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***D2.6 Brochure related to technical assistance services related to market access***

**TECHNICAL ASSISTANCE SERVICES RELATED TO  
ACCESS GRANTING AND ADVANCEMENT OF  
TECHNOLOGY COMMERCIALIZATION PROJECTS IN  
THE USE OF RENEWABLE  
ENERGY SOURCES**

MINSK-2014



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## Introduction

The purpose of the given brochure is to familiarize specialists, developers, entrepreneurs and investors with methods of commercialization projects advancement in the use of renewable energy sources via technology transfer networks.

While preparing this manual various methodical materials concerning commercialization projects advancement were used: “Practical guidance for commercialization centers and technology transfer”, prepared in the framework of a government’s project of the Russian Federation and European Commission EUROPEAID “Science and technology commercialization”, methodical guidance of the Republican Centre for Technology Transfer, European network IRC<sup>1</sup>, American technology transfer network yet2.com, international support network of an innovation activity and technology transfer UNIDO Exchange, Russian technology transfer network RCTT, etc., Consortium of federal laboratories of technology transfer of the USA FLC.

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<sup>1</sup> In 2007 European networks were altered and integrated in the Enterprise “Europe Network” (new networks – “business - innovation – research”, SME). Learn more about it from the website: <http://een.ec.europa.eu/services/overview>

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## Abbreviations

<b>NAS</b>	National Academy of Sciences
<b>CTT</b>	Centre for Technology Transfer
<b>RCTT</b>	Republican Centre for Technology Transfer
<b>UNIDO</b>	United Nations Industrial Development Organization
<b>RDS(T)W</b>	Research, Experimental Development and Technological Works
<b>STD</b>	Scientific and Technical Development
<b>TI</b>	Technological Inquiry
<b>TO</b>	Technological Offer
<b>TA</b>	Technological Audit
<b>TT</b>	Technology Transfer
<b>OIP</b>	Objects of Intellectual Property

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## Basic notions and definitions

*Innovation* – created (mastered) new or improved technologies, kinds of commodities or services, organizational and technical decisions of industrial, administrative, commercial or other character that contribute to technologies, products and services advancement to the market.

*Innovative activity* is the activity leading to creation and realization of innovations.

*Innovative project* is a range of activities concerning innovation creation and implementation.

*Innovative infrastructure* is a set of subjects of an innovative infrastructure that carries out financially, technical and material, financial, organizational and methodical, informational, consulting and other innovative activity maintenance.

*Technology commercialization* is the income (profit) acquisition from the commercial use of information about technology.

*Advancement of technology commercialization projects* is the innovative project formalization to represent it in various networks of technology transfer with the aim of finding partners, financial and other resources for technology commercialization in various forms, including enterprise creations for its realization.

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To improve the efficiency of commercialization project advancement it is necessary to formulate RDS(T)W results in the form of goods i.e. as close to industrial technology as possible. The more technology is ready for commercial use, the more it costs. Therefore, in the early stages of technology commercialization it is useful to involve strategic partners and investment resources, both domestic and international state, and private funds to implement RDS(T)W in the form of grants and funding programmes of innovative activity in order to realize technology commercialization projects.

Creation of a joint venture with a foreign partner is one of the variants of the advancement of technology commercialization projects in the early stages of development. During the advancement of technology commercialization projects the search of partners is carried out via technology transfer infrastructure on the basis of personal contacts, placement and search of information in the Internet, participations in exhibitions, venture fairs and other public actions.

*Technology transfer* is the process of technology transfer from the sphere of development to the sphere of practical use (technology transfer to the recipient). The user carries out its industrial implementation (but not necessarily derives from it income (profit) – environmental technology is an example).

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During technology commercialization income can be received from:

- any commercial agreements connected with technology exploitation, including technology transfer;
- performance of research works to implement technology (market application);
- licence sale to allow the third parties to use technology;
- creation of companies or joint ventures with strategic partners by developers to produce their own output (service rendering) with the use of their developed technologies.

To bring technology to CTT commercialization stage it is necessary to render assistance to developers, in particular:

- to expertize RDS(T)W results;
- to select RDS(T)W results which are the most attractive to finance, having estimated commercialization prospects and having made technological marketing;
- to formalize RDS(T)W results interpretation, as a perspective innovative project;
- to draw up an investment memorandum and conduct an investors search;
- to distribute and legally secure rights to the future intellectual property among all participating parties in the technology commercialization process;



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- to manage commercialization project during the stage of technology implementation to manufacture;
- to render services aimed at selecting further modification and maintenance of objects of intellectual property.

*Centre for technology transfer* is a commercial organization with an average number of employees up to 100 people, the purpose of which is to ensure innovation transfer from the sphere of development to the sphere of practical application.

The main direction of center for technology transfer is the realization of activities directed towards innovation transfer from the sphere of development to the sphere of practical application.

In the XXI century the Republic of Belarus has become oriented to an innovative way of development. Frequently in interviews of officials it is possible to hear about the necessity of manufacture modernization, new technology introduction, implementation of innovative developments and their commercialization, deliveries of an intellectual product to export. All these problems are complex, the solution of which is impossible without technology transfer development and it is paid a great deal of attention in our country and abroad.

## Participants of advancement of commercialization projects

Key participants of a technology advancement process can be divided into two big groups:

Group 1: investors (buyers) of technologies

Group 2: authors (owners) of technologies.

*Investors of technologies*, in their turn, can be divided into four main sub-groups.

Investors who finance technology developments in the earliest stages belong to *the first sub-group*; these are various national and international funds, programmes. For example, Belarusian Republican Foundation for Fundamental Research, Belarusian Innovative Fund, State scientific and technical programmes and State financing programme of innovative projects of the State Science Technology Committee of the Republic of Belarus, International Scientific Technical Centre, European Union programmes, in particular, EuropeAid and others. This group provides a significant funding amount, accumulates a considerable quantity of scientific and technical information and has a significant impact on developmental trends of Belarusian Science.

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*The second sub-group* of investors is formed by private funds, grants and programmes. This group includes international projects, funds and grants. Frequently, members of this sub-group start investing in the development only when research teams have already received funding from the state funds in the framework of the Belarusian and/or international programmes.

Venture funds<sup>2</sup> make up *the third sub-group* of investors. This subgroup was formed exclusively with foreign funds. Foreign venture funds master only a small number of developments and have a significant amount of restrictions on activity sectors and often specialize in developments only for a certain industry. Investments of the members of this sub-group include full or partial transmission of rights on research results to the financing party which is further interested in their exploitation or resale to the strategic investor.

*The fourth sub-group* is formed by companies that finance scientific researches in order to implement them in their own activity. These enterprises develop the so-called inner technology company commercialization; such a company has its own scientific budgets from which it funds research and developmental works to introduce new technologies at their own enterprises.

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<sup>2</sup> *Venture fund is an investment mechanism with general fund formation (usually partnership), to invest financial capital, basically, foreign investors in enterprises that present a big risk for usual markets and bank loans.*

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The following commercialization process participants play the most significant role in the RDS(T)W results commercialization:

*1. Scientific and tech parks*

Scientific and tech parks belong to the most effective elements of innovative infrastructure, the activity of which is aimed at supporting small innovative firms, commercialization results of scientific and technological developments, innovation advancement of ideas and their accelerated promotion to the sphere of goods production. The experience of the leading industrial countries shows that in small innovative firms operating within park structures limits, the period of innovation introduction is reduced in 2-3 times in comparison with an average term.

Scientific and tech parks are associations of high-tech companies (or their affiliates), which are formed around big research centers, usually at universities. Thus, the university represents itself as the park founder and provides the park with its surrounding territory, premises, equipment, library etc.

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Besides, scientific ideas, fundamental knowledge, inventions, consultation concerning scientific-technological development are contributions of the university to the park. Industrial firms are interested in creating park structures that they can use to solve their technological problems, to maintain competitiveness. As a rule, firms offer essential financial, material and technical support to the park.

There is a distinction between scientific and tech parks.

The main task of a scientific (research) park is to provide an organic connection of fundamental and applied researches. Their activity is usually limited to rendering scientific services, especially to scientific and technological innovation development. In this case innovations are usually developed to a stage of the experimental sample creation.

A research centre of the Illinois University of Technology in the United States is an example of a scientific park, there are no industrial firms or their own branches on the university territory, but there are noncommercial research institutes that are closely connected with industry.

Heriot-Watt Park is “an ideal type” of a scientific park that is the oldest park in Scotland. It is an exclusive scientific park in Europe where conduction of research works is authorized and mass production is forbidden.

Tech parks have much more considerable potential, their main task is to mobilize material and labour resources to master new hi-tech manufactures, to create and develop technically difficult industrial firms.

The structure of tech park can include various subdivisions and services taking into account its directions and specificity. Business incubators and innovative centers are a tech park's components; therefore a tech park carries out numerous functions peculiar to these services.

## 2. *Business incubators*

Along with the support centers of a small business, establishments of financial support, societies of mutual crediting of small and medium-sized enterprises, incubators make up infrastructure to develop and support small and medium-sized business initiatives. Any juridical person who owns a premise appropriate for goods manufacture, for work performance, for rendering services or placing offices can be an incubator.

Incubators of a small business differ in a profile of their activity and can be both diversified, and specialized.

Diversified incubators extend entrepreneurs who are engaged in different activities.

Young companies are often chosen so that their interests do not meet in one sphere, in order to avoid competition. Besides, different firms can render services concerning business incubator to their neighbours.

Specialized (single-line firms) work only with those who are engaged in one general activity. They can render services themselves to a certain social group of subjects of a small business.

### *3. Innovative centers*

Innovative centers are specialized small firms; their main role is to render assistance to firms directly by developing and making innovative production.

Typical kinds of innovative centers activity: scientific and technical, advisory-expert and leasing.

Scientific and technical centers with an informative bias promote duration reduction of innovative processes by revealing things in common of the two counter informational streams: «bank of innovations» and «manufacture problems».

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Communication between such centers and customers is based on the mutual exchange of information: customer informs about his/her problems, possible ways of their solutions and available developments, centre informs about new scientific and technical data in the area interesting for customer. Thus, centre provides customer with technical description of the optimum decision of problems and assists in the creation of teams to realize these solutions.

Centers which are engaged in an advisory-expert activity are responsible for forecasting scientific and technological advancement, recommendations development on structurization of economy of regions, estimation and feasibility study of various innovative projects and programmes, statistical processing and analysis of results of an innovative activity, drawing up recommendations about personnel preparation and works effective organization, commercial prospects study of innovations, etc. enters.

Centers, specializing in the sphere of leasing, lease modern technics, scientific and technological equipment for developers' needs and innovative production manufacturers. Thus, tenants are released from a single payment of a full equipment cost, they do not connect their capital, and a lessor acquires an appropriate realization form of a full equipment cost.



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Innovative centers can be independent organizations, and also components of scientific and tech parks.

Centres for technology transfer are a special version of innovative centers, their main role is the innovative activity activation via realization of transfer technology mechanism — the process of technology transfer from the sphere of development to the sphere of practical application.

The main functions of centres for technology transfer are:

- to monitor and form a constantly updated databank of an innovative activity. It includes: search, accumulation and data ordering of innovations, estimation of competitiveness in the internal and external markets; revealing of innovation developers and consumers; research of scientific and technical potential of innovation developers and industrial potential of consumers; estimation of a demand for innovations from consumers and possibility of its satisfaction from innovation developers;
- to render intermediary services to innovation developers and consumers in a search of partners in an innovative activity, including assistance in innovation consumers to find their developers.

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- to assist innovation developers to find their consumers (targeted selection of information on innovations and its granting to consumers, as well as information on requirements for innovations and its granting to developers; presentation of innovations at fairs and exhibitions; distribution of innovation data on in various media; marketing on an equipment delivery, organization of experts training and internships to study operational experience, technological processes and equipment development);
- to initiate a new manufacture creation, to develop new technologies and release of a new production via informing consumers on innovations in which they are interested purposeful;
- to hold conferences, seminars in priority directions of scientific and technological development; consultations, educational programmes, personal training; assistance in the introduction of scientific and technological developments into manufacture; legal, information and expert aid to small innovative firms.

In recent years the role of centres for technology transfer has increased as a tool of the world technology trade.

#### 4. *Commercialization centre*

Commercialization center purposes and tasks are similar to centre for technology transfer; the center represents a uniform window in innovative projects support infrastructure. It possesses information about all mechanisms of innovative projects development and support and it offers them to innovators in order to use.

Primary goals of such a center:

- to provide the most effective ways of ideas and inventions transfer to a business environment;
- to select the best innovative technologies and products, to assist in their commercialization;
- to support innovators via estimation and improvement of commercial prospects of ideas and products;
- to research technology application markets and innovation products consumers;
- to search investor for innovation project realization.

Commercialization center accepts orders to develop an innovative product, service or technology from a business. Innovative enterprises and projects are in a centre uniform base of innovative projects, and they are considered as order executors.

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## 5. *Consulting companies*

Consulting is an activity to consult heads, management personnel, and managers about a wide range of questions in the sphere of financial, commercial, legal, technological, technical, expert activity.

The purpose of consulting is to help the control system to achieve declared purposes.

In other words: consulting is an administrative consultation on a wide range of questions in the sphere of a financial, legal, technological, technical, expert activity rendered by external advisers to solve this or that problem.

Consulting companies specialize in separate activity directions, and their primary goal is to analyze, to substantiate advancement prospects and use scientific and technical, organizational-economic decisions taking into account a subject domain and client's problems.

Besides, a consulting company renders assistance to organizations to end any project which requires new ideas.

The participants of a technology commercialization process, not being investors, render essential assistance in technology commercialization and financial assets attraction. Their functions can be defined as broker, consulting or legal, protecting and advancing intellectual property of developers to the market, and also at an easy rate.

### **Generic methodology of technology transfer**

Methodology of technology transfer is based on the following methodologies: international support network of an innovation activity and technology transfer UNIDO Exchange, American technology transfer network yet2.com, technology transfer network NASA, American network association of university managers of technology transfer AUTM, European technology transfer network SMEs, European support network of enterprise EEN, Russian technology transfer network RCTT, etc.

Definition of technology transfer in relation to the law of the Republic of Belarus is given in the Decree of the President of the Republic of Belarus from January 3, 2007 №1: *Technology transfer is the transfer of technology from the originator to a secondary user.*

In technology transfer the central role belongs to centre for technology transfer (a Fig. 1). CTT mediates among developers, entrepreneurs and investors. They are its equal clients.

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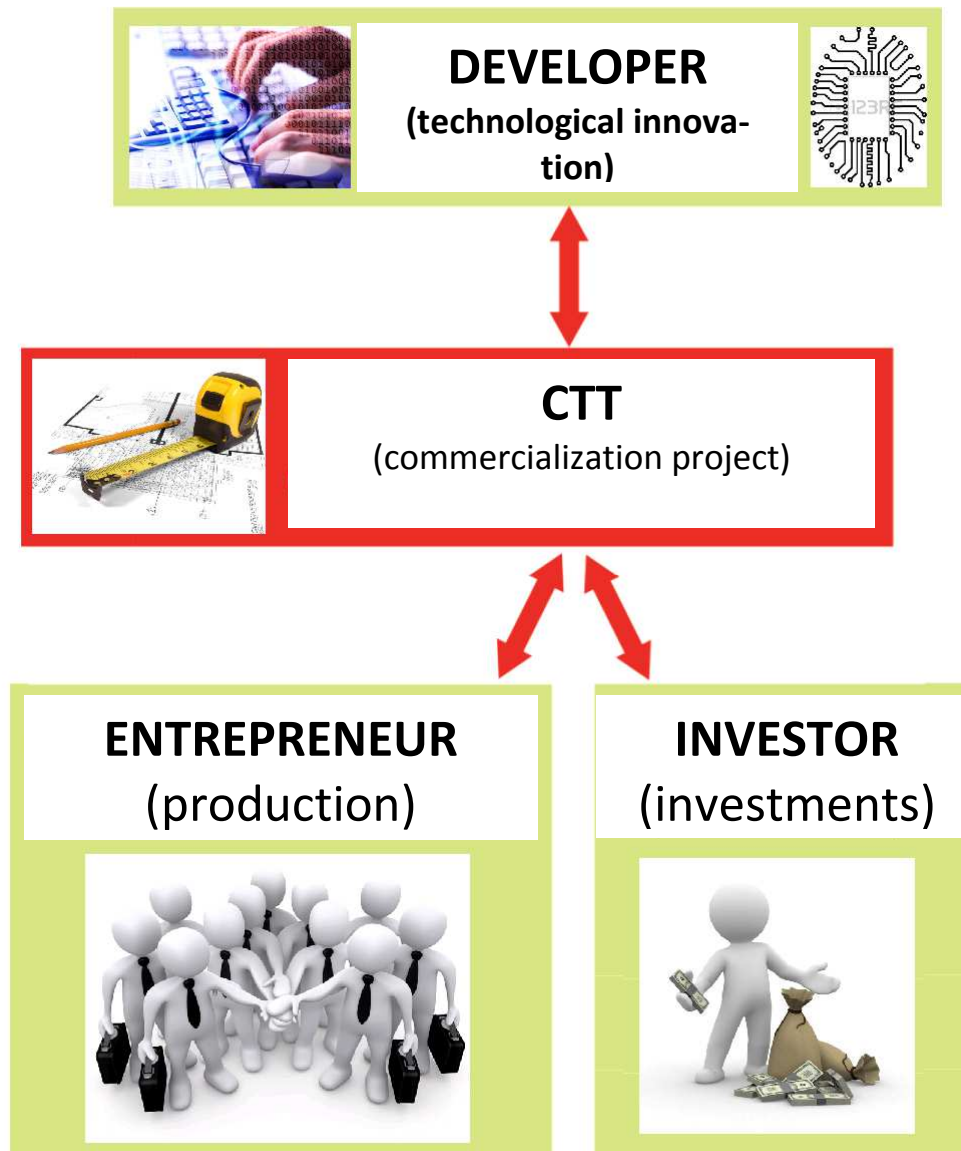


Fig. 1. Interaction scheme of the main participants of technology transfer

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CTT's aim is to help a developer to estimate commercial potential of its developments and give them "trade dress" so that they could interest entrepreneurs and investors. CTT should choose technology that would be an effective investment of investors' funds on the basis of their mentality and wishes; it also should find technological innovation to improve the quality and reduce the cost of the output or its perspective view application for entrepreneurs.

A business-process usual scheme of technology transfer used in CTT networks is shown in fig. 2 – 5. To achieve technology transfer (TT) the following four stages are singled out in a business-process:

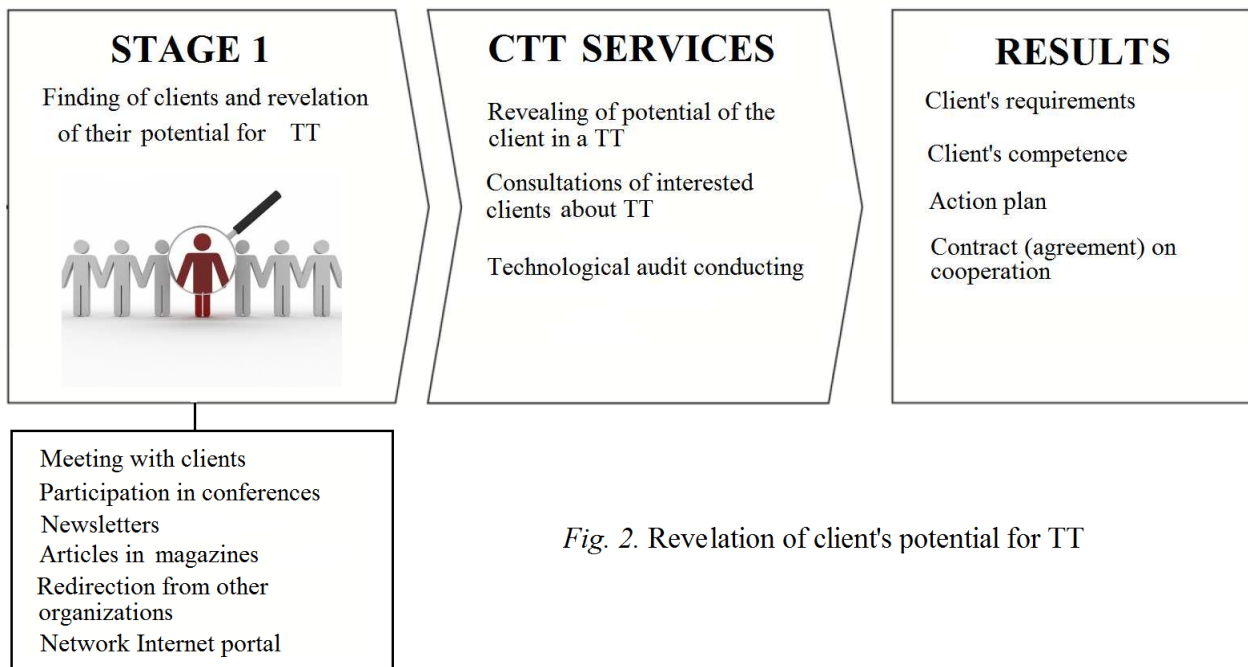


Fig. 2. Revelation of client's potential for TT

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## Stage 1

Revelation of client's potential for TT begins with meetings in the frameworks of which CTT's specialists consult clients about TT questions and reveal potential (interest) of the client in TT. In this stage, in case of a client's interest, CTT can assist in carrying out *technological audit* which is conducted on a contract basis via external experts in a close cooperation with enterprise administration (organization) and its employees. If necessary experts can conduct energy audit to identify potential to improve energy efficiency of the enterprise, including the use of renewable energy sources in order to save fuel and energy resources.

TA includes the following basic stages: preparation of programme inspection, data acquisition, analysis (if necessary calculations performance), report preparation (conclusion).

It is necessary to distinguish the following notions: technological audit for developers' organization and for industrial enterprise.

*Technological audit for developers' organization* – is an estimation of commercial potential and commercialization prospects of research and developmental works, revelation of commercialization knowledge possibilities, recommendation developments to improve intellectual property management and set priorities of resource usage for its commercialization.



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*Technological audit for industrial enterprise* is a way to inspect enterprises, to estimate its technological possibilities and requirements, marketing conditions, management, research and financial activity.

As a result of audit an action plan is developed which should lead to commercialization acceleration of creating and created technologies by the client and acquisition of necessary technologies or know-how.

The results of stage 1:

- client’s requirements – list of technologies intended for commercialization;
- list of technological problems requiring a decision;
- client’s competence
- action plan on condition that CTT is a client’s structural subdivision;
- agreement on cooperation on condition that CTT is part of the organization;
- in relation to the client.

## Stage 2

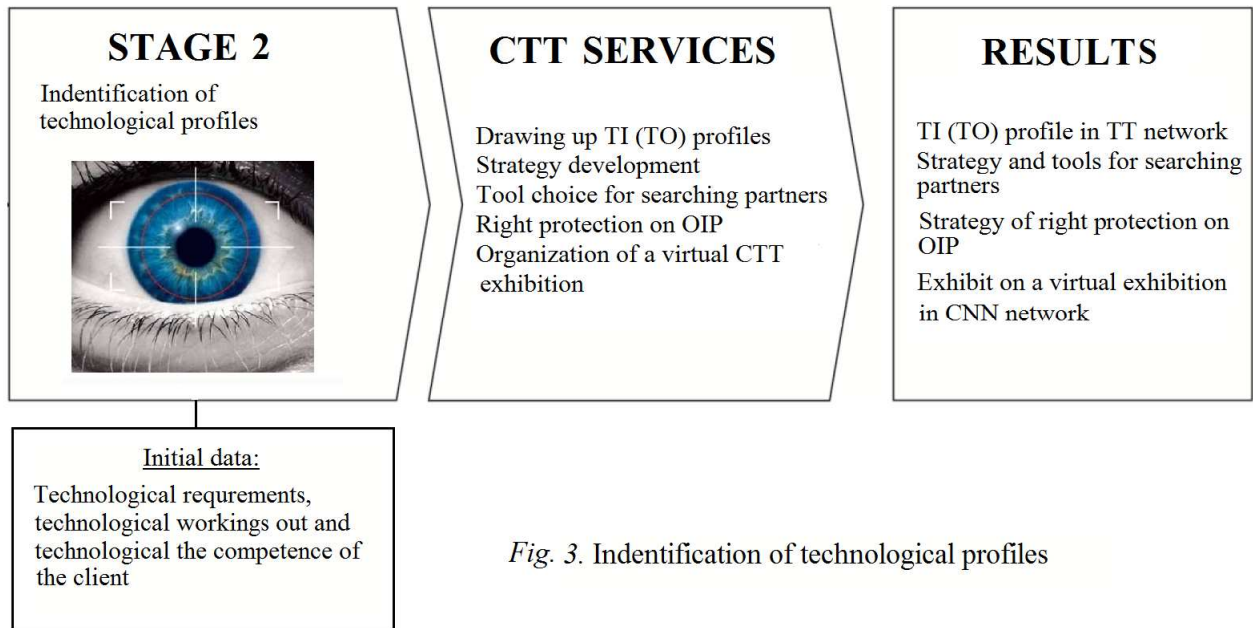


Fig. 3. Identification of technological profiles

*Technological profile - technological offer (TO) or technological inquiry (TI)* is a basic information object which is used in a business process to exchange technological information between network's members and clients.

*Technological offer* is a technology description which is offered to clients for sale, presented in a formalized format.

*Technological inquiry* is a description of clients' concrete technological requirements, presented in a formalized format.

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According to operational experience of RCCT network of the Republic of Belarus and foreign technology transfer networks, the probability of finding a partner with via network directly depends on the quality preparation of the corresponding profile.

Currently, the following classifiers and formats of technological profile representation are the most popular: international support network of an innovation activity and technology transfer UNIDO Exchange, American commercial technology transfer network yet2.com, European technology transfer network SMEs, European support network of enterprise EEN.

The information in TI (TO) database of CTT network is stored in a universal format, and can be printed in any format according to the user's desire.

<sup>1</sup> *There are two methods of classification in classifiers: hierarchical and facet. The choice between these two methods depends on the characteristics of a particular domain. There are the following requirements for the chosen classification system:*

- *sufficient capacity and necessary completeness which guarantee the coverage of all objects in the classification of certain limits;*
- *justified depth;*
- *ensuring the possibility of solving complex problems of different levels;*
- *possibility of expanding the set of classified objects and making necessary alterations to the classification structures;*
- *ensuring an interface possibility with other classifications of similar objects*
- *ensuring simplicity of a classifier's conduct.*

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Network members (CTT employees) together with clients prepare technological profiles. Network members have experience in TI (TO) preparation and clients have unique knowledge in their area or know the specificity of technological problems of their enterprises.

On the basis of technological profiles strategy generation and determination of partners search tools, rights protection strategy to intellectually property objects are carried out. Business plans are developed; preparation of information to be placed at the virtual exhibition RCTT is made.

Prepared and agreed with the client technological profiles are placed in CTT network, and if necessary, also in TT foreign networks, which is a member of CTT.

### The results of stage 2:

- TI (TO) profile in CTT network and TT foreign networks;
- strategy and concretized search tools of partners;
- protection strategy of rights on OIP;
- business plan;
- exhibit at a virtual exhibition in RCTT network.

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### Stage 3

*Technological profile* is a base for technology advancement to the market or a search of partners to receive technology, joint developments, find investors.

CTT carries out a search of partners in CTT network database and in foreign networks of technology transfer, as well as via virtual exhibition of CTT network, broker actions, CTT participation in exhibition pavilions, conferences, seminars, by means of direct mailing to potential partners and personal contacts.

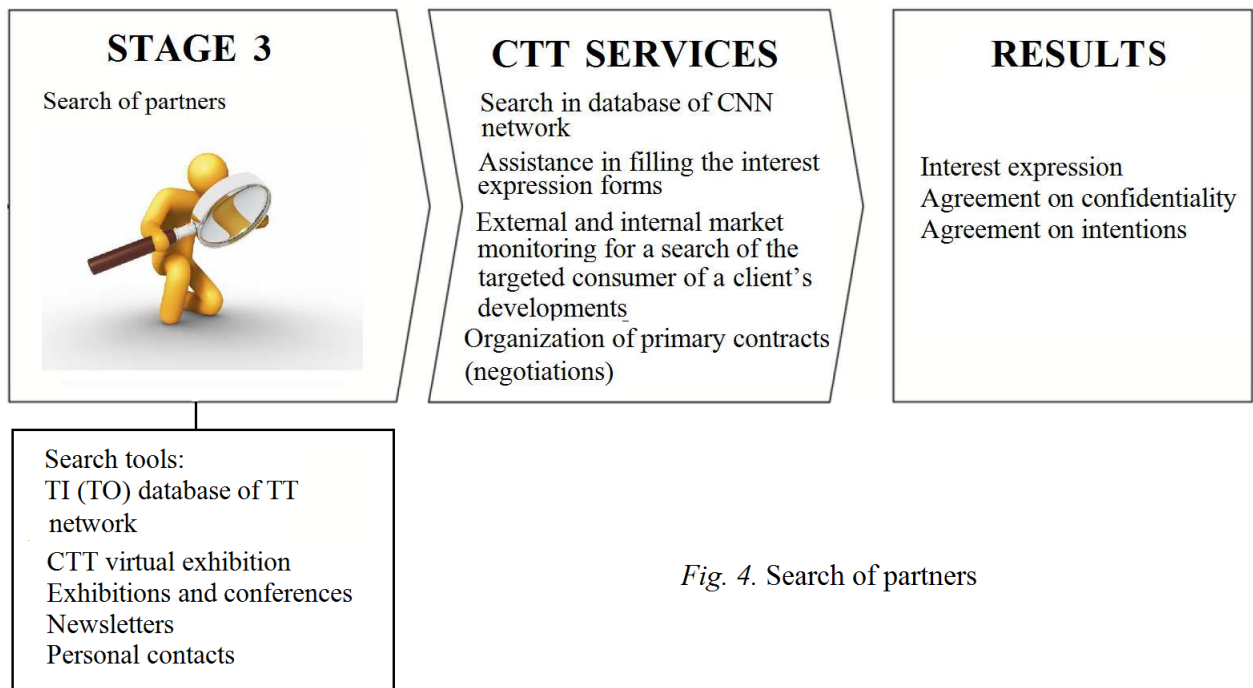


Fig. 4. Search of partners

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The effective tool of CTT network members to find partners for their clients is a monitoring system of internal and external markets that is used to search targeted consumers of a client's developments, interacting with an information supply subsystem of NAS exposure activity of Belarus on the basis of Republican Center for Technology Transfer (<http://icct.by>).

CTT organization of broker actions is an effective method to find partners; there are developers and consumers of a scientific and technical production. Only those organizations are involved in broker actions to which other members showed interests. Display of interest to profile is a key moment in establishing contacts among potential partners. The establishment of contacts among potential partners depends on how *the interest expression form* is filled in by a client, CTT specialists play a significant role in their filling in.

### The results of stage 3:

- filled interest expression form;
- agreement on confidentiality;
- agreement on intentions.

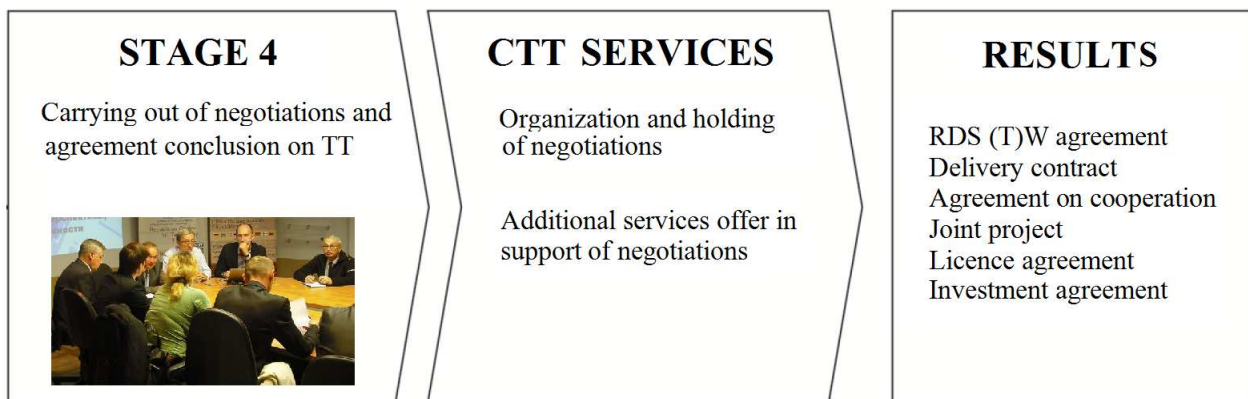
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## Stage 4

Technology transfer doesn't finish when a contact among partners is established via CTT network members. TT network plays an important role in support of the deal, especially in the international cooperation format, as potential partners can have great differences in language, law, mentality, etc.



*Fig. 5.* holding of negotiations and conclusion of a contract .

Many customers do not have experience in holding negotiations, concluding licensing agreement, royalty assignments, realization of international projects, preparation of investment contracts, etc. Therefore, in this stage RCTT network renders assistance to its clients in organizing and conducting negotiations, preparation of agreements (contracts), contracts, etc

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The results of stage 4:

- agreement on RDS(T)W;
- delivery contract;
- contract (agreement) on cooperation;
- joint (international) project;
- licensing agreement;
- investment contract.

It is necessary to take into consideration, that all the 4 stages should be undergone consistently without overlooking any stage.



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## Funding of project and commercialization developments

What is the project commercialization funding? It is a search of funding sources in various stages of an innovative cycle and companies' development.

Owned and attracted funds, funds of various budgetary levels and no budgetary funds, investors' funds that have different forms of ownership and, consequently, with different objectives in the process of commercialization projects, can be sources of financial means during scientific ideas transformation into development and competitive goods

Mechanism of involvement of national and foreign capital into promotion of research results and development in the real sector of economy consists of two stages

*The first stage involves:*

- state support of infrastructure creation of venture industry, economic and legal conditions to develop the system;
- ensuring of trust system in the political environment and liquidity of venture investments;
- creation of universities, academic and branch institutes on the basis of state scientific centers;

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- creation of centre for technology transfer, incubators to build and support small technological enterprises in the initial stage of their life.

*In the second stage accepted:*

- decision to withdraw the state from its earlier created funds (when the main elements of a national system of venture investment have the self-stable development regime).

In the initial stage, venture funds creation with a direct state participation is a key mechanism to attract private capital into a state venture industry.

Public funds reduce risk to private investors; function as a catalyst and an agitator in attracting private capital to the venture industry of the country.

Funds, received by the state as a result of a withdrawal from previously created venture capital funds in the second stage, are reinvested in the specialized "sowing" and start-up funds to finance commercial development stage in high-tech.

Funds used to finance specific developments and their implementation into production, the introduction of products and technologies into market facilitate an increase in capitalization level of invested enterprises and profit-making.

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During the expansion stage companies can rely on bank loans and direct investments. In this stage, companies enter stock market, undergo the procedure of initial public share offering, new strategic investors enter the company.

The European Bank for Reconstruction and Development (EBRD) provides loans to small businesses, including companies of technological spheres. The National Bank of the Republic of Belarus is the authorized representative of the Belarusian EBRD credit line to develop small and medium-sized businesses, at the same time co-funded by the International Cooperation and Development Fund.

Small and medium enterprises may be granted long-term loans, funds in the framework of micro-financing in commercial banks that have received status “member banks”.

However, the procedure of objects crediting selection is formalized and it has such high requirements on capital return, which do not allow companies in the stage “start-up” and later stages to take advantage of this source of funds. At best a credit may be given to a company that made a great deal of investments by itself or at the expense of state or regional programmes and innovative funds, and now it requires a credit to complete production release or services into the market.

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### Main conclusions

Thus, in all the stages of project commercialization, it is possible to count on funds of national research programmes of various levels, allocated on a competitive basis, and on no budgetary funds, on funds of national programmes, funds of investors of various forms of ownership - venture funds, direct investments.

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