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Reference Scenarios for SICILY 2005-2010
Reference Scenarios for SICILY 2005-2010

October 2004



REGIONS OF KNOWLEDGE

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I. INTRODUCTION

The present document has been elaborated by Innova SpA in collaboration with Ms Teresa Rojo (EASW National Monitor).

The purpose of this document is to outline the reference scenarios¹ for the development of the knowledge-based economy and society in Sicily 2005-2010, in the frame of the EU 2010 knowledge base building² governance and European research area strategies.

The outcome of this study will be presented to the regional key actors of Sicily in a participatory workshop (IN.TRACK EASW) where they will elaborate their local research and technology strategy for knowledge upgrading and greater cohesion in Sicily, horizon 2010. In this way, they will decide the contribution of Sicily to the objectives of the Lisbon Summit 2000.

The content of this report is the following:

The first part introduces the reader to the knowledge economy and society concept in regional development. At the foresight and participatory workshop to be celebrated in Sicily in February 2004, participants will be initially informed of the knowledge-based economy and society strategy of the European Union and the recommendations issued for the regions as well as about the importance attributed to local actors in driving knowledge.

The EU recommended path to the knowledge development model is grasped by the progress in the two main change parameters leading to knowledge society good functioning: research and innovation activities together with participation and clustering activities. A progressive matching of both parameters will conduce us to a "dynamic knowledge society, capable of sustainable economic development, improvement of employment and greater social cohesion" (Lisbon 2000 Summit and Call knowREG EC2003/C182/08) .

The list of targets and measures elaborated by the European Union for the building of the knowledge-based economy and society is also briefly described. Some targets and measures being more oriented to technological growth and others to clustering (EU Innovation Trend Chart 2003).

The second part of the report presents the steps followed in the Scenario Building exercise for Sicily 2010. It includes a brief analysis of the present situation, based on the Regional Evaluation Report elaborated by Consorzio Catania Ricerche showing a medium position with regards to research and innovation and a medium to low position regarding participation and clustering, the two knowledge economy and society progress parameters.

¹ By Scenario we understand a set of visions of a future situation together with strategies and actions to achieve it.

² At the Lisbon and Barcelona summit meetings the Union declared that Europe should become the most competitive and dynamic knowledge-based economy in the world by 2010.

The reference Scenarios are elaborated from the morphological analysis of the strategic action lines established by the IN.TRACK project partners: RTD policy to local needs; clustering; spin-offs and education.

The resulting reference scenarios for the development of the knowledge-based economy an society in Sicily, horizon 2010, are the following:

- "The two Sicilies"
- "Innovative and cohesive society"

II. TOWARDS A KNOWLEDGE-BASED EUROPE: the EU knowledge society concept in EU regional development

By "knowledge society" concept it is meant the EU strategy to face the social (cohesion and employment) and technological challenges (resource scarcity and depletion; international competition; limited public funds) through upgrading (EC innovation action plan) and clustering (European research Area) the regional research & innovation capacities.

The knowledge society concept came to substitute the information society concept during the turn of the century because the term information mostly meant a one way communication and implied pyramidal knowledge transfer.

During the last decades, regional experiences have proved that efficient problem solving requires not only that the scientific and technological capacity is developed but also that the actors are clustered or connected to the sources of information and become exposed and involved in the knowledge creation process.

Also, the application of the White Paper on Governance (EU 2000) to the EU research and innovation policy recognises the importance that clustering and communications between partners has in the process of innovation (technology developments transformation into marketable products and processes).

By knowledge-base it is understood the scientific, education, research, technology and innovation capacities well tuned to the needs of the society. Such knowledge base can no longer be expected to remain in the hands of an elite of researchers and industries who will obtain leading results that later disseminate and break through into the international markets.

A successful innovation process requires a high connectivity between a diversity of regional and international actors. The EU Innovation Scoreboard 2002-03 has found that to be the special feature of the best ranked regions of Europe.

II.1 The EU Knowledge development scenario 2010

Here below, selected pieces of the EC communication on knowledge development and regions are reproduced to help us grasp the content of the EU knowledge development strategy:

“Globalisation, rapid technological change and extensive information and knowledge exchanges mark today the transition to a knowledge-based economy. At the Lisbon European council in March 2000, Europe’s Heads of State and Governments set an ambitious objective: over the next ten years, Europe should become the most competitive and dynamic knowledge society in the world, capable of sustainable economic development, accompanied by a quantitative and qualitative improvement in the level of employment and greater social cohesion. ” (EC 2003/C 182/08) (Call knowREG).

“Because European regions have very different profiles in terms of economic development, especially in relation to their capacity to generate, absorb and integrate technological innovation and transforming it into economic growth, adopting a single development model would be a mistake. Nevertheless the adherence to some general development principles seems useful, particularly in relation to research and innovation policies: “Upgrading “knowledge” and increasing technology diffusion at regional level may prove one of the most efficient routes for economic growth”.

II.2 The regional path to research and cohesion development

The EU 2010 strategy stresses “the central role of knowledge in driving sustainable regional development and how regional actors' can effectively participate in formulating their regions' future”³.

From a knowledge region scenario perspective, the path recommended by the EC is “first to establish a local research and innovation strategy mobilising all available resources and actors; and second, to embark on interregional co-operation schemes, forming networks of various types”.

“Local research and innovation strategies that are “region-conscious” is the target in the knowledge-based economy and society according to EC recommendations.- “This involves a targeting of economic development through a systemic mobilisation of all resources available in the regions towards concrete goals, harnessing growth, competitiveness and employment, fostering research, technology and innovation at local or regional level.” (The aim being to reach 3% GDP on RTD and that 2/3 of RTD spending comes from private firms on 2010).

“Local action should start from a shared diagnosis of the territory and the definition of common strategic objectives. All local players should be integrated in the regional strategy, including the regional authorities, the private sector, academic and RTD institutions, social partners and the civil society.”

New role of regions: from mere technology receptors to knowledge drivers

³ As stated in the EC document “About the Regions of Knowledge” (KnowREG) Pilot Action

“In the past, interventions to support regional development were mainly based on the provision of capital and support for physical infrastructure. This was essential to build capacity in terms of laboratories and equipment.⁴ Today, despite the fact that critical infrastructures are still important for enabling the transition to a knowledge-based economy and society (for example the availability of modern telecommunications and data networks), the growing importance of intangible investments in education, training, research and innovation priorities is widely acknowledged.”

“Regions form the spatial basis of groupings of research and innovation operators which have come to be known as “clusters”, often considered as the main drivers of regional development.”

In conclusion: both research and participation activities are the key parameters around which different reference scenarios can be outlined for regional knowledge development.

II.3 The parameters

From the EU perspective, the development of knowledge in a society is mainly a “technology-based development characterised by regional research and innovation activities well-tuned towards the socio-economic needs of the region and capable to build research and innovation capacities in the regions (the latter deriving into employment and learning for the population)”.

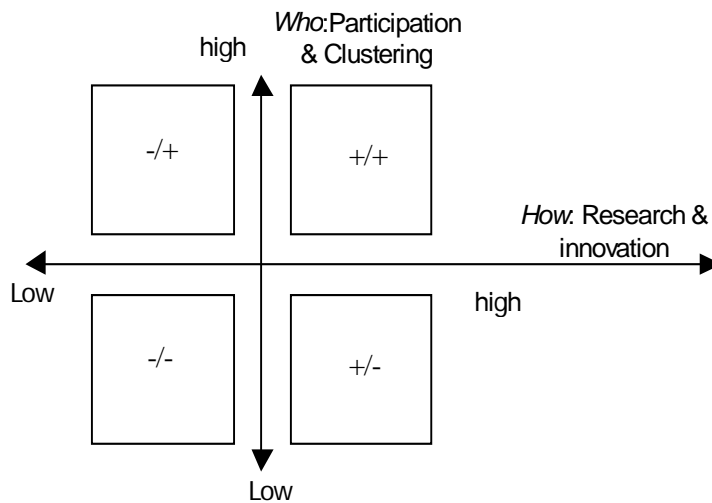
The key parameters that map the space where the knowledge-based economy and society develops are the following:

X : RESEARCH & INNOVATION

Y: PARTICIPATION & CLUSTERING

⁴ Both approaches have been supported by the Community's RTD Framework Programme (through the Innovation programme or the Structural Funds).

Graph 1: Position of scenarios regarding the parameters of knowledge development



A (+/+) = knowledge economy & society scenario quadrant (high research and innovation and high cohesion)

B (+/-) = high research and innovation but low cohesion

C (-/-) = precarious social and technological situation (conflict society)

D (-/+) = low research & innovation and high social cohesion

II.3.1 Research and innovation activities

The European Commission's visions on regional research and innovation activities are as follows:

- "For example the organisation and development of research infrastructure, specialised equipment and facilities; linkages with industrial development zones; development and support of centres of excellence; establishment of science and technology parks; mobility of researchers; partnerships between education and training institutes and local technology-based start ups, etc." (EC document: "About the Regions of knowledge (KnowREG) Pilot Action. Bringing European regions faster to the knowledge-based economy").
- "Develop material and human resources such as supplying the RTI local system with research infrastructure and equipment as well as university and training facilities, support structures to foster creation and growth of innovative enterprises".
- Legal and financial conditions.- "Promoting an environment conducive to research and innovation, through the introduction of accompanying legal, financial and fiscal conditions, that would prove necessary".
- To stimulate a better uptake of research results into the local socio-economic fabric (especially vis-à-vis small and medium size enterprises, SMEs) and help translate them faster into economic growth.

- To increase public and private investment in research and innovation in the regions, thereby stimulating economic and social development.
- Integrated approach.- Contributing actively to an integrated strategy for sustainable development. By integrated approach it is understood, according to the Agenda 21 Rio Summit 1992 definitions, that any action must be evaluated not only from the economic and social point of view but also from the environmental impact it can occur. The integrated approach leads to the precaution principle saying that even if it is not proved but environmental risk is suspected, a lower risk technology should be implemented.

II.3.2 Participation and clustering activities

The EU visions on participation and clustering activities refer to the degree of local involvement in research and education and the international collaboration, the connectivity and openness to the external world, the self-organising capacity of regions, the networking of regional actors. They are viewed as follows:

- There is no single model/path or route to the building of the knowledge-based economy and society, but according to background experience it highly relies on the degree of local actors involvement; and also that international collaboration is a positive contribution to knowledge society building (European Research Area concept).
- "The self-organising capacity of regions becomes an important growth factor: technological capacity and objectives, "connectivity" and openness to the external world are key requirements. Successful cases in Europe, such as the network of the four so-called "motor regions"⁵ offer development models that are not always easy to reproduce."
- "Identification of models for further development activities, which need not be funded necessarily by the Union's budget".
- To increase collaboration on a trans-national / trans-regional basis to enable learning between European regions and the identification of models and activities that can be implemented in different regions. Stimulating experience exchange with other successful regions in specific fields.
- Increasing regional awareness of national research and innovation policies.
- Fostering partnerships between the public and the private sector in order to contribute to the European knowledge-based economy and stimulate knowledge creation and diffusion.
- Fostering links and networks with actors in other regions with complementary technological assets.

- Clustering.- Clusters are formed by groups of innovative enterprises, academic and research institutions, local development agencies and/or other supporting organisations. Their structures embody a developing knowledge base, enabling infrastructure as well as a cultural dimension. Clustering is networking at large, with constituent parts developing strong, interdependent links. Interaction flow patterns vary, representing knowledge transfer, financial transactions or simply, increased personal contacts. In such a case, knowledge "spill-overs" become ultimately the most important cluster "by-products". Research and technological development lie at the heart of such knowledge spill-overs and form part of the key components of successful regional clusters. Efficient clustering involves multi-sectoral linkages and organisations with different profiles. In its most successful expression, clustering combines industry, government and non governmental organisations, together with a number of knowledge-specific players (universities, research centres, science and technology parks and techno-poles, innovation agencies acting like service, competence and diffusion centres).

- "Of particular importance in the dissemination of results and the process of commercialisation is the interplay with scientific activities and "openness" in terms of exposure to changing markets information. University-industry links play here an especially important role. Co-operation between academic spin-offs and their "parent" organisations is often a model of effective regional co-operation. University-industry relations can strengthen the fabric of weaker regions where more traditional industries can turn to universities to investigate and meet their requirements."

II.4 EU recommended measures for Research & Innovation and Participation & Clustering development

In order to benchmark the progress in the knowledge society development strategy that the European Union set up in the Lisbon Summit in March 2000, periodical information is elaborated by the "European Trend Chart on Innovation".

The "European Trend Chart on Innovation" tracks, through a periodical survey, the innovation national policy measures that the different EU countries are implementing in relation to the objectives set out in the European Innovation Action Plan.

Below, the activities of the EU Innovation Action Plan and Innovation Trend Charter⁶ are listed and classified as being a participation & clustering policy measure or rather a research & technology policy measure. We classify them according to the main knowledge change parameter they are related to.

⁵ Baden-Württemberg (D), Rhône-Alpes (F), Lombardy (I) and Catalonia (E).

⁶ Every six months the information on policy measures is complemented by a series of "country reports" from each Member State, highlighting innovation policy trends and priorities. In the Who's who section there can be found the

Table 1 EU recommended policy measures classified by affinity to knowledge development parameters

Policy measure objective	Research & Innovation policy measure	Participation & Clustering policy measure
I.1. Education & Training		✓
I.2. Mobility Students / Researcher / Teachers		✓
I.3. Raising Public Awareness		✓
I.4. Innovation & Management	✓	
I.5. Public Authorities		✓
I.6. Promotion of clustering and co-operation for innovation		✓
II.1. Competition	✓	
II.2. Protection of IPR	✓	
II.3. Administrative Simplification	✓	
II.4. Legal and Regulatory Environment	✓	
II.5. Financing	✓	
II.6. Taxation	✓	
III.1. Strategic Vision of R&D	✓	
III.2. Strengthening Company Research		✓
III.3. Start-up of technology-based companies	✓	
III.4. Co-operation Research / Universities / Companies		✓
III.5. Absorption of Technologies by SMEs	✓	

In synthesis;

- Research and innovation measures mainly include those measures related to the competitiveness of the private firms; legal measures (taxation, finances, infrastructures).
- Participatory and clustering measures include those measures involving the citizenship or the clustering between actors as well as the activities to increase communication and information availability to the public.

III. SICILY'S FUTURE KNOWLEDGE SOCIETY DEVELOPMENTS

As part of the IN-TRACK project, Consorzio Catania Ricerche has elaborated a "Regional Evaluation Report" describing the present situation of the island, background trends and a SWOT analysis of strengths, weakness, opportunities and threats.

The "Regional Evaluation Report" is the point of departure to elaborate the possible futures of knowledge development in Sicily 2005-2010.

The analysis of the "Scenario 0" or present situation shows that Sicily is in a medium position with regards to research and innovation and in a medium to low position regarding participation and clustering, the two knowledge economy and society progress parameters.

organization contact details and the contact persons details for the agencies and governmental departments involved in policy measures.

Future options are visualised in regards of four main strategies like RTD policy to local needs; Clustering; Spin-offs and Education. They were considered the prior issues in the island's future knowledge-based development during the participatory training workshop of September 2004 in Crete.

A different combination of future options can drive Sicily into two different knowledge developments scenarios.

III.1 Sicily 2004 (Scenario 0)

III.1.1 Population and employment

The Sicilian population represents 8,7% of the total Italian population. From 1999 to 2002 the growth of the population has decreased. The number of employees in the service sector continues to represent the main contribution to the Sicilian work force (55,5%) and it has shown a an increasing trend over the last years. Employment in the industry sector has shown a dynamic increase from 2000 onwards, while the number of employees in agriculture has continuously decreased, mainly due to the utilization of new equipments and to the low appeal of the agriculture sector to young people.

The number of skilled workers has increased since 1997. In the category 25 – 64 years old employment has increased. Unemployment among the population of less than 25 years is characterised by being basically young and female, by its precariousness (temporary contracts) and by lack of experience.

Since 2000 the unemployment rate has constantly decreased, especially for women, who have acquired a more important role in the job market, also thanks to the national policy that has supported female employment.

III.1.2. Economic sectors' contribution to GDP

The Sicilian contribution to the Italian GDP is 5,8%. From 1996 to 2001, the regional GDP has shown an average increase of 2.1% that reflects the national growth.

The island's wealth is based on agriculture, tourism and industry. The contribution of each sector to the regional GDP is uneven. The service sector is the most important in the economy of the region, accounting for 70% of the Sicilian GDP (year 2000). Public administration, trade and tourism are the principal components of the service sector in the region.

The industrial sector contributes for 16,5% , with the presence of several large companies in the fields of energy industries and refineries. Traditionally, the main industrial sectors in Sicily are Agro food, Energy (Petrol and Petrochemical), Construction and Tourism. Added-value industrial domains are mainly represented by Mechanics, Microelectronics, Telecommunications and some "embryonic" industrial districts like those belonging to natural stones and ceramics, viticulture and wine production, plastic materials and textile. In the last few years, the Sicilian industry has shown an overall dynamic tendency towards innovation, especially within the so called "Etna Valley" district based on microelectronics and ICT technologies, which is located in the whole area surrounding Catania.

The share of the primary sector in the regional GDP is about 5%. During the last years it has maintained the same level because of local government's support for agriculture through the EC funds (FEOGA). The agricultural sector is involved in a process of growing product specialization.

The Sicilian economic system is characterised by the presence of a few large companies and numerous SMEs (73%. In Italy SMEs represent 63% of the total number of companies). According to the data collected the total number of companies in Sicily is 310.597; the majority still belonging to the agriculture and trade sectors, which have always had a strong weight in the Sicilian economy. Nevertheless, construction and industry have maintained a significant role over the last years.

III.1.3. Innovation policy in the Region

The special powers⁷ of the regional government in industrial policy have contributed to the creation of specific bodies devoted to industrial promotion and development, with a special focus on innovation, training and market openings. Research and innovation have been recognised as priority areas of intervention both at regional level and by the institutional agreement with the National Government. Consistent resources have been assigned to those priority areas by the POR (Sicilian Operating Programme 2000-2006) and PON Ob.1 2000-2006 strategic plan has been undertaken to optimise the utilization of these resources for innovation enhancement in the whole Sicily.

The regional plan for innovation of Sicily (SRI Sicilia -2003), formally endorsed by the Regional Government in 2003 after a continuous consultation and consensus building process, set the guidelines to increase Sicilian innovation capacity and absorption of research and innovation. The SRI has been developed in response to socio-economic issues (weak interface distance between research and market, prevalence of micro-enterprises, but also high knowledge potential, emerging high-tech clusters) and the needs of innovation expressed by SMEs. The strategy puts forward the concept of innovation as a process to develop and convert ideas, knowledge and competences into market products and services.

SRI SICILIA is built around the following key issues:

- Enterprises as target groups (existing and start up companies);
- Bridging research and market;
- Public-private collaboration;
- Networking and clustering.

The strategy overpasses traditional innovation policies promoting industrial research, financial incentives for R&D, state-aids, to pursue schemes for cooperative projects between research institutes, universities and SMEs, cluster-based policies, schemes for knowledge-based start up creation (from scouting to IPR, seed capital and incubation). The aim is to reinforce the regional innovation system by introducing a policy mix capable to sustain innovation at 360° (SMEs have different potential and innovation needs).

The *Piano Operativo Regionale* (POR) for the years 2000-2006, which uses the community structural funds assigned with Agenda 2000 was approved by the EU in July 2000 and should provide a contribution of 9.415 million Euro. Within this programme, the measures supporting innovation and R&D are the following: Measure 3.14: Promotion of the research and innovation regional system; Measure 3.15: Network for the development of Scientific Research; Measure 4.05: Training of local development system; Measure 5.05 Network aimed to improve cities offer; Measure 6.05 Network a service to ICT society.

Also national policies to support innovation have been taken by the Minister of Industry (e.g. Law 297/99; PON Research) and the Minister of Research (PIA INNOVAZIONE).

Although there are some measures fostering innovation and R&D (European, national and regional), the current implementation has not had sufficient impact on the economic and industrial system yet. This is due to different reasons. First of all, the structure of the regional economy is based on traditional activities such as Agro-food, Trade, Tourism, and low technological industries in general. Moreover, in Sicily there is a restricted number of large companies. Another key point is the time gap between the start up of the programme and its financing. The local key actors which have been interviewed, assert that one of the main reasons concerns with the great numbers of innovation and R&D programmes which have not been financed yet.

III.1.4 ICT Penetration

The knowledge economy in Sicily is not enough developed; all the interviewees consider the regional investments in ICT and R&D insufficient. However, there are some geographical areas where the productive systems are more sensitive to the knowledge economy in terms of high-technology investments, high-technology industries and highly-skilled labour, which are mainly close to large cities (Palermo, Catania, Messina). Sicily can be considered as a complex area, due to the co-presence of an excellent and strong public research system and a fragile industrial structure. The local SMEs need the knowledge economy and innovation in order to try to overcome their competitive problems but, at the moment, the public investments are not sufficient.

Italian policy makers have planned the creation of an excellent research and innovation technology district in the field of Micro and NanoSystems. The partners are the Italian Ministry of University and Research (MIUR), the Sicily Region, the Universities of Catania, Messina and Palermo, the Municipalities of Catania, Messina and Palermo and STMicroelectronics. It has been considered that the activity area has good expertise and potentialities in R&D, a necessary condition to successfully create a technological district.

Considering the high number of SMEs and the Sicilian Population (about 5 millions inhabitants), the potential ICT market is very promising and attractive. The Italian ICT market is estimated to be around 2,2 billion of Euro. Sicily represents 2,7% of the total market and during the period 2000-2002 the region experienced an increase of 3.3 % per year (compared to Italy with an increase of 2,8%).

⁷ The Sicilian government is characterised by political autonomy since Sicily is one of the Italian Regions with a Special Statute.

In 2002 the ICT expenditure on GDP was 0,9 %; Italy 2% ; USA 3,8 %; the ICT expenditure for employee is about 386 Euro. In two years, the ICT companies have increased by 17%, but the companies size is not very high in order to compete at national and international level.

SMAU, the main Italian Fair on ITC in Milan, organises in Catania the Euromediterranean ICT and consumer electronics event.

The percentage of growth is very good from 1995 to 2001, which means that R&D and Innovation investments have increased, especially in the indicators: a) Population with tertiary education, b) Business R&D expenditure, c) New Science and engineering graduates, d) High tech patents.

In the fields of computer hardware, semiconductor devices and electronic components, for the years 1995-1999, Catania Area accounted for 11,2 % of Italian inventors on total investors of the sector. Sicily is in the fifth place among the Italian regions for the increment of information technologies' firms between 1997 and 1999 (+25,8% according to Unioncamera sources).

III.1.5 Education, research and innovation capacities

The education system in the region is very well developed and very competitive. It is mainly focused at academic level. There are 3 Universities (Palermo, Catania, Messina) and a lot of higher education institutions (e.g. Scuola Superiore dell'Università di Catania, CERISDI). The main strengths identified in the interviewees are the human capital of universities, and national research centres.

Unfortunately, there is a large number of graduates who cannot find job in Sicily and they are forced to go outside. It means that it is difficult to find a good job, linked to degree. In the last years only the graduates in the fields of engineering, chemistry, physics, mathematics, electronics and informatics have found a good job.

The employment in high-tech manufacturing is low and it is concentrated in the area called "Etna Valley", which is located in Catania, where high tech companies such as STM, Nokia and numbers of SMEs in the fields of electronics, materials, ICT are settled. In the class of computer hardware and electronic components Catania is the only centre in southern Italy appearing among the main concentrations in any high-tech class in Italy. Through the activity of its large companies more than 1.000 researchers have been employed.

The percentage of regional R&D expenditure is 0,64% of the regional GDP, while in Italy is 1,02% . The distribution of the total R&D expenditure among the different institutional sectors shows the highest value in Universities expenditure (64,1%), while only the 11% on the total regional expenditure is represented by public administration. R&D expenditure is highly concentrated in large firms, which are normally part of large industrial groups.

The "Etna Valley" is mainly characterised by the presence of national and international companies which mostly operate in the electronic sector as well as in telematics and telecommunications sectors. The main industrial colossus, ST Microelectronic, together with the vital action of local SMEs, has given an

innovative impulse to the region. During the 90's ST Microelectronics has started to co-operate with important local institutions, such as the Universities of Catania, Palermo and Messina; it has been involved in many research projects, especially in the fields of microelectronics and nano-technologies.

Another relevant aspect concerns the birth of new firms which have been created both by STM ex-employers and by young entrepreneurs (national law n.44/1986), such as Antech (telecommunication and satellite), Wire Net (telecommunication) and Proteo (water management software system). Local government policies have encouraged the settlement of national and international companies even by the establishment of important services, such the local counter "InvestiaCatania" whose main function is to provide companies with all the necessary assistance for the creation of new businesses within 90 days. Thanks to its support, some of the most important multinational companies have decided to develop businesses in the area. Within the Information Technology sector, major companies, such as Computer Science Corporation, IBM (with the first Mobile Technology Centre in Italy), Magneti Marelli (which is specialised in developing software for checking engines of motor car industry) have settled in Catania. Another field which has strongly developed in the last year is Biotechnology.

In general, the establishment of networks and clusters, and the interaction and knowledge flows within them have been given increasing priority.

III.1.6 SWOT analysis: strengths, weakness, opportunities and threats

The analysis on carried out by Consorzio Catania Ricerche gives the following results.

Table 2: Results of the SWOT analysis for Sicily 2004

SICILY SWOT ANALYSIS	
Internal Analysis	External Analysis
<p>Strengths</p> <p>Presence of a few dynamic companies (Electronics, ICT, Pharmaceuticals)</p> <p>Research</p> <p>Success cases (cooperation among research centres and companies)</p> <p>Highly qualified personnel</p> <p>Big internal market</p> <p>Natural resources</p>	<p>Opportunities</p> <p>Increasing awareness towards the set-up of technology-based companies</p> <p>Public financial aids (POR, PON) towards Research & industry cooperation</p> <p>Presence of natural and human resources attracting external industrial groups</p> <p>Strategic position within Mediterranean area</p>
<p>Weaknesses</p> <p>Small-sized companies operating in the most traditional industrial sectors</p> <p>Export</p> <p>Public Research (Institutions, University) not answering companies' needs</p> <p>R&D private investments</p> <p>Few connections between Research and Industry</p> <p>Uneasy access to credit and financial aids</p> <p>Few relations with non local research and industrial districts</p> <p>Few public/private services towards technology transfer</p>	<p>Threats</p> <p>Loss of regional competitiveness and consequent marginalization</p> <p>Ineffective regional policy towards innovation and technology matters</p> <p>Instability of funding supply</p> <p>Increasingly high brain drain</p>

III.1.7 Position of Sicily Scenario 0 inside knowledge society options parameters

As a result of the Regional Evaluation Report elaborated by Consorzio Catania Ricerche, the following considerations are made on the present situation of Sicily regarding the knowledge-based development.

In the first place, the position of Sicily is evaluated in terms of the main parameters of future desirable change: research & innovation together with participation & clustering (see table below).

The position of Sicily appears to be medium to low as far as participation and clustering is concerned, while it is medium with regards research and innovation.

Table 3 Sicily 2004 knowledge economy and society profile according to the change parameters.

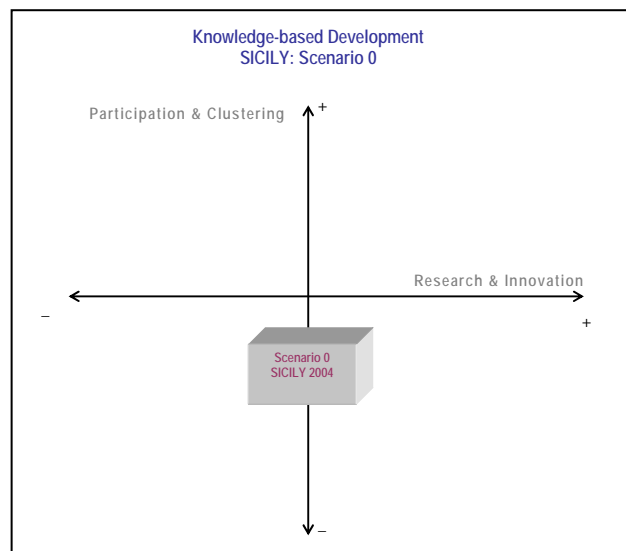
Characteristics of Sicily knowledge development achievements 2004	Level of Research & Innovation	Level ⁸ of Participation & clustering
High quality of research	High-there is a highly developed research system	Medium-Low-. mainly concentrated on public research institutions
Research and innovation to satisfy SMEs and market needs	Low- Public Financing of research not addressed to industrial applications	Low-. Lack of connection between research and market needs
Limited private R&D activities	Medium. Research and innovation only in big companies. But very limited in SMEs SMEs no sensitive to innovation issues. Lack of innovative and funds to invest in RTD	Low-Clusters and networks of SMEs underdeveloped. lack of coordination and joint efforts from SMEs
Highly skilled human resources	High- well developed and competitive education system. Increasing number of University graduates	Medium-Low-. The system is not able to absorb the supply
Entrepreneurial culture in the scientific community	Medium-High-. There are star-ups and spin-offs but very linked to specific sectors and geographical Areas(STMicroelectronics-Catania (Etna Valley)	Medium-. The scientific community participates in development but only in some areas
Uneven geographical distribution of knowledge (Two-speed development)	High- Knowledge intensive areas <u>only</u> around the big cities: Palermo, Messina and specially Catania (Etna Valley) Low- the rest of the island traditional productive structure	High- in those high-tech areas, there is collaboration, links and cooperation between Universities and Industry; access to start-up and spin-off creation Low- outside high-tech districts no links with the local and fragmented industrial structure.
Limited impact of programmes to foster innovation	Low-. Despite efforts, innovation is not achieved out of the specific regions and areas.	Low-. Lack of strategic vision of an inter-connected system

⁸ Levels are 1 to 5, that is: low, low-medium, medium, medium-high, and high.

Overall, Sicily can be positioned in a medium level as far as the development of research and innovation is concerned. Despite the great development occurred in strategic high-tech sectors such as microelectronics, telematics and telecommunications in the area of Catania (Etna Valley), where the knowledge-based economy is developing, the expenditure in R&D is less than 1% of GDP, most research is supported by public funds and rest of the territory is still characterised by a traditional industrial structure where research and innovation have not yet found a fertile ground to develop since SMEs do not invest in research and innovation without public support and they are not able to implement innovation as global competition requires.

Regarding participation and clustering, the position of Sicily is medium-low due to the lack of an overall system of interconnected regional players in the island. As mentioned before, the Etna Valley -in the surroundings of Catania- is characterised by the interaction between the academic and the industrial world (the University of Catania and STMicroelectronics work together in applied research and innovation projects) and also within the industry (numerous spin-offs created from STMicroelectronics as well as start-ups that have created an innovating climate, attracting further national and international companies). However, these developments are restricted to a geographical area whereas the rest of the territory is characterised by lack of cooperation and connections between research and SMEs needs, lack of collaboration among SMEs (no clustering). Moreover, the society is not aware of the impact of innovation in the island and brain drain phenomenon (highly educated people have go abroad to look for a job) constitutes a serious threat for the region's future development.

Graph 2 Sicily Scenario 0



III.2 Morphological Analysis of main strategic action lines

From the present situation of Sicily, analysed above, and from 2005 to 2010, different possible futures or scenarios can result, depending on the evolution of structural factors as well as the initiatives and involvement of regional, national and international actors.

The morphological analysis is an exercise to explore the different shape that each strategic line or variable can look like in the future.

The strategic lines for developing the Knowledge Society Scenario in the islands were selected by the IN.TRACK experts in the meeting held in Crete on September 2004.

The following were considered the prior issues that required to be tackled in order to achieve knowledge society developments:

- PLANNING RDT POLICY TO LOCAL NEEDS
- CLUSTERING
- SPIN OFFS
- EDUCATION

III. 2.1 PLANNING RTD ACTIVITIES TO MEET LOCAL NEEDS

Despite the existence of a strong public research system and substantial high-tech developments, it seems that these are circumscribed to specific sectors and geographical areas. As a matter of fact, the analysis of the situation in Sicily recognises that the research capacity is not attending needs of important sectors of the Sicilian economy. If this is not tackled, Sicily could embark on a two-speed development process, with well developed areas sensitive to research and innovation, with qualified workers and high salaries on the one hand and a weak a fragmented economy in traditional non-competitive sectors, with no access to innovation, unskilled labour and low salaries, creating social and economic tensions in the island that will threaten the future development.

In the future years, the options can vary from:

2.1.1. Research capacity continues to be mostly oriented to high-technologies

2.1.2. Research capacity and programmes re-orient to low and medium technologies needed by traditional sectors (agriculture, tourism, construction, etc.). This would mean to give support to the SMEs operating in these sectors and involve them in specific research and/or pilot projects. In this way, SMEs could strengthen their productive capacities and become competitive in national and export markets. For example, ICT technologies could be implemented in the tourist sector in order to attract international

tourists (although tourism has increased since the 80s, the increase has been mainly due to national visitors), placing Sicily in the main international circuits of tour operators. Another sector that could be considered for innovation and sustainable development is the wine sector. National research and centres and/or laboratories could develop cooperative research taking into account the needs of wine-growers and producers with the scope to re-launch and revitalize the wine sector and re-gain competitiveness in European and International markets that have been flooded with wine from New World Wine Countries (Argentina, US, New Zealand, South Africa etc). Also the initiative EtnaBiotech could be reinforced with a joint collaboration between biotech firms and Sicilian farmers.

2.1.3. A combined situation in which part of the high technology capacity becomes oriented towards the traditional sectors

III. 2.2 CLUSTERING (PARTICIPATION AND INVOLVEMENT OF LOCAL ACTORS)

As stated before, also in terms of participation and involvement of the local actors, there are strong differences in the region. On the one hand in the Etna Valley, there are high connections between the research and the industrial sector and among firms belonging to the district. However, in the traditional sectors the opposite occurs: there is a lack of collaboration between the world of research (public and academic) and the majority of enterprises of small dimension. The Sicilian region has not succeeded in building a connective network of research and innovation systems. Moreover, the highly qualified workforce that the high-tech sectors cannot absorb cannot find a job elsewhere and are, therefore, forced to migrate abroad.

The future options in regards of clustering are the following:

2.2.1. The current situation is maintained

2.2.2. A series of measures are introduced in order to enhance the connections in traditional sectors: facilitate students to go into 2-3 month practices into associations and enterprises of small dimensions and obtain as many credits as in courses; foster the participation of associations and SMEs in European projects to meet local needs; foster contacts and collaboration with North Africa and South East Europe to collaborate with them in joint research projects; facilitate the access to funds (credits, financial aid) to SMEs that decide to engage in product or process innovation and publicise the measure among SMEs; create –for instance within the Universities- a specialised office where groups of enterprisers, SMEs, associations may place a technology offer or a request. Publicise and foster the participation of local SMEs to national/international fairs (e.g. SMAU – Euromediterranean event in Catania).

III. 2.3 SPIN OFFS

STMicroelectronics' ex-employees and young entrepreneurs are setting up their new businesses in the high-tech fields.

The options are the following:

2.3.1. The focus on high-tech spin-offs and start-ups continues. Both the public and the private sector support the creation of new companies in the knowledge fields: The regional government implements measures to increase the awareness towards the set up of both national and international technology-based companies; the funding to young entrepreneurs increases, female entrepreneurship is encouraged. The bureaucracy improves and the time to implement projects is reduced. Moreover, the private initiative through the promotion of risk capital is also attracted to the region: venture capital, business angels, seed capital in the knowledge economy fields.

2.3.2. Efforts to apply the results from Universities and research centres to the SMEs in traditional sectors. The links with the technology transfer offices are reinforced so that SMEs can benefit from research results applied to local needs and gain competitiveness. For instance, the ICT applications could be adapted to the needs of the tourism sector e.g. create a network of on-line hotels/pensions/ B&B etc. with an on-line booking system and/or create a web portal connecting the wonders of island and propose attractive cultural-eno-gastronomic offers to attract foreign visitors.

III. 2.4 EDUCATION

Tertiary education is increasing in Sicily. The local Universities are generating a well educated labour force in the scientific/technological fields that is being, for the most part, absorbed by the high-tech industries. Nonetheless, there is a large number of graduates who cannot find a job in Sicily and are forced to go abroad. As a matter of fact, it is difficult to find jobs outside the scientific/technological area and the level employment in high-tech industries is low outside the Etna Valley.

The options are the following:

2.4.1. The situation continues as it is now. Continue to concentrate on tertiary and post-graduate education

2.4.2. Concentrate in long-life learning and undergraduate programmes, stimulating the practices in enterprises of small and medium size, in order to fill the gap of technology transfer with SMEs. Also promote courses targeted to SMEs managers in order to increase awareness of the need to innovate and introduce ICT and innovation in traditional sectors.

2.4.3. Combine both

III.2 Reference Scenarios Sicily 2005-2010 knowledge society developments

The following tables present a synthesis of the options outlined for the future knowledge developments in Sicily as well a list of reference scenarios combining future options. The graph below pictures the future development scenarios of Sicily 2010.

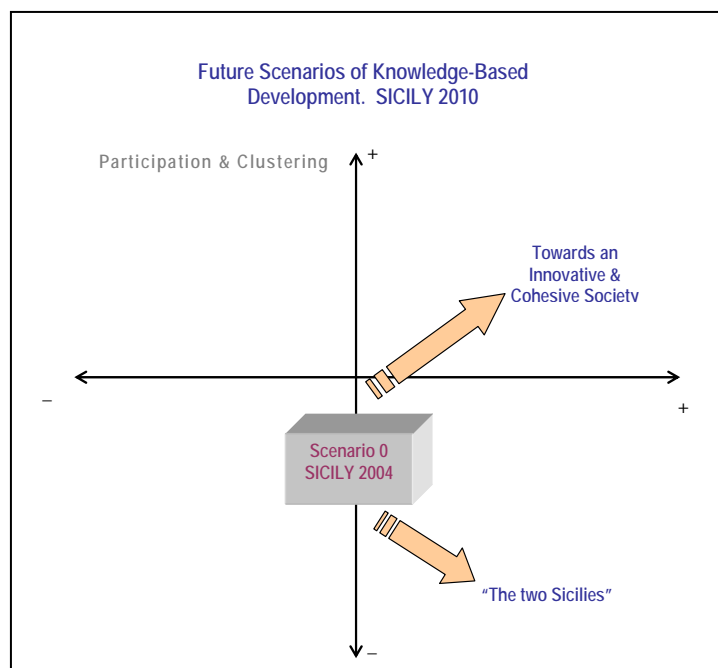
Table 4 Synthesis of the options outlined on future knowledge developments in Sicily

Strategic issues	Future options	Future options	Future options
1. RDT Policy	2.1.1	2.1.2	2.1.3
2. Clustering	2.2.1	2.2.2	-
3. Spin-offs	2.3.1	2.3.2	-
4. Education	2.4.1	2.4.2	2.4.3

Table 5 List of Reference Scenarios for Sicily combining future options

Sicily 2010 "The two Sicilies"	2.1.1, 2.2.1, 2.3.1, 2.4.1
Sicily 2010 Innovative and cohesive society	2.1.3, 2.2.2, 2.3.3, 2.4.3

Graph 3: Sicily 2010 Future Development Scenarios



III.2.1 Sicily 2010 "The two Sicilies"

From the current scenario it can be seen that important knowledge advancements are taking place in Sicily but it seems that these are circumscribed to specific sectors –(micro)electronics, telematics and geographical areas –the surroundings of Catania. However, the analysis of the situation in Sicily also recognises that the research capacity is not attending needs of important (traditional) sectors of the Sicilian economy. If this is not tackled, Sicily could embark in a two-speed development process, with well developed areas sensitive to research and innovation, with qualified workers and high salaries on the one hand and a weak a fragmented economy in traditional non-competitive sectors, with no access to innovation, unskilled labour and low salaries, creating social and economic tensions in the island that will threaten the future development. The knowledge economy and society, to develop successfully, has to be a widespread phenomenon, embracing the whole economy and society and not limited to one area or sector.

If no measures are taken, Sicily in 2010 could become a region with enormous differences in terms of economic and social development with a developed knowledge-based area – the Etna Valley and an underdeveloped area- the rest of the island. The traditional sectors will face a difficult crisis due to the lack of competitiveness, SMEs will have to close down and the employees fired. Unemployment will increase and there will be migrations towards the main cities, specially Catania in order to look for a job. Excess of labour supply might create severe tensions in the labour market and the brain drain phenomenon might aggravate. Moreover, the concentration of the population around the metropolitan areas will be in detriment of the rural and coastal areas that will be abandoned. This will also have a negative impact on tourism and on the artistic-cultural heritage of the island and the number of foreign visitors will decrease.

III.2.2 Sicily 2010 Innovative and cohesive society

This scenario pictures the situation towards the development of the knowledge economy and society in the whole island. The research infrastructure in the island has been reinforced and the R&D efforts are not only oriented to high-tech in the Etna Valley but also towards the development of technologies needed by traditional sectors such as agriculture, energy and tourism. The SMEs that operate in these sectors have been involved in specific pilot projects. The research world and the SMEs cooperate to obtain competitive advantages.

The Etna Valley is progressing well. Many international companies have settled in Sicily attracted by the rapid development of the sector and by the high quality of human resources available. The financing has changed and now it is no longer public money financing start-ups and spin-offs but venture and seed-capital. There are also some business angels going around the island looking for "hot" opportunities.

Cooperation and networking does not only take place within the high-tech districts but also among SMEs in traditional sector as well as other main associations (e.g. association of farmers, of Young Entrepreneurs, etc) and institutions (Chamber of Commerce, IRCs) who are actively participating in RTD projects. Networking is also taking place at fairs and exhibitions both in the mainland and abroad.

Unemployment and brain drain do no longer pose a problem for the island since many high skilled graduates are finding jobs in the SMEs and not only in technological and scientific fields but also in economics, business administration and foreign languages, since the SMEs have become aware of the need to innovate and to be in contact with the University and the technology transfer office. Placement of young graduates within SMEs has been facilitated thanks to the 2-3 month training period and the staff at the technology transfer office at the University is busy screening technology offers and demands. A successful case of technology offer- technology demand match was the development of a tracking system developed by an informatics student that has been successfully applied in the wine sector to allow the tracking of the product from the beginning - wine production from grapes- to the end of the production process- bottling, labelling and final commercialization of the wine in the market.

The joint efforts of the operators in the tourism sector – hotels, pensions, B&B, museums, archaeological sites, restaurants, events organisers (concerts, theatre) - have given good results since now foreign tourists find attractive holiday packages in the island that can easily book through the Internet and Sicily is in the top classification of attractive destinations that combine “sea and culture”.

Within this situation Sicily is in the path for a sustainable development and the whole island will be able to fully grasp the benefits of the knowledge economy and society.

ANNEX 1: EU knowledge policy measures

1.1 Education and initial and further training: specifically this deals with education and initial and further training in the context of skills acquisition which may be relevant to enhancing the innovative capability of individuals, including technical training, vocational studies, etc. Broadly, it includes actions which “concentrate on imparting the skills that are needed to produce and implement innovation”. Life-long learning should be included as should the acquisition of “a basic educational grounding which is essential to facilitate ongoing adaptation to the new skills that innovation requires”. Distance learning and multimedia should not be neglected. However, all activities in this category are external to the firm environment.

1.2 Mobility of students, research workers and teachers: this covers the mobility of students, research workers, engineers or scientists from one country or industrial sector to another, and from education or research to industry, which has the effect of encouraging the transfer of technology and the dissemination of know-how.

1.3 Raising the awareness of the larger public and involving those concerned: innovation can develop and spread only if it is accepted by society. Actions here reflect the stimulation of public awareness and acceptance of science and technology, the stimulation of consumer demand for technological novelty, innovation in forms of social organisation and communication, and measures which affect the attitudes, values and positions of the social groups involved towards aspects of innovation.

1.4 Fostering innovative organisational and management practices in enterprises: this is, of necessity, a broad category. Innovation is primarily the responsibility of enterprises, and managing change is one of the main challenges with which they have to cope. Actions under this category range from promoting the ability of enterprises to: keep abreast of changes in markets and techniques and the related methods of design, production and organisation; stimulate the absorption of new techniques and know-how; modernise their structure and organisation, and reshape methods, roles and responsibilities; develop technological, economic and business “watch” capabilities; develop their human capital (training within the firm); and adopt benchmarking and the spread of “best practice” (both technical and managerial). It also includes the provision of technical, commercial and managerial advisory services.

1.5. Public authorities and support to innovation policy makers: includes measures aimed at informing and raising the awareness of the importance of innovation and technology to politicians, senior officials, regional authorities, project and fund managers; improving performance and spreading innovation in the public sector and in government; promoting more active competition in the case of public invitations to tender; monitoring and analysis of innovation processes, results and impacts at the socio-economic level; comparative studies of innovation systems, policies and infrastructure. Actions encouraging the exchange of information and experience among the Member States and those stimulating the development of

harmonised statistical information systems, including regular surveys on innovation in industry, services and SMEs, are also covered.

1.6 Promotion of clustering and co-operation for innovation: actions dealing with intra-sectoral co-operation and collaboration. Includes aspects of promoting the dissemination of best practice, "cluster" and network development, measures facilitating the activities of trade organisations, development of sectoral information databases, etc.

2.1 Competition: involves measures designed to stimulate competition - one of the driving forces behind innovation. Measures covered include those designed to combat monopolies and to open and liberalise markets and those aimed at the deregulation of protected or compartmentalised sectors. Also covers measures which ensure transfer of technology and the exploitation of patents without undue distortion of competition; and harmonisation of the treatment of joint enterprises.

2.2 Protection of intellectual and industrial property: covers harmonisation of intellectual property protection systems; reducing complexity and costs associated with patenting and the maintenance of patents; hastening the formulation and adoption of standardised patent criteria and rules of legal protection; exchange of IP best practice; dissemination of awareness and information on IP protection and patents; support for legal costs of cases of patent infringement.

2.3 Administrative simplification: excessive bureaucratisation and administrative overheads are recognised as potential barriers to innovation. This category covers measures designed to streamline administrative practices and may include the provision of on-line application processes, specialised help-line or advisory services, "one-stop shops", simplification or transparency of eligibility conditions, simplified payment procedures, streamlined tendering procedures, etc.

2.4 Amelioration of legal and regulatory environments: this includes a broad range of measures including: modifications to Company Law; adoption and amendment of regulations and standards; promotion of performance standards and voluntary agreements; promotion of standards awareness and dissemination of information; harmonisation and streamlining of the legal environment; lifting of restrictions on the creation of new types of businesses and enterprises. Could also cover measures on the impact of legal and regulatory frameworks on innovation performance.

2.5 Innovation financing: provision of finance for innovation activities. Includes measures designed to deliver, or stimulate the delivery, of financial support for innovation, including: mobilisation of private capital, equity finance, venture and risk capital; promotion of investment into RTD; creation of guarantee mechanisms; operation of stock markets, especially for growth enterprises; dissemination of information; development of specialist training; provision of advice; schemes to disseminate best practice and experience.

2.6 Taxation: covers all aspects of the fiscal treatment of innovation, not only direct measures such as R&D tax credits but also indirect taxes, social security measures, etc.

3.1 Strategic vision of research and development: covers initiatives aimed at developing long-term strategic approaches to research and its applications, particularly those targeted more closely at growth sectors of the market (including services) and at relevant gaps in national markets. Examples include initiatives such as "Foresight", "Key Technologies" and "Delphi". Similar measures which foster broad-based discussion of potential technology options, generate industry/research/public-sector/training/financing and other networks and initiate interdisciplinary and inter-sectoral thinking are also covered.

3.2 Strengthening research carried out by companies: broadly involves measures designed to encourage and strengthen the performance of research within industry. This might involve schemes which involve: the participation of industry in the definition of national research projects; increasing the contract activities of universities and research institutes for industry customers; promoting industry participation in collaborative schemes such as EUREKA; direct and indirect institutional mechanisms.

3.3 Start-up of technology-based companies: actions for encouraging researchers and engineers to start up technology-based companies, within universities ("incubators" and "campus companies"), science parks or as spin-offs from larger firms. This will also embody aspects of measures for facilitating the spread of such practice (covering IPR, social rights, financial arrangements, administrative and legal simplification, etc.) and promotion schemes. Actions could also deal with the dissemination of best practice through pilot projects involving, for example, university technology-transfer departments and, the regional institutions concerned (e.g. local authorities, chambers of commerce), risk capital companies and technology brokers.

3.4 Intensified co-operation between research, universities and companies: includes actions which aim to promote the dissemination of knowledge between research institutions, universities and companies. This may cover the development of closer links between research and training (anticipating the needs of the productive sector); facilitating university company start-ups, legal and contractual arrangements between universities and public research organisations for the exploitation of results with industry; demonstrator projects; co-financing schemes and awards for academic/industrial research co-operation; stimulation of dialogue between the producers and users of technology (such as sectoral and inter-sectoral forums, technology clubs, etc.); creation and growth of science and technology parks, etc.