IS E<sup>3</sup>, it is essential to develop courses (study guides) and publish them in the Internet.

For a student to receive organisational support NL:ISS<sup>1</sup>, it is essential to establish an ITC and have relations with a U and NGO (TTN).

For a student to receive organisational support NL:NGOS<sup>1</sup>, it is essential to establish relations with an IS (ITC).

### 4. Recommendations on regulatory support

Requisite regulatory support at the regional level in the University:

- Regulations on centre (faculty, institute) for advanced training and skills upgrading (standard regulations are available)
- Regulations on filing intellectual property (standard regulations are available)
- Regulations on interaction with ITC (unavailable)

Requisite regulatory support at the national level:

- Regulations on ITC (unavailable)
- Regulations on TTN (available)
- Law of Ukraine [On State Regulation of Technology Transfer Activities](#) (available)

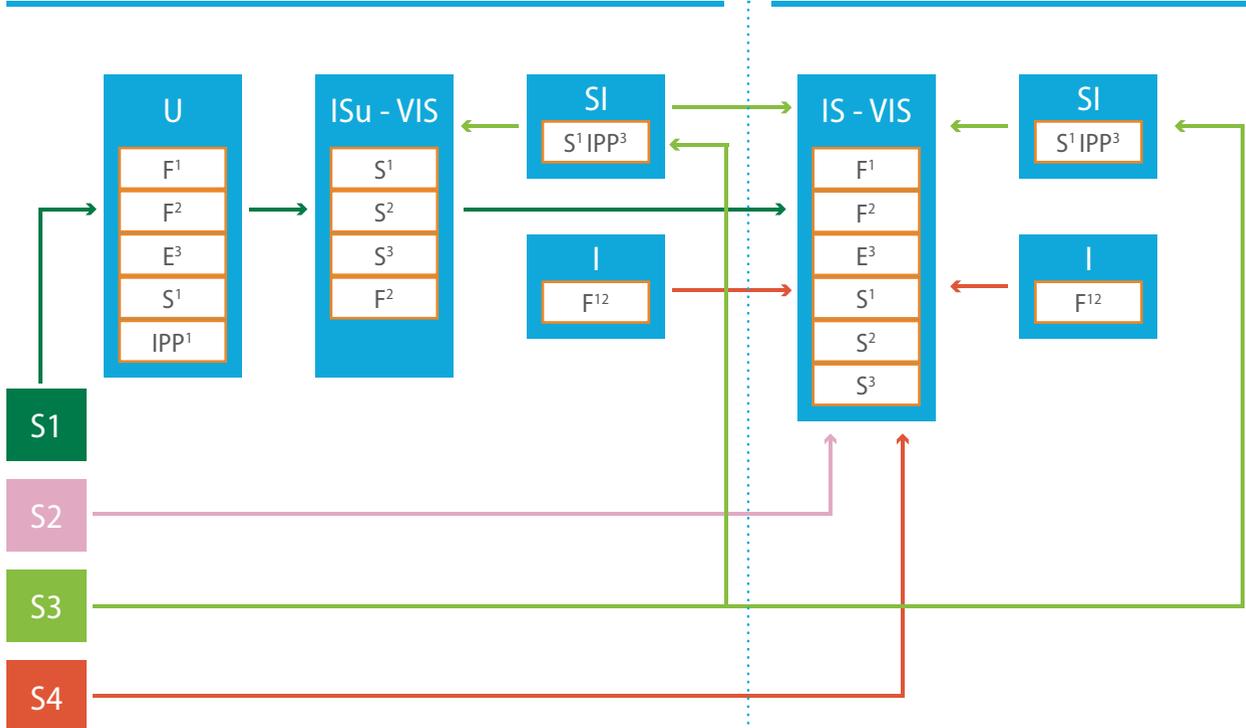
# MODEL “UNIVERSITY - INNOVATIVE STRUCTURE – EXTERNAL SCIENTIFIC PARK”

$Ue^{123}s^1IPP^1 ISus^{123}f^2 If^{12}SIs^1ipp^3 : ISe^{123}s^{123} If^{12} SIs^1ipp^3$

## 1. Guide for students

### REGIONAL LEVEL

### NATIONAL LEVEL



## 2. Guide description

### Method C1

Method C1 envisages that the student first attends a course at the university -  $E^1, E^2, E^3$ . Then, the student develops innovation products, protects intellectual property (if required) -  $IPP^1$ , and submits an innovation proposal in due form to the ISu-TTC. Here the student receives advice  $S^1, S^2, S^3$  on how to contact an external science park with the help of IS-VIS, and has a chance of receiving funds -  $F^2$ . Finally, the innovation proposal is filed with the IS-VIS. After an appraisal and a positive reference, information on the innovation proposal is forwarded to a science park.

### Method C2

Method C2 envisages that the student has not attended special courses at a university; they have independently developed an innovation product and addresses an IS-VIS where one can receive online learning services  $E^1, E^2, E^3$ , and organisational, economic and legal support from experts (if required) -  $S^1, S^2, S^3$ .

### Method C3

Method C3 envisages that the student has independently developed an innovation product and has decided to

participate in a regional (national) competition of innovation developments. Hence, the student addresses a regional (national) SI that announced the competition - IPP<sup>3</sup>, and receives organisational support in filing their innovation proposal with an ISu-TTC or directly with an IS-VIS. There the student can receive online learning services E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, and organisational, economic and legal support from experts – S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>.

## Method C4

Method C4 envisages that the student has independently developed an innovation product, submits an innovation proposal in due form to an IS-VIS to receive advice from experts – S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>, or funding F<sup>1</sup>, F<sup>2</sup> from regional or national investors.

## 3. Actions to be taken

For a student to attend studies RL:Ue<sup>1</sup>e<sup>2</sup>e<sup>3</sup>, it is essential to develop courses according to standards for educational and professional training of specialists, and engage instructors.

For a student to receive organisational support RL:Us<sup>1</sup>, it is essential to establish an appropriate department and relations with an ISu-TTC.

For a student to receive assistance when filing intellectual property RL:Uipp<sup>1</sup>, it is essential to set up a support service and engage professionals.

For a student to receive different kinds of support RL:ISus<sup>1</sup>s<sup>2</sup>s<sup>3</sup>, it is essential to establish a TTC and relations with a U and IS-VIS.

For a student to receive external funding RL:ISuf<sup>2</sup>, it is essential to prepare regulatory documents.

For students' studies NL:ISe<sup>1</sup>e<sup>2</sup>e<sup>3</sup>, it is essential to develop online learning courses and place them on a platform.

For a student to receive different kinds of support NL:ISs<sup>1</sup>s<sup>2</sup>s<sup>3</sup>, it is essential to prepare regulatory documents and place them on a platform, and set up a support service with engagement of qualified specialists.

For a student to receive organisational support NL:ISs<sup>1</sup>, it is essential to prepare regulatory documents and set up interaction with an ISu-TTC or IS-VIS.

To engage a student in a regional competition RL:Slipp<sup>3</sup> or a national one NL:Slipp<sup>3</sup>, SI should announce a competition, publish in the Internet the regulatory documents for participating in the competition, and set up interaction with an IS-VIS.

For a student to receive funding NL:If<sup>1</sup>F<sup>2</sup>, it is essential to prepare regulatory documents and set up interaction with an IS-VIS.

## 4. Recommendations on regulatory support

Requisite regulatory support at the regional level in the University:

- Standards for educational and professional training of professionals (Educational and qualification, and educational and professional programs are available)
- Standard discipline syllabus (available)
- Regulations on filing intellectual property (standard regulations are available)
- Regulations on interaction with TTC (unavailable)

Requisite regulatory support at the national level:

- Regulations on VIS (unavailable)
- Regulations on competition of innovation projects (unavailable)
- Regulations on an online learning course (Regulations for online learning are available)
- Law of Ukraine [On State Regulation of Technology Transfer Activities](#) (available)

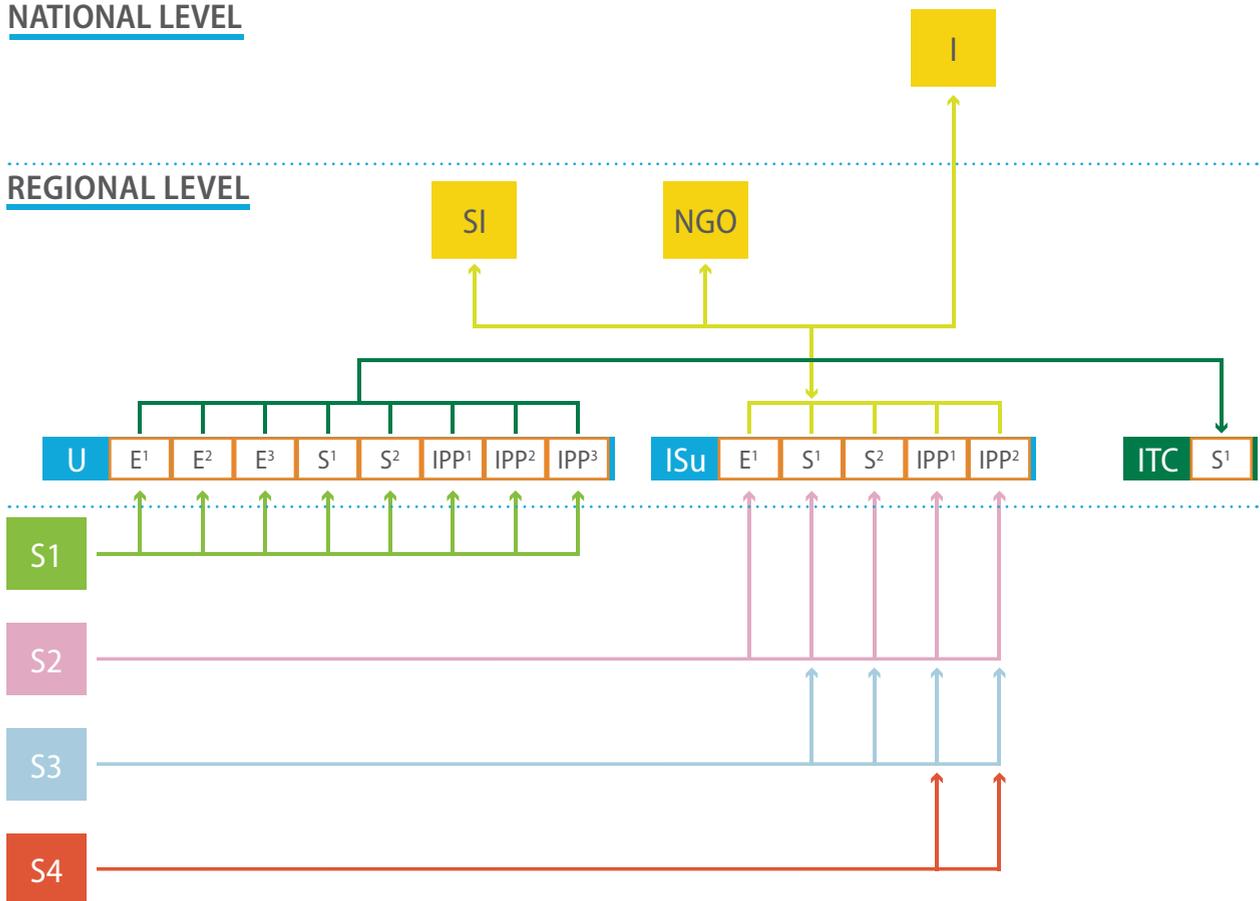
# MODEL INNOVATIVE UNIVERSITY STRUCTURE

$Ue^{13}s^{12} f^{1}ipp^{123} ISe^{1s^{12}f^{1}ipp^{12}} ITCe^1 : Ue^{13}s^{12} f^{1}ipp^{123} ISe^{1s^{12}f^{1}ipp^{12}} ITCe^1$

## 1. Guide for students

### NATIONAL LEVEL

### REGIONAL LEVEL



## 2. Guide description

### Method C1

Method C1 envisages that the student goes to the university - E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, and the university supports the student in starting innovation activities. After graduating from the university, the student develops an innovation product or service in the university's information structure, receiving at the same time informational and economic support in developing innovation products, and services in protecting the results of innovation activities. An ITC acts as a consultant at the initial stages of innovation activities. The university transfers the activity deliverables to a ministry, state institutions, NGOs, and/or IT companies.

### Method C2

Method C2 envisages that the student has not studied courses E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup> in the university, though can study course E<sup>1</sup>

and participate in innovation activities. The student receives the support of the university's innovation structure if its activities meet the requirements to an ISu and conform to its tasks. The ISu protects the intellectual property. An ITC acts as a consultant at the initial stages of innovation activities. The university transfers the activity deliverables to a ministry, state institutions, NGOs, and/or IT companies.

### Method C3

Method C3 envisages that the student has not studied but can participate in innovation activities. The student receives the support of the university's innovation structure if its activities meet the requirements of an ISu and conform to its tasks. The ISu protects the intellectual property. An ITC acts as a consultant at the initial stages of innovation activities. The university transfers the activity deliverables to a ministry, state institutions, NGOs, and/or IT companies.

### Method C4

Method C4 envisages that the student has their own innovation product or service. The student addresses an ISu to protect intellectual property and transfer activity deliverables to a ministry, state institutions, NGOs, and/or IT companies pursuant to rights set forth in the contract for transfer of intellectual property deliverables.

## 3. Actions to be taken

To study RL: UE1, E2, E3, it is essential to develop courses, engage instructors and allocate resources.

The student receives support from an ISu or U if the area of his/her innovation activities meets the needs of the university and its area of activities.

The university's innovation structure should be set up as a university's structural unit by merging and/or re-organising existing departments with an appropriate profile, or by establishing a new structural unit for administering, coordinating and supervising the process of developing and executing projects.

An ISu needs appropriate departments for managing support of a student's innovation activities (E<sup>1</sup>, S<sup>1</sup>, S<sup>2</sup>, IPP<sup>1</sup>, and IPP<sup>2</sup>).

To receive ITC consultancy, interaction of an ITC with U and ISu should be set up.

## 4. Recommendations on regulatory support

Requisite regulatory support at the regional level in the University:

- Regulations on centre (faculty, institute) for advanced training and skills upgrading (standard regulations are available)
- Regulations on filing intellectual property (standard regulations are available)
- Regulations on interaction with ISu (unavailable)

Requisite regulatory support at the national level:

- Regulations on ISu (unavailable).

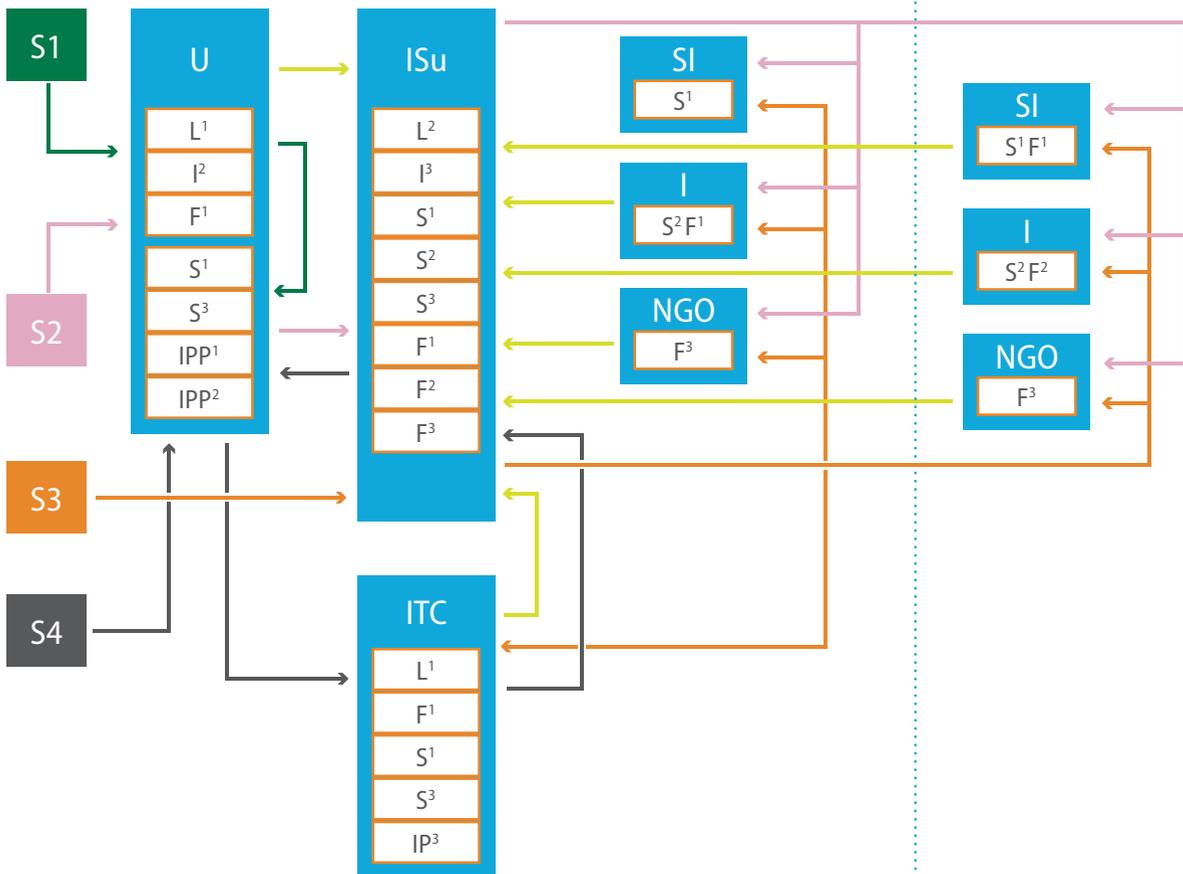
# MODEL "SCIENCE PARK - INNOVATION OFFICE - UNIVERSITY»

$Ue^{12s^{13f^{1ipp^{12}}}} ISUe^{23s^{123f^{123}}}$   $NGOf^3$   $Is^2f^1$   $SIs^1 : ISs^{123f^1}$   $NGOf^3$   $Is^2f^1$   $SIs^1f^1$

## 1. Guide for students

### REGIONAL LEVEL

### NATIONAL LEVEL



## 2. Guide description

### Method C1

Method C1 envisages that the student first goes to the university – E<sup>1</sup>, E<sup>2</sup>, and then addresses the Innovation Office for legal aid (S<sup>3</sup>) in intellectual property protection. Next, the student protects intellectual property – IPP<sup>1</sup>. The Innovation Office provides organisational support S<sup>1</sup> in technology transfer, looking for potential customers, administering the implementation process, and so forth. Following this, the university's Innovation Office assists in implementing intellectual property assets (IPP<sup>2</sup>).

## Method C2

Method C2 envisages that the student first goes to the university – E<sup>1</sup>, E<sup>2</sup>, and then addresses the Innovation Office, which provides organisational and legal support (S<sup>1</sup>, S<sup>3</sup>) in cooperation with a science park. The following step will be to address the science park (ISu) where the student will pursue further studies in setting up their own business and attracting investments (E<sup>2</sup> and E<sup>3</sup>). The student will also submit an innovation proposal in due form. Information on the innovation proposal is given to interested SI, I and NGO (S<sup>1</sup>). Investors can provide support in increasing investment proposal appeal (S<sup>2</sup>). Following this, the student can receive funding both within ISu (F<sup>1</sup>, F<sup>2</sup>, F<sup>3</sup>) and from an ITC (F<sup>1</sup>) or I (F<sup>1</sup>) or NL:SI (F<sup>1</sup>). Further startup development will occur within the business incubator ISu (S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>).

## Method C3

Method C3 envisages that the student has not taken any study course, and addresses the ISu to establish a start-up. In the science park (ISu), the student will receive organisational, economic and legal support in setting up one's own business (a start-up) – S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>. Following this, the innovation proposal in due form is distributed among all structural objects of the model (U, ISu, ITC, I, NGO and NL:SI) for fundraising. Investors can provide support in increasing investment proposal attractiveness (S<sup>2</sup>). Following this, the student can receive funding both within ISu (F<sup>1</sup>, F<sup>2</sup>, F<sup>3</sup>) and from ITC (F<sup>1</sup>) or I (F<sup>1</sup>) or NL:SI (F<sup>1</sup>). Further start-up development will occur within the business incubator ISu (S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>).

## Method C4

Method C4 envisages cooperation of the student with IT companies within the science park framework while developing the innovation product. In so doing, the student studies at the university (E<sup>1</sup>), continues one's studies in an ITC (E<sup>1</sup>) and works on the innovation product with the organisational support of ISu and ITC (S<sup>1</sup>). ITC (IPP<sup>3</sup>) keeps up dedication to developing and protecting intellectual property assets by holding competitions, contests, idea fairs, and so forth. IP rights are protected via the IO U (IPP<sup>1</sup>).

## 3. Actions to be taken

For the student to attend a course of study RL:UE<sup>1</sup>, E<sup>2</sup>, an education standard should be developed. It should provide for courses in innovation and entrepreneurship, development of contents and curricula of such courses, and engagement of instructors and allocation of resources. The students of respective major disciplines attend such studies obligatory. Students majoring in other disciplines and interested persons can study in the university's post-qualifying education departments.

For the student to attend a course of study RL:ISu E<sup>2</sup>, E<sup>3</sup> and RL:ITC E<sup>1</sup>, courses should be developed, instructors (experts and mentors) engaged and resources allocated (premises, a manager, and so forth). The students should be prequalified for such courses.

For the student to receive assistance when filing and implementing intellectual property RL:UIPP<sup>1</sup>, IPP<sup>2</sup>, an Innovation Office should be established in the university, and professionals should be engaged to work in this department.

For a student to be interested and motivated in dealing with intellectual property RL:ITC IPP<sup>3</sup>, the ITC should allocate human and financial resources, and set up interaction with RL:U and RL:ISu.

For a student to receive organisational support RL:US<sup>1</sup>, S<sup>3</sup>, the university should set up an Innovation Office, and interaction with the Science Park should be established (ISu).

For the student to receive support RL:ISu S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>, a business incubator should be set up within the science park framework, and interaction with U, ITC, SI, NGO, and I should be established.

For a student to receive organisational support (RL, NL):I S<sup>2</sup>, interaction with ISu should be established.

For a student to receive organisational support (RL, NL):SI S<sup>2</sup>, interaction with ISu should be established.

For a student to receive organisational support RL:ITC S<sup>1</sup>, S<sup>3</sup>, it is necessary to establish interaction with U, and allocate requisite personnel and resources.

## 4. Recommendations on regulatory support

Requisite regulatory support at the regional level:

- Regulations on centre (faculty, institute) for advanced training and post-qualifying education (standard regulations are available);
- Constituent agreement and science park charter (standard ones are available);
- Strategy and regulations on a University's Innovation Office (developed for the Lviv Polytechnic);
- Regulations on a business incubator (standard regulations are available);
- Regulations on filing intellectual property rights (standard regulations are available);

Requisite regulatory support at the national level:

- Industry standard for higher education with a Master's degree EQL (being developed within the WP6 framework of the project);
- Law of Ukraine [On Science Parks](#) (available);
- Law of Ukraine [On Investment Activities](#) (available);
- Law of Ukraine [On State Regulation of Technology Transfer Activities](#) (available).

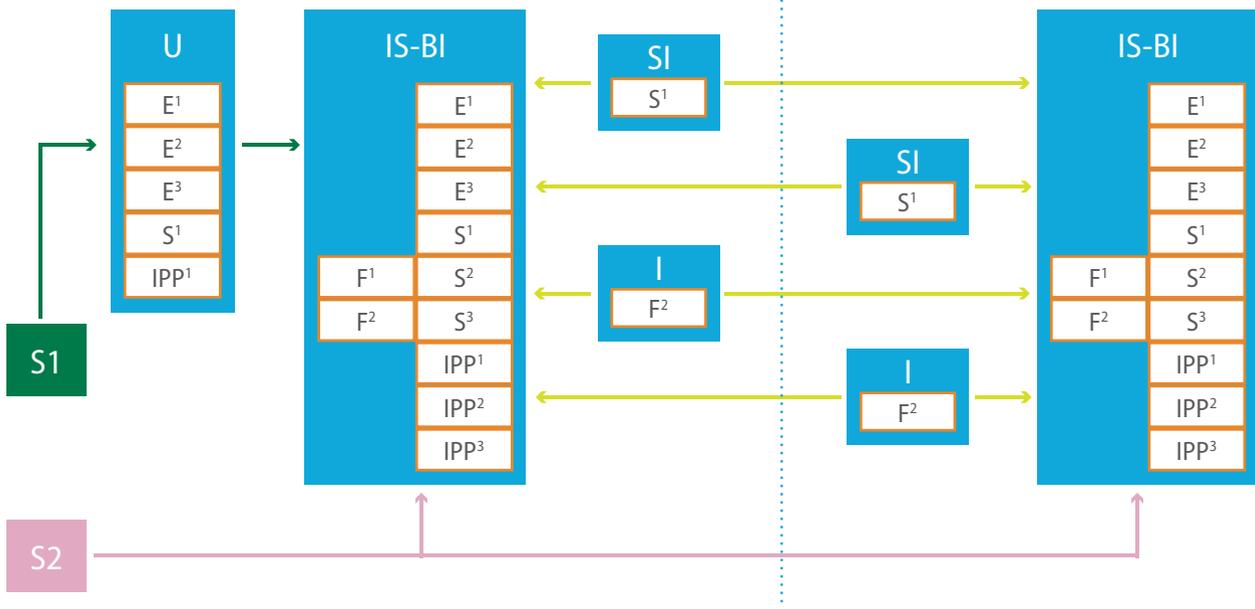
# MODEL “INNOVATIVE STRUCTURE AT THE NATIONAL LEVEL - INNOVATIVE STRUCTURE AT THE REGIONAL LEVEL - UNIVERSITY»

$Ue^{123}s^1ipp^1 ISe^{123}s^{123}f^{12}ipp^{123} If^2 SIs^1 : ISe^{123}s^{123}f^{12}ipp^{123} If^2 SIs^1$

## 1. Guide for students

### REGIONAL LEVEL

### NATIONAL LEVEL



## 2. Guide description

### Method C1

Method C1. The student goes to the University, which cooperates with an innovation structure (a business incubator) at a regional level.

1. The student first goes through all the processes, which the university can offer him/her - education - E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>.
2. The student develops an innovation product.
3. The student protects intellectual property (if required) - IPP<sup>1</sup>,
4. The student submits an innovation proposal in due form to an IS-BI – S<sup>1</sup>.
5. The student establishes an LE with any form of ownership pursuant to the law in effect.
6. Afterwards, the student cooperates with an IS, gains access to its services and chooses necessary services E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>, F<sup>1</sup>, F<sup>2</sup>, IPP<sup>1</sup>, IPP<sup>2</sup>, IPP<sup>3</sup>.

State institutions and investors can address an IS and offer their own spectrum of services. Only in an IS can the student have access to the entire spectrum of services required for developing an innovation product.

## Method C2

A university student, irrespective of a specific university, can address a regional/national IS.

1. The student requires no knowledge from the university. The student already has an appraised innovation concept and a team willing to work on the concept.
2. The student submits an innovation proposal in due form to an IS (BI) – S<sup>1</sup>.
3. The student addresses a regional/national IS (BI) and gains access to the services of an IS (BI) - E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, S<sup>1</sup>, S<sup>2</sup>, S<sup>3</sup>, F<sup>1</sup>, F<sup>2</sup>, IPP<sup>1</sup>, IPP<sup>2</sup>, IPP<sup>3</sup>.
4. The student receives appropriate support and knowledge, and develops an innovation product.
5. The student protects intellectual property (if required) - IPP<sup>1</sup>, IPP<sup>2</sup>, IPP<sup>3</sup>.
6. Afterwards, the student cooperates with a regional/national IS and gains access to respective services.

The student can set up an LE at any stage of working in an IS, if required.

## 3. Actions to be taken

For a student to go to the University E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, courses should be developed, instructors engaged and resources allocated (premises, a manager, and so forth). The students should be prequalified for such courses.

For the student to receive assistance when filing intellectual property in the University IPP<sup>1</sup>, an appropriate department should be established, and qualified professionals be trained.

For a student to receive organisational support in the University S<sup>1</sup>, it is essential to establish an appropriate department and relations with an IS.

For a student to receive support from state institutions and investors, an IS (BI) should be established pursuant to the law in effect. Informational materials should be prepared and the mass media should be involved in the process.

For a student to receive organisational support IS (BI), an IS (BI) should be set up, and interaction of the IS (BI) with U, SI, and I should be established.

## 4. Recommendations on regulatory support

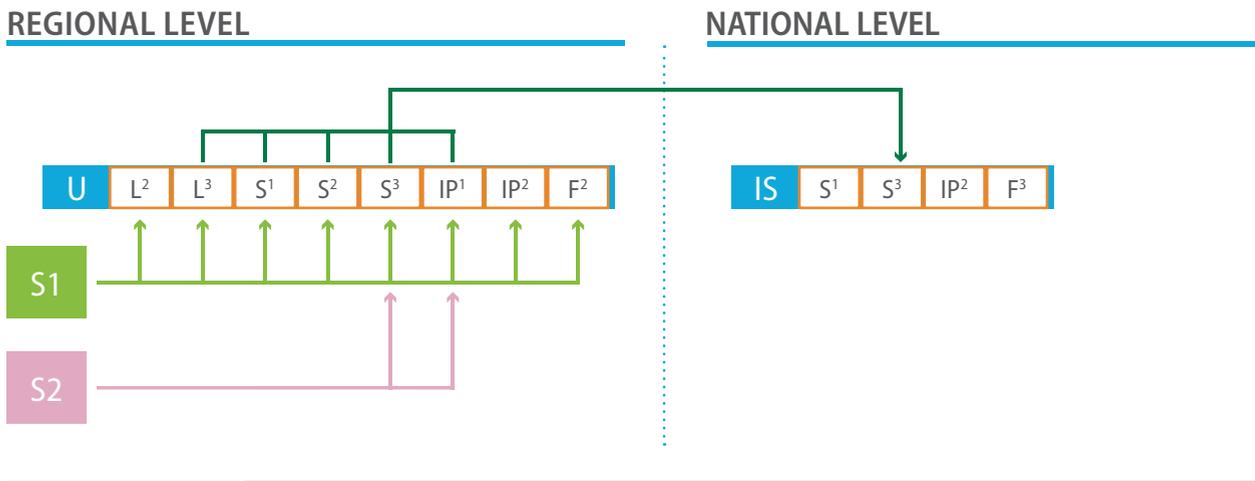
Requisite regulatory support at the regional level in the university:

- Regulations on centre (faculty, institute) for advanced training and skills upgrading (standard regulations are available).
- Regulations on online learning (standard regulations are available).
- Regulations on filing intellectual property (standard regulations are available)
- Regulations on establishing and interacting with an IS (BI) (available when a BI has already been established as an innovation structure).

# MODEL OF ENTREPRENEURSHIP SUPPORT AT THE UNIVERSITY

Ue<sup>23</sup>s<sup>123</sup>ipp<sup>12f2</sup>: ISs<sup>13</sup>ipp<sup>2f3</sup>

## 1. Student's route



## 2. Guide description

### Method C1

Method C1 envisages that the student first studies a course in the university, - E<sup>2</sup>, E<sup>3</sup>. During studies, the student formulates a project of their own concept. In the university, the student receives necessary consultancy and support when developing their own concept into the form of a commercial proposal (an investment pitch). The student has the option of making a cash call to those organisations with whom the university has concluded partnership agreements. Those commercial and innovation projects, which were selected by university experts, can be examined at the national level for fundraising IS. At this level, support is provided for correct formulation of the student's concept S<sup>1</sup> S<sup>3</sup>.

### Method C2

Method C2 envisages that the student has not taken any study course, and has independently formulated one's own concept. In the university, the student receives necessary consultancy and support when developing one's own concept into the form of a commercial proposal (an investment pitch). The student has an option of making a cash call to those organisations with whom the university has concluded partnership agreements. Those commercial and innovation projects, which were selected by university experts, can be examined at the national level for fundraising IS. At this level, support is provided for correct formulation of the student's concept S<sup>1</sup> S<sup>3</sup>.

## 3. Actions to be taken

For the student to take a study course U E<sup>2</sup>, E<sup>3</sup>, courses should be developed, instructors engaged and resources allocated (premises, a manager, and so forth). Students can choose study courses on their own.

For a student to be provided with support when formulating one's own concept with a subsequent investment pitch, the activities of existing university departments should be transformed to deal with patents and intellectual property protection.

A business incubator should be established within the university framework.

The university should look for partners with a capability for investiture or financing successful concepts of students.

At the national level, a structure should be established for coordinating the efforts of universities and providing support for the concepts selected.

#### **4. Recommendations on regulatory support**

Requisite regulatory support at the regional level in the university:

- Regulations on filing intellectual property (standard regulations are available)

Requisite regulatory support at the national level:

- Regulations on IS (unavailable).

# RECOMMENDATIONS ON INTERACTION BETWEEN A HIGHER EDUCATION INSTITUTION (HEI) AND IT COMPANY (ITC) TO ENHANCE THE ENTREPRENEURIAL AND INNOVATION ACTIVITIES OF IT STUDENTS

## 1. Processes related to innovations in an ITC

The universal structural model of organising the innovation activities and entrepreneurship of IT students envisages that an ITC can actualise all kinds of processes (education, support, funding and intellectual property protection) with all possible components. The realisation of these processes in an ITC should distinguish these processes from those described at the university level.

The ITC in-house processes are envisaged to be focused to its own employees who already have a certain level of knowledge and practical skills. Besides, the availability or topicality of certain processes depends greatly on the innovation focus of the ITC. One can distinguish between innovation-active IT companies (IA ITC) and potentially innovative IT companies (PI ITC). IA ITC is a company, which has already achieved success in developing and implementing an innovation IT product or service. As a rule, these are major companies with a large number of staff and who can allocate a significant share of their own budget to innovation activities. PI ITC is a company that can potentially develop one's own innovation IT product or services but cannot do this presently because of certain circumstances. In Ukraine, PI ITC represents the majority.

With account of the aforesaid, general processes can undergo the following changes.

The education process E, in contrast to that realised in a U, can have the following components:

E<sup>1</sup> – to learn how to identify new innovative products and technologies that will be in demand in the IT market;

E<sup>2</sup> – to learn how to become a co-owner of a business (in an ITC) or set up an own associated business; and

E<sup>3</sup> – to learn the basics of fundraising.

Such content of processes E<sup>1</sup> and E<sup>2</sup> builds on the fact that an ITC employee already had to be educated in the basics of innovation activities and entrepreneurship as a student of a U. Therefore, the student has to develop further and improve their own knowledge and skills in this area. Besides, if the student is an ITC employee, then the ITC will gain no profit if the employee sets up their own business (this regards, primarily, PI ITC). However, if the company foresees that such a process will be inevitable for innovation-active employees, then the ITC should set up a mechanism of new entrepreneurship (the employee becomes a co-owner of the business, receives certain benefits and preferences, the employee can establish an associated business, the employee can work at the same time at the ITC and in one's own company or a public association, etc.), and the employee should learn such a mechanism at E<sup>2</sup>.

Process E<sup>3</sup> should be focused on learning about new sources of funding, which were unknown to the employee when he/she studied at the U.

In contrast to the majority of ITC, where the ITC has to administer E processes, and the employees have to be engaged or encouraged on a voluntary basis, the IA ITC can create conditions for creative activities that the majority of E processes will be organised by the employees themselves owing to their inner self-motivation.

The support process S fully coincides with those realised in the U and can have the following components:

S<sup>1</sup> – organisational;

S<sup>2</sup> – economical;

S<sup>3</sup> – legal.

S<sup>1</sup> envisages that ITC creates appropriate conditions for the employee for development of both his/her creative personality and developing and promoting innovation concepts, products and services both to the market and in the ITC.

S<sup>1</sup> can include the following:

- Providing free time for creativity;
- Providing a place for creativity;
- The possibility of attending subject-matter events;
- Holding subject-matter events in the ITC;
- Engaging outside experts to analyse and develop innovative concepts;
- The possibility of free communication between different ITC departments; and
- Providing everything required for developing a prototype product.

S<sup>2</sup> envisages that the ITC provides the employee with economic support, making it possible at the initial stage to assess the feasibility of developing an innovation product.

S<sup>2</sup> can include the following:

- Analysis of the feasibility of developing an innovation product;
- Estimating the need of all kinds of resources to be committed;
- Assistance in developing a business model; and
- Evaluating the possible options of introducing the innovation product in the ITC.

S<sup>3</sup> envisages that ITC provides an employee with legal support. This support can differ significantly at an IA ITC and a PI ITC.

S<sup>3</sup> PI ITC can include the following:

- Legal advice on the lawfulness of an employee's innovative activity in the ITC;
- Advice on employee's rights to innovation activity results; and
- Developing regulatory documents concerning the employee's innovation activities.

S<sup>3</sup> IA ITC can include the following:

- Drawing up documents endorsing the right to ownership of an innovation product;
- Consultancy on co-ownership in the ITC;
- Consultancy on establishing and the existence of a separate ITC – a partner; and
- Consultancy on possible ITC reorganisations (change in ownership, merger, takeover, etc.) due to introducing an innovative product.

The financing process F at an ITC can differ from that at a U as follows:

F<sup>1</sup> – self-financing, as a rule, depends on the decision of the ITC founders (or management). It is not systemic and depends on the economic expediency. F<sup>1</sup> is extended to outpace competitors in developing prototypes and/or creating conditions for introducing innovative products.

F<sup>2</sup> – external financing, as a rule, is not extended to a PI ITC; however, if it will be, then the ITC will change its status to an IA ITC. With IA ITC, F<sup>2</sup> is possible for business expansion and scaling, and entering new markets, though this will demand additional participation of outside organisations in the business, viz. partners. In practice, it is very difficult to find investors for development of an established business.

F<sup>3</sup> – public funding; practically not used in an ITC.

The process of intellectual property protection almost fully matches that in the U and can include the following:

IPP<sup>1</sup> – registering rights in all the intellectual property developed by ITC employees;

IPP<sup>2</sup> – introducing both own and outside innovation products in the ITC; and

IPP<sup>3</sup> – encouraging development of innovation products with intellectual property components.

To administer all the above-mentioned processes, the ITC has to set up a separate department (this concerns big IA

ITC). The responsibilities of such a department will be not only administering own processes, but also interaction with all innovation activity participants: U, IS, SI, I, and NGO.

The number of actualised processes clearly indicates the level of innovation activities in an ITC. Very conventionally, ITC can be categorised in the following levels:

Actualised: E – PI ITC 1st level

Actualised: E and S<sup>1</sup> – PI ITC 2nd level

Actualised: E, S – IA ITC 1st level

Actualised: E, S, IPP – IA ITC 2nd level

Actualised: E, S, F, IPP – IA ITC 3rd level.

With the active participation of employees in actualising and introducing innovation activities, the ITC has to account for the new risks of its own activity, which can be as follows:

1. The employees can become financially more independent of the ITC;
2. The innovation activities can have an adverse impact on the ITC core business (seizure of resources, lack of time, etc.);
3. Developing new products can change the ITC production management system;
4. Distribution of ITC property can change (the employees can receive their own share); and
5. A group of employees can withdraw from the ITC to start their own business.

## 2. Approaches to cooperation between U and ITC.

When developing its own mechanisms of actualising innovation activity processes, the ITC can pursue different strategic approaches to cooperate with a U, which can be as follows:

1. Approach – ‘duplicating’. It consists in that, irrespective of what has been actualised in U, in ITC, these processes will be developed independently and they can duplicate entirely those actualised in U. Such an approach demands many resources, but it is independent of other innovation activity entities.
2. Approach – ‘addition’. It consists in that the processes in ITC are based on those actualised in U. ITC actualises only additional processes, which are absent in U. Such an approach saves resources but makes provision for obligatory execution of processes in U.
3. Approach – ‘integration’. It consists in that ITC and U jointly develop certain (theoretically, all) processes. Such an approach saves resources and makes the ITC relatively independent of its relations with U.

Hence, the integration approach allows both the ITC and U to develop jointly innovation activity processes; thereby receiving joint results and saving own resources.

## 3. Recommendations for an ITC according to the models described in the report.

In what follows is a concise form of all kinds of models considered in the report:

$Ue^{123}s^1ipp^1 ISe^{123s^{123f^3}ipp^{23} NGOs^{1f^{23} If^2 SIs^1} : NGOs^{1f^{23} If^2 SIs^1}$

$Ue^{123s^{13}ipp^1 ISipp^{123} If^3 : If^3}$

$Ue^{123s^1ipp^1} : ISe^{3s^1}NGOs^1$

$Ue^{123s^1ipp^1 ISus^{123f^2If^2SIs^1} : ISe^{123s^{123} If^2SIs^1}ipp^1$

$Ue^{13s^{12f^1}ipp^{123} ISe^{1s^{12f^1}ipp^{12} ITCe^1} : Ue^{13s^{12f^1}ipp^{123} ISe^{1s^{12f^1}ipp^{12} ITCe^1}$

$Ue^{12s^{13f^1}ipp^{12} ISue^{23s^{123f^123} NGOf^3 Is^{2f^1} SIs^1} : ISs^{123f^1} NGOf^3 Is^{2f^1} SIs^1f^1$

$Ue^{123s^1ipp^1 ISe^{123s^{123f^12}ipp^{123} If^2 SIs^1} : ISe^{123s^{123f^12}ipp^{123} If^2 SIs^1}$

$Ue^{23s^{123}ipp^{12f^2} : ISs^{13}ipp^{2f^3}$

To define options of U and ITC cooperation, we leave only those parts of the model, which define processes in U (and in ISu), namely:

$$\begin{aligned}
 &Ue^{123}s^1ipp^1 \\
 &Ue^{123}s^{13}ipp^1 \\
 &Ue^{23}s^{123f2}ipp^{12} \\
 &Ue^{13}s^{12f}ipp^{123} \\
 &Ue^{123}s^1ipp^1 ISus^{123f2} \\
 &Ue^{12}s^{13f}ipp^{12} ISue^{23}s^{123f123}
 \end{aligned}$$

If we choose the 'duplication' and 'integration' approaches as strategic ones for cooperation, then the processes, which the ITC should actualise, will be as follows for each of the above models:

$$\begin{aligned}
 &Ue^{123}s^1ipp^1 - ITC e^{123}s^1ipp^1 \\
 &Ue^{123}s^{13}ipp^1 - ITC e^{123}s^{13}ipp^1 \\
 &Ue^{23}s^{123f2}ipp^{12} - ITC e^{23}s^{123f2}ipp^{12} \\
 &Ue^{13}s^{12f}ipp^{123} - ITC e^{13}s^{12f}ipp^{123} \\
 &Ue^{123}s^1ipp^1 ISus^{123f2} - ITC e^{123}s^{123f2}ipp^1 \\
 &Ue^{12}s^{13f}ipp^{12} ISue^{23}s^{123f123} - ITC e^{12}s^{13f}ipp^{12}
 \end{aligned}$$

The model with  $Ue^{123}s^1ipp^1 - ITC e^{123}s^1ipp^1$  requires the least efforts on the part of ITC.

Models:

$$\begin{aligned}
 &Ue^{123}s^{13}ipp^1 - ITC e^{123}s^{13}ipp^1 \\
 &Ue^{23}s^{123f2}ipp^{12} - ITC e^{23}s^{123f2}ipp^{12} \\
 &Ue^{123}s^1ipp^1 ISus^{123f2} - ITC e^{123}s^{123f2}ipp^1
 \end{aligned}$$

are very similar in regard to cooperation with ITC.

If we choose the 'addition' strategic approach, then the processes, which the ITC should actualise, are as follows:

$$\begin{aligned}
 &Ue^{123}s^1ipp^1 - ITC s^{23f123}ipp^{23} \\
 &Ue^{123}s^{13}ipp^1 - ITC s^{2f123}ipp^{23} \\
 &Ue^{23}s^{123f2}ipp^{12} - ITC e^{1f13}ipp^3 \\
 &Ue^{13}s^{12f}ipp^{123} - ITC e^{2s^3}f^{23} \\
 &Ue^{123}s^1ipp^1 ISus^{123f2} - ITC s^{23f123}ipp^{23} \\
 &Ue^{12}s^{13f}ipp^{12} ISue^{23}s^{123f123} - ITC ipp^3
 \end{aligned}$$

Models:

$$\begin{aligned}
 &Ue^{123}s^1ipp^1 - ITC s^{23f123}ipp^{23} \\
 &Ue^{123}s^1ipp^1 ISus^{123f2} - ITC s^{23f123}ipp^{23}
 \end{aligned}$$

are absolutely similar in regard to cooperation with ITC.

Model  $Ue^{12}s^{13f}ipp^{12} ISue^{23}s^{123f123} - ITC ipp^3$  requires the least expenditures on the part of ITC to establish cooperation.

Hence, for each implemented model, one can evaluate the processes to be actualised according to the approach chosen.

## 4. Current cooperation status

To analyse the status of cooperation between U and ITC within the framework of this project, ITC was polled to identify those innovation activity processes, which have been actualised in the ITC, or are slated for implementation in the short term.

The questionnaire, with the form given in the supplement, was sent to 50 companies of different size and level of maturity in different regions of Ukraine. Only seventeen of these companies participated in the polling (34 % of the total). The formal reasons of refusing to participate in the polling were as follows:

1. Working with 'closed' innovations (the companies are not ready to discuss innovation issues with outside participants) – 60.6 % of those who refused to participate.
2. It is unclear how the University can participate in developing company innovations – 30.3%.
3. Other reasons – 9.1%.

Cooperation of Universities with companies in innovation and students' entrepreneurship in Ukraine is underdeveloped. The majority of companies consider links with educational institutions as only a source for potential selection of employees and are not ready to participate in their development or fail to understand the advantages of such cooperation.

Analysis of polling results has shown that, presently, only 47% of respondents work with innovations. Of these, 25% account for the eastern region; 100% for the central one; 75% for the southern one, and 25% for the western region.

IA ITC accounts only for 17.64% of the total number of respondents. A significant distinctive feature is that IA ITC have actualised at least one of the processes.

General analysis has shown that, from the company viewpoint, the most significant processes are as follows: E<sup>1</sup> – learning how to create novelties; S<sup>1</sup> – organisational support in developing innovation products; F<sup>1</sup> – allocating own funds to support innovation products, and IPP<sup>1</sup> – filing one's own intellectual property assets. These processes (and not only these ones) have been actualised and are being used at all IA ITC represented in the polling.

With regards to PI ITC, the existing processes indicated were E<sup>1</sup> – learning how to create novelties, and S<sup>1</sup> - organisational support in developing innovation products.

It must be emphasised that these processes have been realised in part within the framework of cooperation with universities. In the future, such companies are willing to cooperate both in processes they have not yet established and extend kinds of activities.

Universities with established processes for intellectual property protection and organising funding are most useful for such companies, and have the advantage to establish a mutually beneficial partnership.

## 5. General recommendations for an ITC

Having standardised all the above-mentioned, the general recommendations for an ITC can be as follows:

1. An ITC has to define the level of its innovation activities.
2. It is necessary to identify clearly, which processes have been actualised in the ITC, and which can be actualised in a short term.
3. It is necessary to appoint a responsible person (or a department) for organising innovation processes in an ITC.
4. It is necessary to identify clearly the existing models of cooperation with U at the regional and national levels.
5. It is necessary to identify clearly with which innovation activity entities (U, IS, SI, I, or NGO) regionally and nationwide the ITC cooperates.
6. It is necessary to choose a strategic approach to cooperation (duplication, addition or integration).
7. Based on all the above chosen, a plan for actualising specific processes in the ITC should be developed.

Therefore, it must be emphasised that the majority of ITC in Ukraine are PI ITC, which pay little attention to developing their own innovation processes jointly with U, in the future, if a systemic approach will be pursued in building relations with all innovation activity entities, a highly effective European level innovation eco-system can be obtained.

It carried out a survey of IT companies from different cities of Ukraine for the purpose of implementing of innovative activities involving students.

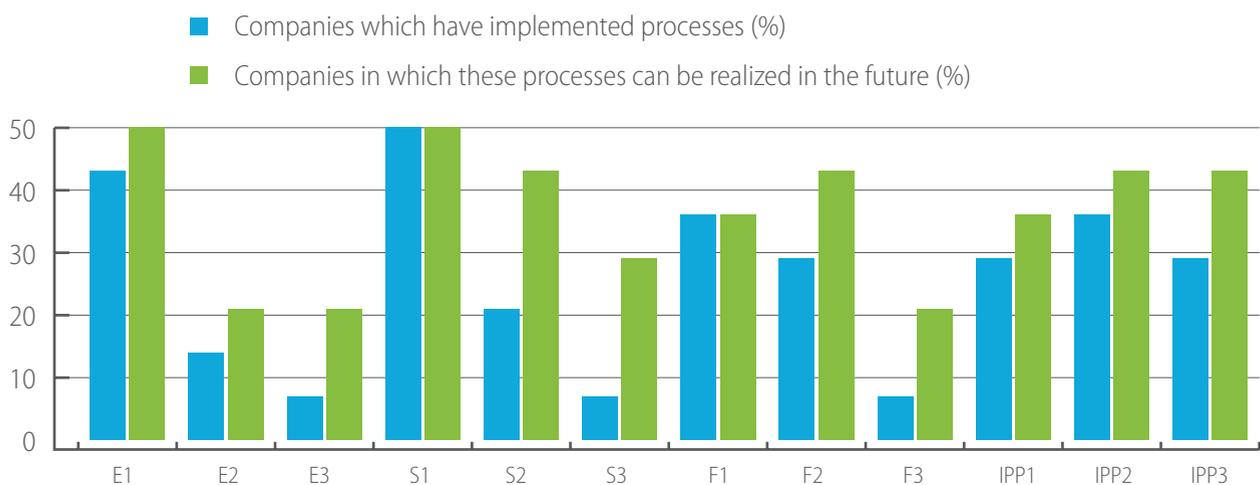
According to the results of a survey it was found:

- The number and percentage of companies which have implemented processes and these processes can be realised in the future (Table 1);
- The number and percentage of companies which implemented or will be implemented processes of university collaboration - the company (Table 2);
- The number of companies that interact with government, NGOs , investors (Table 3).

**Table 1**

Number and percentage of companies which have implemented processes, and these processes can be realised in the future

Name of process	The number of companies which implemented process	Percent (%) of companies where all Processes are done	The number of companies which will implement process in future	Percent (%) of companies, which will implement all processes in future
E <sup>1</sup>	6	43	43	50
E <sup>2</sup>	2	14	14	21
E <sup>3</sup>	1	7	7	21
S <sup>1</sup>	7	50	50	50
S <sup>2</sup>	3	21	21	43
S <sup>3</sup>	1	7	7	29
F <sup>1</sup>	5	36	36	36
F <sup>2</sup>	4	29	29	43
Φ <sup>3</sup>	1	7	7	21
3IB <sup>1</sup>	4	29	29	36
3IB <sup>2</sup>	5	36	36	43
3IB <sup>3</sup>	4	29	29	43

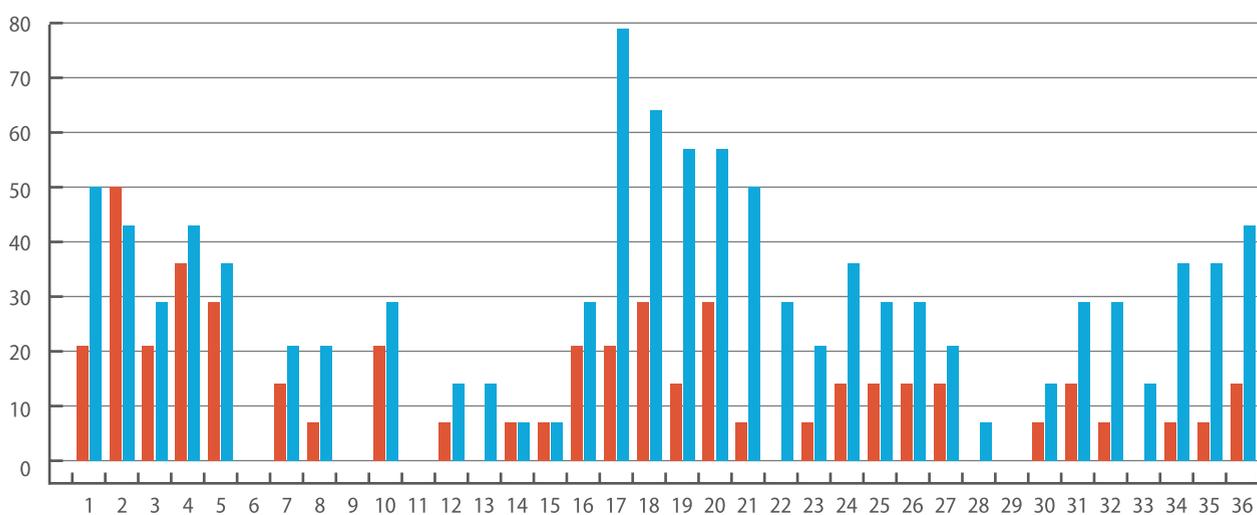


**Table 2**
**Number and percentage of companies which implemented or will implement processes in collaboration with a University – Company**

Name of process	№ process	Опис	Number of IT companies in which processes of collaboration	Percent (%) of companies in which processes of collaboration	Number of IT companies, which will implement processes of collaboration	Percent (%) of companies, which will implement all processes in future
E <sup>1</sup>	1	Education of how to create a new	3	21	7	50
	2	Participation in education (as a teacher)	7	50	6	43
	3	Participation in the learning process (as a listener)	3	21	4	29
	4	Assistance in attracting speakers (experts)	5	36	6	43
	5	Joint training materials (including printing)	4	29	5	36
E <sup>2</sup>	6	Learning how to create your own business				
	7	Participation in education (as a teacher)	2	14	3	21
	8	Participation in the learning process (as a listener)	1	7	3	21
	9	Assistance in attracting speakers (experts)				
	10	Joint training materials (including printing)	3	21	4	29
E <sup>3</sup>	11	Learning how to find sources of funding				
	12	Participation in education (as a teacher)	1	7	2	14
	13	Participation in the learning process (as a listener)			2	14
	14	Assistance in attracting speakers (experts)	1	7	1	7
	15	Joint training materials (including printing)	1	7	1	7
S <sup>1</sup>	16	Organisational support the creation of innovative products	3	21	4	29
	17	Activities (seminars, conferences, exhibitions)	3	21	11	79
	18	Organisation of competitions with prizes	4	29	9	64
	19	Technological expertise	2	14	8	57
	20	Guide students (mentoring) while working on innovative projects	4	29	8	57
	21	Joint advertising company innovative measures	1	7	7	50
	22	Help in promoting innovative products to national and international markets			4	29
S <sup>2</sup>	23	Economic support the creation of innovative products	1	7	3	21

Name of process	№ process	Опис	Number of IT companies in which processes of collaboration	Percent (%) of companies in which processes of collaboration	Number of IT companies, which will implement processes of collaboration	Percent (%) of companies, which will implement all processes in future
	24	Help with calculations in creating business models	2	14	5	36
	25	Economic evaluation of innovative project	2	14	4	29
	26	Advice for Economic Affairs	2	14	4	29
	27	Accounting for enterprise innovation type	2	14	3	21
S <sup>3</sup>	28	Legal support the creation of innovative products			1	7
	29	Advice on Legal Issues				
	30	Assistance in registering a new company	1	7	2	14
F <sup>1</sup>	31	Bold own funds in support of innovative products	2	14	4	29
F <sup>2</sup>	32	Raising funds of other investors to support product innovation	1	7	4	29
F <sup>3</sup>	33	Creating the conditions for community involvement in support of innovative products			2	14
IPP <sup>1</sup>	34	Register your own intellectual property	1	7	5	36
IPP <sup>2</sup>	35	Implementation own intellectual property	1	7	5	36
IPP <sup>3</sup>	36	Creating the conditions for increasing the number of intellectual property	2	14	6	43

- Companies which have implemented processes (%)
- Companies in which these processes can be realized in the future (%)



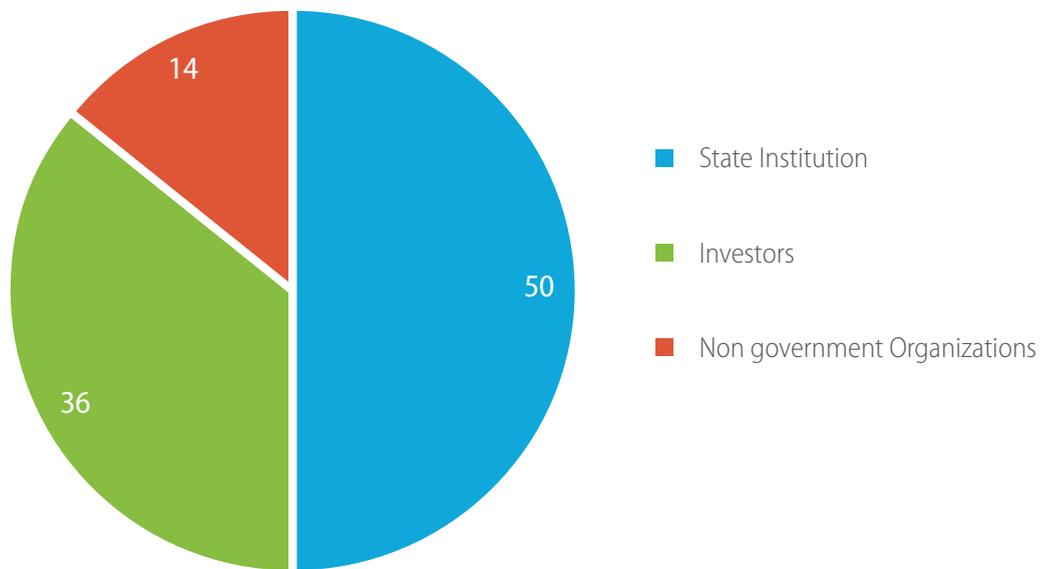
**Table 3**

The number of companies that interact with government, NGOs and investors

Organisations	Number of companies	% of companies
State Institutions	7	50
Investors	2	14
Non Governmental Organisation	5	36

**Figure**

The percentage of companies that interact with government, NGOs, investors



№	GENERAL CONCLUSIONS	GENERAL ROADMAP
1	<p>Processes E1-3 S1-3 F1-3 IPP1-3 are implemented in an average of 26% of companies, which is a very low figure.</p> <p>50% of companies support at the organisational level the creation of innovative products.</p> <p>36% - allocate their own funds to support innovative products exert implementation of their intellectual property.</p>	<p>Universities must initiate implementation of the processes in the companies that interact with these universities.</p> <p>Due to the political and economic situation in Ukraine to attract investors to support product innovation is very difficult, because the percentage of such funding will be very small. Companies need to focus on the allocation of their own funds in support of innovative products and creating conditions to attract the community to support product innovation.</p>
2	<p>Joint activities of universities and companies in the field of innovation activity is in its infancy, as shown by the data in Table 2. But there is growth potential of the companies in some processes, as evidenced by the data in Table 2 and graphically represented by the dynamics of Figure 2.</p>	<p>Universities along with companies need to find processes for interaction and the development of innovation. To initiate this interaction may appropriate departments university.</p>
3	<p>Most of the companies are co-operating with government and non-government organizations. Business companies are not focused on working with investors, only 14% of companies interact with different investors.</p>	<p>Companies need to expand their activities in search of interaction with investors and to attract investment capital in order to create innovative IT products and services.</p>