

<u>Feasibility Study for Setting Up Science and Technology Park (STP) in</u> <u>Montenegro – SUMMARY</u>

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The strategic documents¹ which are relevant for the development of the Science and Technology Park (STP) in Montenegro as well as for the scientific work in general all contain three major points that mark the vision of the future development of Montenegro:

- 1. Priorities and vision for the future development of Montenegro are based on the fundamental principles of a sustainable development concept (harmonious balance between economic development, social and environmental protection needs),
- 2. Development should be based on knowledge, that is, science should play a key role in solving future development challenges,
- 3. It is necessary to bring scientific and research activities to a higher level, primarily through significantly increased financial support by the state.

Considering the above mentioned trends and development strategies of Montenegro, this Consortium consisting of five institutions with great experience in the region and in the development of STP, has carried out a "Study for setting up a Science and Technology Park in Montenegro" as a response to the following request made by the clients – Ministry of Science and Ministry of Information Society and Telecommunications:

- The Study needs to be a relevant document which will decisively guide the Government of Montenegro and relevant ministries to make the next strategic steps;
- The Study needs to give guidelines and define the cornerstones of the STP profile;
- The Study must include a guide for setting up STP, which will serve as a manual to assist local, regional and national decision makers; and
- The Study must rank the priority actions for appropriate future investment, international cooperation and other activities.

For the purpose of carrying out this Study, two main methods of gathering data have been used: desk research and field research.

The first method comprises the analysis of the statistic data and national strategies in different areas, as well as the method of benchmarking on regional and EU level, which were conducted through the analysis of the relevant strategic papers and previous studies elaborated by the Consortium members.

The field research was conducted during the months of August and beginning of September with the use of two different methods – questionnaires and interviews. Four different questionnaires were developed in order to **survey** the four main groups of stakeholders: representatives of the municipalities, consultants and experts from the industry, representatives of the higher education institutions, and government representatives. The **quantitative analysis** examined the following:

- STP MNE strategic positioning within (1) applied research, (2) private sector development, (3) country competitiveness,
- Existing applied and fundamental research status and implications to private sector,

¹ Primarily the Declaration on Montenegro as a ecological state, National strategy for sustainable development, Spatial plan of Montenegro, National programme for integration of Montenegro in the EU.

- Local and national support to higher education and private sector development,
- STP MNE registration, corporate governance, external boards,
- STP MNE services,
- STP MNE return on investment indicators,
- STP MNE facilities.

Considering that the Study needed to be carried out during summer/vacation time, the response to the survey was low, which did not allow for the conduction of all the planned methods of data analysis (the single analyses of all four groups and cross referencing of all three together). Only the groups of representatives of the higher education institutions and of the industry could have been analysed at the time when this summary was written. The missing responses are still being collected in order to finalise and subsequently submit the remaining analysis reports.

In the period determined for the development of the Study (from the 27th of July 2011 until the 9th of September 2011) the consulting team sent **questionnaires** to more than 160 institutions and conducted more than 100 semi-structured **interviews**. Considering the previously mentioned restrictions, the consulting team deviated slightly from the planned method and the recommendations made in this Study are primarily based on the data extracted from the analysis of the statistic data and of the national strategies as well as the method of benchmarking, by taking into consideration information gathered from the numerous interviews conducted on the field. Finally, recommendations were made considering:

- 1. social and human capital,
- 2. research capacity,
- 3. technological and innovative performance, and
- 4. absorption capacity in Montenegro.

The analysis of the Montenegrin economy was primarily based on the analysis of the sector of small and medium enterprises (SME), as well as on the situation in the area of higher education, science and research. Considering the economic and fiscal development of Montenegro, it must be pointed out that the country has made considerable improvements since its independence in 2006 and in 2009 and 2010 has positioned itself on the first place in South-East Europe (including Bulgaria and Romania) according to the Global Competitive Index (GCI), which is mostly due to the improvement of the business environment in Montenegro. However, the problem of the high labour costs, i.e. the faster growth of earnings than of the productivity on the one hand and the problem of incomplete structural and institutional reform on the other hand are still hindering the development of the country. Therefore, Montenegro today needs to focus on the improvement of higher education, the better exploitation of the existing technologies and on the development of research and its commercialisation. This will lead to the improvement of production processes and of the quality of products and services as well as of development based on innovations and knowledge.

The Montenegrin GDP growth rate (resulting from the high FDI inflow and revenues from tourism and banking sector) has been impressive, however, at the same time several problems have been identified. The increase of imports has not been followed by the respective increase of the exports. This is associated with the lack of diversification of the Montenegrin exports which are focused on only few main products (aluminium, steel, mineral fuels) and are thus vulnerable to the oscillations on the international markets. The problem is also caused by the low and constrained exporting capacity of Montenegrin SME. The latter is largely connected with the large number of still existing

problems in the area of general administration (starting a business, registration of property, gathering necessary permits etc.), but also with the lack of investment in innovation and research, and the lack of cooperation between the scientific community and industry.

The research shows that SME are one of the main contributors to the economic growth, the reduction of unemployment, increase of a country's competitiveness, substitution of imports and increase of exports, and are furthermore a source of innovation. It is however evident that the development of the SME sector in Montenegro is not at a satisfactory level. The percentage of SME in Montenegro according to the Statistical Yearbook form 2009 amounts to 48% which is considerably smaller than in the EU, where the percentage of SME in the total number of companies (according to EUROSTAT) is little less than 100%. Additionally, there is a huge regional disproportion in the distribution of the SME in Montenegro, since only 13% of SME are located in the north, whereas 40% are in the south and 47% in the central region. Reports show that the strategic goals for the development of the SME that have been set for the period of 2007-2010 have been fulfilled, however there is a lot of potential for improvement in the areas of advancing forms of the institutional support, strengthening of R&D, regulation of the statistical evidencing of SME trends etc. There is also still the need for adequate institutional infrastructure, better access to sources of financing, as well as for partnerships with the public sector. These needs are evident also in the new SME strategy which has identified the following goals:

- Improvement of the business environment,
- Strengthening of the financial support,
- Strengthening of the competitiveness of the SME and promotion of the entrepreneurship,
- Support to the start-ups.

It is clear that the development of the STP directly responds to the set goals and that it contributes (directly and indirectly) to the development of the SME sector, and by that to the general development of the Montenegrin economy.

The trend of the development of human resources in Montenegro also speaks in favour of the development of the STP in Montenegro. The data show a significant increase in the total number of master graduates in the period of 2004-2009, whereas the increase of graduates of doctoral studies has been relative and does not follow the positive trend over the last 5 years. Based on the available data, it is possible to assess the trend in scientific and research community in Montenegro and estimate that 180 graduates will obtain their PhD title in 2014, which is significant considering the development of the area of science and research in Montenegro. 80% of students enrolled in master programmes graduate from the University of Montenegro, which makes this institution the major generator for the development of the scientific and research community. It is clear that not all scientific staff can remain at the universities (the main institution for conducting basic research), but that there must be institutions which will allow these young scientists to direct their skills and knowledge in creating practical solutions for specific problems (alternative research, applied research etc.). This type of applied research is mostly done in the industry, but it is also done at the institutes or centres which aim at linking research centres with the business environment and industry.

There are different instruments that allow development of enterprises based on science and technology and that enhance cooperation between research centres and industry. Since the financing and the support to the applied research usually comes from specific programmes or institutions that aim at specific groups and topics, it is important to develop systems on the regional

and national level that will allow linking of the single initiatives in order to create sustainable links. In this way it is possible to avoid redundancies and assure optimal utilization of resources.

In order to better understand the area of application and of utilisation of innovation, as well as to gain insight into the potential strategies of creating optimal interfaces, different instruments will be defined which can be used for that purpose:

- Incubators are established for the high-tech sector at academic level with the purpose of
 producing sustainable increase in the number of innovative, technology-oriented spin-offs
 from the academic sector, but unlike the Competence Centres/Centres of Excellence they are
 not focused on specific technologies and fields.
- Business park is a coherent and self-contained area, which is developed and implemented by
 private investors and/or public organisations. It is subsequently sold or leased to commercial
 users and companies at a lower rate than usual. A typical mark for business parks is the
 common cost-effective or lower than cost-effective use of the infrastructure facilities offered
 there. In particular, business incubators are set up to offer young entrepreneurs temporary
 subsidised space, equipment and infrastructure.
- Technology Park is a relatively wide term used to describe various attempts to stimulate the
 development of entrepreneurship in knowledge-based small and medium-sized enterprises
 within one country. The main goal of the STP is to fill the lack of activities that support
 establishment and development of highly innovative new companies as well as to support
 the efforts of transferring knowledge from central research institutions to regional
 companies and further on to the market. Proper infrastructure and business oriented
 services for small and medium sized should help to establish a critical mass of innovative
 regional companies.
- Centres of excellence unlike the previously described three types of centres which are more focused on the commercialisation of research with a strong orientation towards business, these centres are more research oriented. They are set-up at the academic and industry level and aim at bridging the gap between the basic research carried out at the universities and industrial R&D, and at supporting joint science and industry research centres that are involved in the high-quality research.
- Impulse Centres constitute important nodes of instruments/network of the national innovation system. Their main objective is to ensure the position of the province as a leading knowledge, technology, industrial and export region. The Impulse Centres makes a major contribution in stimulating the general regional economic development and thus in job creation. Impulse Centres usually offer specialised infrastructure and services, as well as information system and access to thematic networks. These Centres enhance the regional and as well as the national attractiveness of the location for innovative company foundations and support sustainable economic development both in and outside the Centres.

Each of the presented instruments contributes to the development of research and innovation, however, it must be pointed out that innovation can not be observed as an isolated phenomenon, but as a process resulting from interactions and links. Innovative activities and interactions between single factors are under the strong influence of the environment; innovation is a result of the mutual complex interaction between them. It is important to note that the success in the area of innovation

depends on long-term relationships and close interactions between the innovation and external institutions and organisations.

It is therefore important to define and develop a **National Innovation System** (NIS) which will regulate the mentioned mutual action, and technology and information flow between people, enterprises and institutions as key factors of the innovation process. It is important to emphasise the following important actors of the NIS: political system, education and research system, intermediaries, industrial system.

Montenegro, just like the other West Balkan countries currently can not provide the needed infrastructure and support programmes neither to the education and research system nor to the industrial system. As a first step it is recommended to develop instruments for the support of the education and research system which is in the centre of the scientific and research system in general. Montenegro has not yet achieved a satisfactory level of development in the area of research and know-how that can be transferred and commercialised. For the purpose of support of the mentioned system it is also important to develop adequate legal frameworks and assure efficient protection of intellectual property. The research conducted in the elaboration of this Study led to the identification of three main facts that represent major problems in the process of development and support of the Montenegrin knowledge and innovation society:

- 1. There is no integrated innovation system at the national level,
- 2. There is no institutional solution for financing the basic and applied research at the national level,
- 3. There is no strategic approach to the scientific and innovation activities, i.e. no national strategy that gives precise direction for the development of innovation as well as the cooperation between science and industry.

Subsequently these problems have negative implications for the whole economy, specifically in the following areas:

- Human resources are not being optimally utilised for the country's economic development, because SME, which are the main carriers of the country's economic development, can not attract highly qualified work force, since highly qualified people usually prefer to work for large companies that offer better conditions,
- Difficulties in attracting experts from the Diaspora and motivating them to repatriate by giving them the opportunity to develop their innovative enterprises based on knowledge and technology,
- Exports are liable to the oscillations in the international markets due to the low level of diversification of the products, as well as to the low level of production and export capacities of the SME,
- Efficiency and development of high quality products,
- International exchange and better use of existing technology,
- Low level of development of new technology which must be increased through research and innovation,
- Awareness rising among the large community which is of major importance for the development of the knowledge based society,
- R&D infrastructure.

The establishment of an STP in Montenegro could naturally not completely solve all identified problems, since they require a larger action of the development of the whole national innovation system which would take care of the generation, dissemination and application of scientific and technological knowledge on a larger scale as well as the establishment of a systematic and on-going cooperation between science and industry. However, taking into consideration the situation in the country and the identified problems, this Study proposes the establishment of a specific form of the Science and Technology Park that will, with its instruments, address the above listed problems and will furthermore lead to the achievement of the following benefits:

- Increase of employment;
- More dynamic growth;
- Improvement of the existing business relationship among the Montenegrin companies and those from the region, as well as attracting new European companies in Montenegro;
- Increase foreign direct investments in Montenegro;
- Participation and development of international projects;
- Contribution to the internationalisation of Montenegro;
- Establishing new businesses, especially in the area of energy efficiency and green energy, that will contribute to the development of Montenegro as ecological state;
- Development of those regions of the country which have been neglected so far with regards to research and development;
- Reduction of inequality among different regions in Montenegro;
- Improvement of research capacities for increased competitiveness in the European Union;
- Increase of the country's competitiveness through improvement of the production processes and product quality;
- Initiation and development of small and medium sized companies in Montenegro which will subsequently develop into subcontractors of the large domestic and foreign companies within the range of the technology park.

Considering all the above mentioned data and trends, as well as the identified instruments that allow the development of the society based on knowledge and innovation, the consulting team proposes the following:

The STP in Montenegro should be built as a centre that will **incorporate the characteristics and instruments of three types of centres: technology park, business park and incubator**. As such the STP will have a central unit (based in Podgorica) which will be formally connected to two sub-units, i.e. impulse centres based in Bar (southern region) and Pljevlja (northern region), which is in alignment with the national strategy of regional development. It is important to particularly emphasise that regardless of the mixture of the characteristics and instruments of different types of centres, this STP will have an educational aspect and will preserve its focus on knowledge and technology.

Besides the above mentioned impulse centres, the development of additional impulse centres in the north (with focus on agriculture and livestock) as well as in the south (with focus on health and medicine technologies) with the particular regional character should be considered. One of the factors that will influence the decision on establishment of the new centres must also be the proactivity, i.e. the willingness of the local communities to offer material and non-material support to the establishment and development of these centres.

This recommendation is based on the fact that the inexistence of the NIS in Montenegro does not allow the development of the technology park in its typical form. The proposed structure of the STP will allow the creation of the optimal instrument for the development of the innovation based economy and will be the starting point for the development of the adequate national innovation system.

The following factors are defined by national framework and strategy requirements:

1. Strategic guidelines

As already pointed out, the STP shall be a first step in creating and implementing a National Innovation System in Montenegro. It shall thus include the characteristics of an incubator, a technology park and a business park. Considering its main role of fostering both academic and industrial R&D and building the basis for the interaction between the academic community and industry, this STP should be located within reach of the university. It should aim at specific technological subject areas of high relevance for Montenegro and it should initiate and improve R&D in different regions of Montenegro through the implementation of impulse centres in two strategic locations. This STP should be centrally coordinated and administered and it shall provide both infrastructure and a wide range of services to the institutions, primarily SME, located there. This STP should be the creative surrounding that will foster commercialisation of research and support technology oriented companies and it should continuously recruit new research capacities from the university and beyond.

2. Thematic focus

Based on the conducted research, this consulting team proposes that the STP should be focused on the following five topics:

- Energy efficiency and green energy The national R&D strategy explicitly points out to the
 need for research especially in the area of energy. It is stated there that research should be
 directed in the area of energy potential, renewable energy typical for Montenegro, as well as
 energy efficiency bearing in mind that in this field Montenegro occupies one of the last
 positions in Europe.
- Agriculture, food processing and livestock This area is of extreme importance for the general development of Montenegro considering that the food production makes up one fifth of the Montenegrin GDP and that this sector covers 37% of the national territory. Regardless of the high level of competition in the international market (mostly due to large subventions in this sector), Montenegro has a great potential especially in the area of production of organic food. Development of this thematic focus within a STP would allow small producers to extend and legalise their production and to establish themselves as SME. Financial, administrative and legal support that is offered to them within a STP would allow them to grow and develop.

There are already two institutes in Montenegro which focus on R&D in the area of agriculture and food technology (in Podgorica and Bar) which offer a good foundation for further research in this area as well as the commercialisation of the results. Besides these two, the Institute of Marine Biology in Kotor could be directly and actively involved in the support of development of the agriculture and food processing sector through the support of the development of fishery and indirectly by creating and preserving favourable conditions for the development of this activity.

The central unit in Podgorica should, in accordance with the local possibilities primarily focus on agricultural and food processing technologies as well as livestock, whereas the focus of the impulse centre in Bar should be on the development of research and innovation in the areas of subtropical cultures. A further possibility would be the establishment of an additional impulse centre in the north that would focus on the agricultural and food processing technologies and livestock, and would therefore contribute to the exploitation of the natural resources in the north, as well as to its economic development.

- <u>Information and communication technologies (ICT)</u> This sector, as one of the strategic priorities is present in all strategy papers, and is of major importance for the economic development of Montenegro and for the development of the country as society based on information and knowledge. The ICT sector has an overreaching influence on the national economy and global competitiveness since it supports all other sectors of the economy.
- Health and medical technologies The health policy in Montenegro until 2020 has defined the general goals of health policy, specifically: prolongation of the life expectancy, improvement of the quality of life concerning health, as well as insurance against the financial risk. Additionally, now-a-days the use of the modern technologies offers indispensable support to tourism. The Montenegrin tradition in this field provides a good basis for the development and further extension of modern technologies. Development of these technologies in the area of bio-medicine and health are today supported by many STP around Europe and in the world. The health sector is part of the social system whose structure, organisation, goals and functioning are determined by the political and economic structure of the country, as well as by its economic potential, the medical condition of the nation, medical problems, traditions, culture and many other factors. On the other hand modern health and medical care are becoming more sophisticated which allows for the application of a multidisciplinary approach of a group of experts of different profiles (e.g. medical aesthetics and surgery that use technologies such as CAD design and Rapid Prototyping, the general inclusion of IT engineers in almost all units of the medical care).

The developments in these first four thematic fields directly contribute to the development of tourism as well, which is one of the major sectors in Montenegro.

- Wood processing Montenegro has a lot of potential in the area of wood processing which is not being sufficiently used at the moment. For the purpose of the development of the Montenegrin economy, the available natural resources must be used efficiently in order to increase employment and improve the country's economic performance. The main goal which is being followed with the selection of this thematic focus is the development of the SME in the northern region and thus support of the decentralised regional development of Montenegro, which is one of the country's strategic goals.
- Technical culture unit for children For the purpose of educating even more technical staff and to encourage children to develop interest in science, technology and innovation, one of the most effective initiatives seems to be the creation of centres that offer young people interested in technology the opportunity to gain practical knowledge within extracurricular activities. These centres should be established as part of the STP in several locations in Montenegro. In the first stage it would be good to establish three centres of this kind in the north, in the central region and on the coast.

The main mission of these centres should be to allow children access to practical knowledge from the areas of electronics, robotics, informatics, architecture, modelling, and which will encourage them to become curious and creative individuals who are interested in scientific work and research.

3. Regional focus and form

The central unit will be based in Podgorica with two satellite units, i.e. impulse centres in the southern (Bar) and northern (Pljevlja) region. Podgorica has been selected as the strategic location for the central unit especially because of the proximity to the University of Montenegro where the greatest portion of the Montenegrin R&D is located. Considering the type of research activities that are being conducted in Podgorica it is evident that the first four thematic areas should be located there: energy, agriculture, food processing and livestock, ICT, and health and medical technologies. The impulse centre focusing on agriculture and food technology (subtropical culture) and on ICT should be based in Bar whereas the second impulse centre with the focus on wood processing should be situated in Pljevlja. As already mentioned, the technical culture unit for children should be established in all three centres in order to attract as many children as possible.

The STP will be organised in such a way that it will incorporate characteristics of all three kinds of centres (technology park, business park and incubator) and it will be equally concentrated on both research and the business aspect. The impulse centres in Bar and Pljevlja, will primarily be business parks, but will have the characteristics of a technology park as well, meaning that they will primarily focus on the aspect of entrepreneurship and will then focus on innovation and research.

It is the opinion of the consulting team that this impulse centre should be linked with the services and capacities of the already existing Business Start-up Centre in Bar in order to create and use synergies. The inclusion of the instruments of the incubator and the business park within the STP will create a "critical mass" that will allow for the development of an adequate innovation and business climate. In order to avoid the cannibalism effect in the still hardly existent innovation and technology field in Montenegro, we would strongly recommend the transfer of the already existing business incubator "Inventivnost" from Podgorica in the new STP and to integrate it in the STP's structure.

The consulting team focused on the presented thematic fields and regional focuses based on the results of the conducted research. We would, however, like to emphasise that we expect the thematic areas and especially regional focuses to develop and expand in the future.

4. Services

Just like the typical technology park this STP will provide services and infrastructure, as well as the necessary know-how resulting from the cooperation between the higher education institutions and the industry. Services will be offered on two levels – by the central unit in Podgorica and by the impulse centres themselves. The central unit will offer the following services that will be at disposal to *all* regions and not only to Podgorica:

- Consulting / Coaching / Training in the area of High-Tech / Technology / R&D
- Consulting / Support in the area of Financing / Funding
- Legal Department
- Marketing & Networking
- Administration & IT support
- Technology Audit

Technology Transfer

The impulse centres will offer the following two types of services:

- Consulting / Coaching / Training in the area of individual and specific topics
- Consulting / Support in the area of Financing / Funding

Regarding the **location of the STP** this team proposes that the central unit in Podgorica should be built as a new building and should be located near the University of Montenegro. The new building would not only allow the advantage of choosing the optimal location, it would also give a visual impulse, which would mean a new step in the process of establishment of the national innovation system in Montenegro and of the knowledge based economy.

The impulse centre in Bar should be built in the business (duty) free zone with the purpose of attracting international companies.

The cost estimation for the establishment of the STP is based on the suggested organisational structure of the STP as well as the services that it should offer. The proposed estimation is made based on the experience of our Consortium in the SEE region and the EU, as well as on the examination of prices in Montenegro²:

- Infrastructural costs: 6.800.000 € (non-recurring)
- Equipment costs: 4.700.000 € (non-recurring)
- Operational costs:
 - o Staff of the centres: 102.000 € 144.500 € (annually)
 - Support to spin-offs and SME: 170.000€ 230.000 € (annually)

The stated costs refer to the first phase of the establishment of the STP. After it is fully operational, it should be possible to cover part of the costs from the proper revenues. Similar centres in the world cover approximately 50% of their operational costs from their revenues, and it is necessary to take this fact into consideration when making mid-term and long-term plans. Based on experience and on the conducted research it is logical to assume that the initial investment for the establishment of the STP can be ensured from different sources, and not merely from the government's resources (e.g. resources of the municipalities, established public-private partnerships).

This consulting team assumes that the central unit situated in Podgorica will be built as a new building from the government funds, whereas the impulse centres will be located in the already existing facilities or be built with the use of the funds from the local communities and public-private partnerships. This will considerably reduce governmental costs in the implementation of this project, which are presented in the previous part of the text as a sum, regardless of the financing sources.

<u>Suggested legal form</u> of the STP should ideally be a **Foundation**, based on the following three reasons:

• Foundations have a non-profit character and in case that their activities would bring some kind of profit in the future, they would not be seen as competitors to other profit oriented

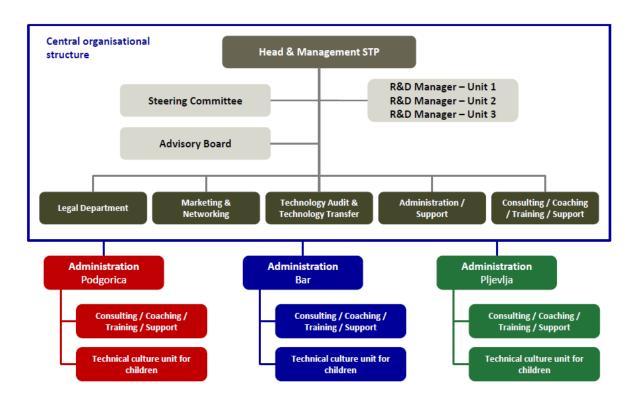
² A detailed illustration of the costs including a throrough explanation is presented in the Study itself.

companies, which brings certain advantages and enables better ways of cooperation with the stakeholders,

- Foundations allow the establishment of public-private partnerships,
- Foundations allow participation in EU tenders and other tenders and calls for proposals.

Considering that at the moment there is no legal form "Foundation" in Montenegro, as an alternative legal form we suggest would be the *limited liability company* (d.o.o.), *in case* the legislative framework stays the same at the moment of establishing of the STP. We consider, however, that a motion should be made for the establishment of the legal form "Foundation" in the legislative framework.

<u>The organisational structure</u> is basically divided into a central organisational structure for the whole STP and the attached peripheral organisational structure for each individual centre, as demonstrated in the figure below.



Action plan and time-line

In order to conduct the detailed planning and establishment of the STP, it is necessary to make a business plan which should consist of the following three points:

- Elaboration of a detailed strategic concept;
- Development of a suitable framework concept;
- Execution of a detailed cost calculation and financial plan.

The development of the business plan should take six months, after which period the implementation and the architectonic planning starts with the duration of 18 months. After this the building-up of infrastructure and organisational structure should be conducted within a year, after which the STP should start with its work.

Generally we estimate that after about three years of planning and implementation, the STP could start with its work.

Basic potential risks at national level

- No systematic development of the national innovation system, especially with regards to the inadequate capacity and institution building, lack of legislative framework, lack of financial support scheme,
- No human resource development scheme,
- No further development of the basic research,
- No improvements in the area of legislation and regulation for intellectual property rights,
- No interest in research and technological development from the industry and the SME.