
Innovation Services Structure for Science Technology Parks (STPs) – forging regional improvement mechanisms for companies, university and R&D centers and government partnership

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Abstract: This article presents the research results from a Doctorate thesis under development regarding to the Science and Technology Parks (STPs) as innovation habitats inserted in local/regional policies. The study proposes an Innovation Service Structure Model for STPs focusing local/regional development, by creating tools applied to the main STP's stakeholders needs, specially small and medium-sized enterprises (SMEs), aiming to enhance their results, and strong/continuing partnership between Companies, Universities and R&D&I Centers and government agents (ternary models). The methodology used in this research is: exploratory studies, complemented by a critical-collaborative action-research, best practices analysis and model development and validation. To support the development of the proposed STP Model five specific aspects were chosen: KNOWLEDGE SERVICES; BUSINESS DEVELOPMENT SERVICES; ON-SITE COMMON SERVICES; AREA EXPANSION; OVERALL IMAGE (visibility). For this study, the researchers had the collaboration of STP experiences and projects in Spain, Italy, Portugal, Germany, United Kingdom, China, Brazil, Turkey and Uruguay.

Keywords: technology park – science park - knowledge services - innovation services – business managements - SME – innovation – R&D – regional development – technology partnership.

The Science and Technology Parks (STP) movement is now over 40 years; the first one was created in the United States of America (USA) in the 1950's. Since then, the movement grew in USA and advanced to others world regions: Europe and Japan (70's and 80's); Asia-Pacific (80's and 90's); and in the rest of the world (00's).

In 2002, the International Association of Science Parks (IASP) defined a Science Park as “an organisation managed by specialised professionals, whose main aim is to increase the wealth of its community by promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions. To enable these goals to be met, a Science Park stimulates and manages the flow of knowledge and technology amongst universities, R&D institutions, companies and markets; it facilitates the creation and growth of innovation-based companies through incubation and spin-off processes; and provides other value-added services together with high quality space and facilities”. Other associations like Association of University Research Parks (AURP) and United Kingdom Science Park Association (UKSPA) also have their own definition for STP.

The definition may change over time, as KIRK and CATTIS (2004) stated: “the model continues to evolve as a physical and organizational entity and as a hearth for technology-based economic development and nexus for business formation and entrepreneurial support programs.”

It's known that the role (or functions) of Science Parks presents a challenge because no two are alike. The STP models are, in our days, a complex interaction of multiple factors of value that give its capacity to act as a unique economic development tool.

In these models, the main factors are: governance and management, knowledge creation (stronger links to universities, research institutes, public and private – formal and informal links), value added services, quality spaces (suitable environment for companies' attraction), companies' creation (start-ups, spin-offs, from universities or independent inventors, or from other companies, as their R&D results), territorial influence (in regional development public policies), and networking.

Each STP defines its goals and the way to achieve them, taking into consideration stakeholders, local/regional economy, social/environmental sustainability, and balance of power among others. There is one goal that all STPs have in common: to attract and cluster together new and established tech-based companies and to enhance local/regional economic base.

This article presents the research results from a Doctorate thesis under development. The study proposes an Innovation Service Structure Model for STP focusing local/regional development, by creating tools applied to main stakeholders needs, specially small and medium-sized enterprises (SMEs), aiming to enhance results, and strong/continuing partnership between Companies, University and R&D&I Centers.

As academic studies available about this specific subject are limited, the methodology used is: exploratory studies, complemented by a critical-collaborative action-research (THIOLLENT), best practices analysis and model development and validation.

The exploratory studies were done through the following actions: bibliographic search (knowledge society, knowledge economy, clusters development and innovation systems); identification and bibliographic research on STP associations information systems, with the objective of gathering experience and information on STPs in the context of knowledge society; bibliographic search to assess the international concepts related to STPs and other innovation habitats; bibliographic search about 72 (seventy two) STPs across the world, to identify and collect the following information: creation date, country, name, address, contacts, real estate information, social, economic, politic and cultural

environment, governance and management system, supporting legislation, financial aspects and investment incentives, marketing and communication, external visibility, regular services, knowledge and innovation services for company, results, and impact evaluation.

From these exploratory studies, aspects were selected as a tool to be applied throughout the research. Furthermore, to support the development of STPs Innovation Services Model five specific aspects were chosen: KNOWLEDGE SERVICES- Knowledge Access; Knowledge Dissemination and Sharing; Intellectual Property and Technology Commercialization; and Technology Development; BUSINESS DEVELOPMENT SERVICES - Business Plan and Investment Proposals; Business Management Improvement; PROVISION OF ON-SITE COMMON SERVICES – Common Services; Common Services and infra-structure accessibility; and common services usage; AVAILABILITY FOR AREA EXPANSION - area for building construction; future building construction projects; OVERALL IMAGE (visibility) OF THE SITE - Site and environment characteristics; Partnership characteristics; Prestige.

To support the research a questionnaire, based on the five aspects above, was elaborated in two languages: Portuguese and English. It was validated by three researchers, two from Brazilian universities (University of Sao Paulo and Catholic University of Sao Paulo, both in Sao Paulo city) and one from an United Kingdom university (Edinburgh University School of Management & Economics, in Edinburgh City), and was e-mailed to STP managers.

The questionnaire, composed by 38 closed issues and 22 open questions, has been sent by e-mail to 454 STP registered members of the IASP (International Association of Science Parks). The measurement scale used in the questionnaire was a five points LIKERT scale, where each respondent could indicate their level of agreement or disagreement for each closed issue.

Several STPs filled out the questionnaire, from different countries, namely: Spain, Italy, Portugal, Germany, United Kingdom, China, Brazil, Turkey and Uruguay.

The filled-out questionnaires were analyzed, and four European STPs were directly interviewed in 2007, to exchange ideas and experiences that could add value to the research document and doctoral thesis in preparation to be defended in December 2008.

All collected information contributed to the proposal of the Innovation Service Structure Model for STP, focus on the SME, with the support of Universities and R&D Centers, targeting the regional economic performance improvement.

Results, analysis and discussion

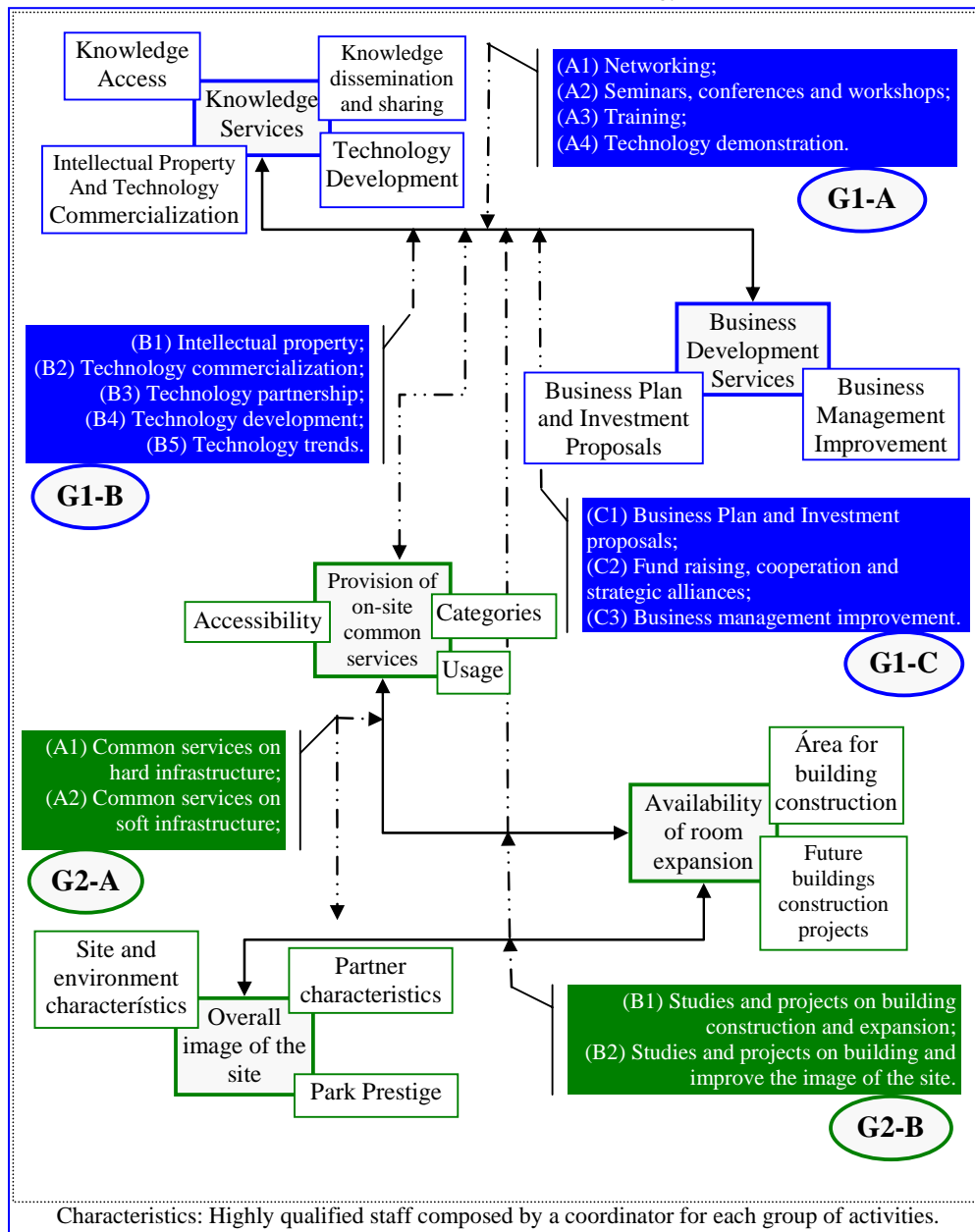
The research results are presented into four types: closed questions answers; open questions answers; STP's characterization; and personal observations, resulted from the researchers interaction with the visited STP's staff.

The search results analysis were separated into three parts: analysis and discussion of the questionnaire - questions results; analysis and discussion of the *in situ* observations results; identification and analysis of STP's best practices.

It's interesting to note that the results obtained in this study were corroborated by the findings of the recent general survey conducted by IASP (General Survey, 2006-2007 - Facts and Figures of Science and Technology Parks in the World), especially those related to services provided by STPs to companies.

The analysis and discussion of the search results brought to the researchers a perception that the aspects analyzed contribute to the development of the service structure model for STPs, object of this research that can be seen in figure 1.

Figure 1 Innovation Services Structure Model for Science Technology Parks



The best practices of STPs identified and analysed in this research are associated with the model proposed [1] and presented in table 2.

Table 2 Best practices identified and Group to the Innovation Services Structure Model for Science Technology Parks (see Figure 1)

<i>Best practices identified</i>	<i>Group</i>
<p>ERA MORE (European Network of Mobility Centres) – Gives assistance to mobile researchers by providing information and services related to entry, residence and work procedures in the country. (AREA Science Park).</p> <p>The ERA-MORE (European Network of Mobility Centres) project is the product of a joint initiative between the European Commission and the countries participating in the 6th EU Research Framework Programme. The network is made up of about 200 Mobility Centres across Europe. The initiative is designed to offer assistance to mobile researchers and to encourage the exchange of information and good practices in mobility management among those running the system.</p>	(G1-A1)
<p>HiCo Project (High Tech Integrated Cooperation) - The project is dedicate to the development of the border area of Friuli Venezia Giulia/Slovênia, aiming at the creation of industrial cluster and cognitive districts. The primary project purpose of HiCo is to harmonize and coordinate local policies, developing a competitive system of innovation-oriented industries, attracting investments on research, business technology intensive and innovation targeted services. (Área Science Park).</p> <p>The project is promoted and coordinated by AREA in collaboration with the regional and economic development bodies SVILUPPO ITALIA FVG and EZIT Trieste.</p> <p>HiCo’s objectives are to: enhance skills and expertise within the technological, scientific and productive systems of the cross-border area; promote the setting up of scientific and industrial partnerships; implement and field test cross-border structures for technological start-up activities and innovation funding orientation; pool methodology, services and promotional structures for attracting investment from industry.</p>	(G1-A1)
<p>The International Congress and Exhibition Centre of Madeira Tecnopolo – ICEC is located in Madeira Tecnopolo and devoted to organizing seminars and conferences - the working team is formed by four managers of events, two administrative officers and three officers working in maintenance services (Madeira Tecnopolo).</p> <p>The Exhibition Centre provides 5,000 square meters of exhibition area, distributed between two contiguous and complementary pavilions allowing the building of, up to 300 modules of 9 square meters. Electricity connections, water, drains, telecommunication, internet, etc, are easily coupled thanks to huge technical galleries situated under the pavilions. There are also eleven rooms and auditoriums of the Congresses Centre. The use of movable walls installed in every room gives mobility to the whole Centre.</p>	(G1-A2)
<p>Integration Meeting of Information & Communication Technology (ICT) Businesses – Is an annual event, organized and promoted by the Technology Management Agency and the Brazilian Association of Software and Information Services, where the SMEs working on ICT, could expose, without costs, their products and services to the ICT community and interested public.(TECNOPUC)</p>	(G1-A2)
<p>D4 Project –Dedicated to the human resources improvement on technological research and development, the project aims to strengthen the regional level, improving the relations between: businesses, universities, agencies and research centers; promoting the continuous exchange of knowledge and skills (AREA</p>	(G1-A3)

<p>Science Park).</p> <p>The D4 Project is a long-term scheme promoted and funded by the Central Office for Work, Training, Universities and Research in the Autonomous Region of Friuli Venezia Giulia. AREA Science Park is leader of the group of bodies and businesses running the project.</p> <p>The D4 project's objective is to consolidate at regional level the partnership between businesses, universities and research centres, promoting the continuous exchange of skills and competences, the mobility of ideas and researchers, the joint, synergetic devising and implementation of innovative research projects, and technology development and transfer.</p>	
<p>Innovation Campus – Among others, is a laboratory for modeling new professional profiles. The first one create is the Technology Broker, a specialist on technology transfer and innovation. The training high-level was made on the job, thanks to a didactic approach based on learning by doing and role playing. (Area Science Park).</p> <p>The project is managed by AREA Science Park in partnership with Milan MIP-Politecnico (Technology Institute specialized in Management and Industrial Engineering), which has provided its experience, gained through its Technology Transfer Office (TTO).</p> <p>“Innovation Campus” is an initiative with the objective of offering continuous training and a meeting and support workshop for national and international operators and agencies in the sector. It provides higher education courses, specialist studies, shadowing and consultancy on technology transfer themes and projects.</p>	(G1-A3)
<p>Innovation Network - The project aims to disseminate to the region businesses the opportunity to acquire innovation, knowledge and new technologies (AREA Science Park).</p> <p>Innovation Network is supported by the Friuli Venezia Giulia Region that has established within the region a structure of services to businesses, dedicated to transferring to them the expertise and technology found in the world of research and to stimulating the setting up of innovation projects.</p> <p>The network structure is built around Competence Centres active in areas of common interest, such as the environment, energy and productivity efficiency, or specializing in the typical productive sectors of the Friuli Venezia Giulia region, such as wood and furnishings, agro-industry and ship-building and pleasure boating.</p> <p>Every link of the innovation network provides the businesses involved with expertise, specific skills and services which are necessary for developing innovation in products, processes and management.</p>	(G1-B)
<p>Innovation factory - The Innovation Factory project was established to support and assist the creation of new and innovative businesses. The project aims to research groups and researchers who wish to implement their own projects spin-offs, and entrepreneurs interested in taking part in the creation of new businesses based on research carried out in collaboration with research institutions of the park. (Area Science Park)</p> <p>Innovation Factory offers business incubator services with specially equipped units, help in assessing the enterprise concept from technological, commercial, legal and economic standpoints, plus financial support with the possibility of funding in the form of seed capital.</p>	(G1-C)
<p>SISTER – Liaison Office – The project was developed by experts from AREA in 2001 and aims to exploit the results of research from the Universities of the region - offers a wide selection of services for the transfer of technologies, such as: assessment of the technological potential of an idea, the applicability innovation, market analysis, protection of intellectual property and support for the creation of</p>	(G1-B)

new businesses (AREA Science Park).

Sister – Liaison Office is dedicated to enhancing research in the Friuli Venezia Giulia region; and has devised and tested a new enhancement process which represents the effective way of organizing the procedures and services required to transfer research findings onto the market.

One of the activities promoted by Sister – Liaison Office has been the drawing up of a map of the competences existing in regional research institutions which are applicable to industry, with the aim of encouraging technology transfer to businesses.

Innovation Relay Centre Network (IRC) - IRC Anatólia (Cyberpark) - IRC Ceseand - IRC Irene (AREA Science Park) – offers contact services with partners; identification of partners technology needs; looking for European partners; support the establishment of the partnership; assistance in negotiating the partnership contract; services related to intellectual property and patents. (G1-B)

The first IRCs were established in 1995 with the support of the European Commission, as members of an integrated pan-European platform to stimulate Transnational Technology Transfer (TTT) and promote innovation services. Today, more than 70 IRCs cover a wider geographical area than any other technology transfer network in the world. Their success in stimulating transnational technology transfer-based on brand recognition, close links with enterprises and universities, and the effectiveness of the tools and procedures developed by the network- is unique. These IRCs are connected by an intranet which allows rapid diffusion of technology profiles across Europe, from a searchable database.

IRC staff (a total of nearly 1,000) are experienced specialists with backgrounds in business, industry and research. Most IRCs are operated by a consortium of qualified regional organisations such as Chambers of Commerce, Regional Development Agencies and university Technology Centres. Altogether, almost 220 partner organisations are involved, ensuring wide geographic coverage. At regional level, IRCs do assist to entrepreneurs by offering a single point of access to the entire range of expert support they need—both that supplied by their own staff and systems, and through links to other regional and European resources.

PatLib (Patent Library) is a network of centres throughout Europe providing information on patents. It was established to promote and encourage the use of patents, and was aimed at researchers, industrial operators and anyone else who might benefit from increased access to technical and scientific information. (G1-B1)

The **Ufficio Studi e PatLib** was established as the result of an initiative by AREA Science Park that, having acquired extensive experience in patent documentation, increased the information base and widened the scope of the service. The number of sources available is vast and can be tailored to specific needs. Integration with the other structures also increases modularity and synergy between the various opportunities and services available.

A wide and flexible range of information, providing answers to diverse questions, can be obtained from the patents: from prior-case assessment to the identification of innovative technologies, from the search for partnership opportunities to competition monitoring, from the prediction of development trends in individual sectors to the control of the potential use of technical solutions protected by expired patents.

International Technology Incubators programme (ITI) – aims to promote and manage the group of high-tech SMEs that want to establish innovative Italian business abroad. ITI promotes the internationalization of Italian companies towards a convergence of economic and industrial growth with the development of a knowledge intensive business through: enhancement of skills and knowledge of science and productive Italian systems; promoting the creation of technical and (G1-B3)

<p>industrial partnerships; sharing methodologies, services and facilities (AREA Science Park).</p> <p>The ITI project aims at offering advanced professional services by means of the outsourcing system provided by local professionals and local companies, such as: availability of appropriate areas to host companies and R&D labs; legal representation and support; management consultancy; marketing intermediation; financial intermediation; networks with Universities and research centres; training; and ancillary services.</p>	
<p>Sector studies realized by STPs – Studies of technology trends in sectors of interest like: food and mechanic sectors (PTA); food products, environmental and wood(AREA Science Park).</p>	(G1-B5)
<p>Support Management Services (SAGE) - Support services offered to SMEs to establish and develop the manage business procedures. The SAGE was developed from a research project escalated to CNPq which provides a team of scholarships (five) to support the actions of institutional incubator RAIAR and businesses installed; two scholarships develop the Business Plan, the Strategic Planning and Plan Marketing firms who are installed in RAIAR, also, accompanying the growth of enterprises, preparing statistical reports and do the maintenance of data (Incubator RAIAR of TECNOPUC).</p>	(G1-C)
<p>Idea to business – I2b – regular meetings, public sector financing, promoting and development of special programmes (Technologiepark Bremen)</p>	(G1-C)
<p>Advisory services in marketing, competitiveness, stock monitoring, financial tools and management (Parco Tecnológico Padano)</p>	(G1-C3)
<p>Business Innovation Centres (BIC) – specialized centres of expertise in various areas related to business management; EBN – European network that bring together the BICs and other organizations; NBIA – association specialized in entrepreneurship and business incubation (Madeira Tecnopolo).</p>	(G1-C3)
<p>Virtual Show Room – The AREA Science Park Virtual Reality is a virtual space for exhibitions (Show Room), it is a system of simulation, modeling and projection of graphical images, that area of exhibition represents a simple and effective way to show the territory and configuration of the logistics park Scientific Technological as well as scientific experiments and games virtual controlled remotely. The Show Room will be divided into four parts: virtual theatre, virtual tour, scientific experiments and interactive games (AREA Science Park).</p>	(G2-B2)
<p>FIRM Project (<i>Formazione per gli Imprenditori Regionali e i Manager</i> - Training for Owners and Managers in the Region) is an integrated programme of services providing information, guidance, assistance and training for owners, managers and project leaders of Micro, Small and Medium Enterprises in the area, with the aim of promoting an enterprise culture, which is the key to economic and social growth. (AREA Science Park)</p> <p>The programme is co-coordinated by AREA Science Park and involves a large number of partners. Its purpose, drawing on a network of helpdesks, is to reach the widest target audience across the Region. Thus, owners and managers of businesses in the Region will be guided on a learning curve starting with an analysis of needs and skills, leading on to classroom training and, finally, to individual support.</p>	(G1-A3 e G1-C)
<p>Imprenderò Project is managed by a consortium of 19 partners, promoted and funded by the Autonomous Region of Friuli Venezia Giulia through the European Social Fund. The project sets out to disseminate and promote the enterprise culture, enhancing it as an indispensable element for collective social and economic development. Imprenderò is aimed at researchers, doctorate students and graduates interested in setting up a business or at collaborators and employees of businesses</p>	(G1-C e G1-A)

interested in furthering spin-offs (AREA Science Park).

In this project, AREA Science Park: carries out individual consultations providing information, orientation and a skills audit aimed at setting up business; assists in the development phase of the business plan and its implementation, by providing advice and support; and creates an integrated system of seminars providing information and training on the principal topics relating to spin-offs.

Talent Scout project promotes the participation of SMEs involved in biotechnology and in the complementary sectors, in the Integrated Projects (IPs) and the Networks of Excellence (NoEs) funded by the European Commission. The aim of the project is to integrate European business clusters and leading research centres in Europe with innovative small and medium sized enterprises within the Life Sciences sector (AREA Science Park). (G1-B)

Talent Scout uses a wide network of scientific institutes, innovation centres and research enhancement bodies from different European countries (including Europe's two main Innovation Relay Centres – Germany's Zenith and Greece's Help Forward).

The SMEs and research structures in the Talent Scout project come under two categories: "R&D Performers" (those involved in research, and product and service development); and "End Users" (biochemical, clinical and environmental analysis centres, equipment and raw materials suppliers, clinical engineering services, veterinary, alimentary and environmental diagnostics services ...).

Scouting project has been developed to offer new innovation opportunities to companies belonging to the Trieste Manufacturers' Association, an AREA partner for developing innovation. The initiative aims to strengthen competitiveness in companies stimulating new projects based on ideas that have not yet been put into practice. In particular it supports the initial, and most critical, stages of each project by fostering the transfer of technology, and providing specialist assistance and financial support. (AREA Science Park) (G1-B e G1-C)

The project supports the development of innovation plans concerning products, processes and management. AREA makes its know-how and resources available to companies whereas the Trieste Chamber of Commerce provides the necessary funds.

They pool their resources to offer the following services for free: assessing the need for innovation, defining potential strategies, collecting patent and document information, identifying the most appropriate technical-scientific skills, drafting project plans.

Support Project – this project, funded by the EU's Leonardo da Vinci programme, aim the creation, checking and diffusion of training programmes and instruments aimed at encouraging the introduction into small and medium-sized enterprises of methodology and tools which can further the adoption of innovative and ecologically sustainable strategies. (G1-A e G1-C)

The AREA Science Park role within the projects is that of defining the structure and lay-out of training materials created under the project.

Novimpresa Project was conceived to promote the diffusion of innovation to Friuli Venezia Giulia's small and medium-sized enterprises. The project resulted from the need to make accessible to businesses in Friuli-Venezia Giulia the heritage of know-how and skills developed in areas around the two universities, the scientific Centres of Excellence and AREA Science Park. AREA Science Park offer highly skilled support to local entrepreneurs and help them develop innovative products, processes and management. (AREA Science Park) (G1-B)

The Novimpresa project work programme concentrates on initiatives following the basic strategic lines: intensive action in the region through "door to door" surveys;

strengthening collaboration with research bodies and institutions in order to develop a competence network in the Friuli Venezia Giulia region; transferring skills and expertise from various sectors and contexts; developing collaboration between businesses with shared innovation needs.

Novaregio is an international project which aims to make Friuli Venezia Giulia one of Europe's Innovative Regions. Through a comparative Europe-wide analysis of the best policies and most effective regional government strategies regarding innovation, Novaregio is able to indicate the best ways to adopt these at local level. (G2-B2)

The Novaregio project brings together 8 partners from 7 European countries (Austria, Greece, Italy, Spain, Slovenia, Sweden and Hungary) skilled in promoting innovation and link-ups with influential institutions operating within regional government and innovation support. Novaregio also works with two of the main European networks: CEI, Central European Initiative (17 member states) and CPMR, Conference of Peripheral Maritime Regions of Europe (representing 140 maritime and peripheral areas of Europe).

Novaregio's objectives are to: elaborate a plan of action for the coordination of policies on innovation; create a European virtual centre for the online publishing and pooling of know-how on innovation policy matters; produce a comparative analysis of the best policies and most effective regional government strategies on innovation at European level, so that these can then be adopted at local level; devise a benchmarking manual for regional innovation funding policies and promote the widespread diffusion of 10 cases of good practices in Europe, chosen from 25 successful examples; and encourage regional organisations to adopt the guidelines suggested in the manual.

Both the model [1] and the best practices identified [2] are composing the proposal of the doctoral thesis, which will be defended at the end of 2008; however, adjustments can still be made.

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