Co-operation and Collaboration in Europe: the Role of Sub Regional Collaborative Networks in Constructing the European Research Area

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(Based on a c*ontribution to the ES workshop on European Research Area, Regional Scientific Co-operation in Southeast Europe, Pathways for Stabilizing the RTD Potential held in Bucharest, 26 September 2003)*

1. Regional disparities of the scientific activities in Europe: rather natural but to what extent?

The construction of the European Research Area (ERA) needs, among other things, a clear view on the distribution of the scientific activities throughout the continent. A bibliometric study of the Observatoire des Sciences et des techniques in Paris[2] made by the end of the nineties has shown that one-third of the research was concentrated within only four regions of the European Union (EU): l'Ile de France, Baden-Würtemberg, Bavaria and Greater London. Sixty-eight regions out of the total of 445 regions in EU shelter 27% of the population but account for some 36% of the total gross national products and 57% of the scientific production in Europe! At the other end of the scale are seventy- two peripheral regions, representing 11% of the population, but responsible for only 0.3% of the technological production and 7% of the GDP. The picture comes out rather similar from the last comprehensive statistical study of the European Commission.[3] Obviously, it will not become less heterogeneous, if the mapping is extended to: 1/ the ten countries integrating the Union in May 2004, 2/ the three candidates for 2007 and their neighbours in Southeast Europe, and 3/ further to East to the republics of the Commonwealth of the Newly Independent States.

An even distribution of research activities and achievements is neither realistic nor necessary fruitful. The so-called Mathew effect is always present in the rather competitive game that is science[4]. However, one might ask the question: should be there a reasonable limit to the disparities beyond which they become dangerous for the efficiency of the whole Area?

Promoting *cohesion*[5], that is, decreasing the disparities between the privileged and less privileged parts of the Union, but also with respect to the 'associated countries', was written into the previous Framework programme documents as one of its general aims.

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[2] Laurent Carroué, Alternatives économiques, 188, January 2001

[3] Statistics on Science and Technology in Europe, 1991-2002, Luxembourg: Office of official publishing of the European Communities, 2004

[4] Eminent sociologist of science, Robert K. Merton, introduced this metaphor in his seminal paper from 1968. The Gospel according to St. Matthew said: '*For unto every one that hath shall be given , and he shall have abundance , but from him that hath not shall be taken away even that which he hath'*

[5] *Cohesion* can be understood as meaning of decrease in the disparities that exist amongst the countries in Europe as well as amongst the regions within them

Can this goal be pursued by the actual 6th Framework Programme (FP 6), which puts the accent on '*excellence*' rather than '*cohesion*'?

To some extent, the cohesion goals will be achieved by including some of the best scientists and institutions from Central and Eastern Europe into the pan European networks of excellence (one of the main targets of FP 6). However, many other aspects are at risk to be underestimated, among other things, the necessity of a better and more extensive co-operation within and among the European sub regions as warranty for securing regional relevant expertise, and local breeding ground for new talents and ideas[6]. In what follows, I shall elaborate in more concrete terms the case of Southeast Europe being, maybe, the most heterogeneous sub-region in Europe.

2/ Need of regional expertise

"*Why should scientists not look for partners, wherever they are, irrespective of their geographical location?*" This is a question that often arises when one is considering regional scientific co-operations, e.g. among the countries of Central, Eastern or Southeastern Europe[7]. That is quite a reasonable question, within the traditional framework of how academic science is conducted. Academic science- as creation of objective fundamental knowledge about the world- is a collective game, but driven by very individualistic players following the so-called CUDOS rules[8]. Like knights in the middle age, academic scientists are '*lonely seekers after the truth'* [9] trying to convince the sceptical peers that their findings are original and worthwhile. However, in their quest for new and original results, individual academics cannot avoid the building up of co-operations with colleagues sharing the same fundamental curiosity. If we agree without problems that there is a need for international co-operation- mostly with the developed countries of the EU- in order to rebuild the national scientific infrastructures that support academic science in Southeast Europe, can we argue objectively for the usefulness of a regional dimension, or should we support the idea simply because it seems '*politically-correct"*?

The world today is an arena for complex and interwoven economic, social and environmental issues. No national government or international organization could cope with them without appropriate *scientific expertise*. But the participation of scientists in the creation of such expertise involves skills that are quite different from those they need to carry out good academic science[10]. The CUDOS scheme drives academics to become experts in narrow fields, because specialization is the only strategy leading to original breakthroughs. For that reason alone, individual scientists are rarely able to act as

[6] We propose to the local sections and the working groups of Euroscience to contribute in developing the debate on these issues.

[7] S.Anguelov, Euroscience Newes, Number twenty 2002, p. 10

[8] CUDOS is the acronym for *Communality, Universality, Disinterestedness, Originality* and *Scepticism*; five principles, regulating the functioning of the invisible colleges building the corpuses of the various scientific disciplines; for a recent discussion, see John Ziman, *Real Science: what it is, and what it means*, Cambridge University Press 2000, and the original paper of Robert Merton, The Sociology of Science, University of Chicago Press, Chicago 1973

[9] John Ziman, *op.cit,.*

[10] Philippe Roqueplo, Entre savoir et décision, l'expertise scientifique, Editions INRA, Paris 1997

effective advisors when dealing with complex questions requiring urgent solutions. In the same time, they are the only 'actors' in the society capable of tapping into the archive of the objective knowledge that is needed to build up expertise[11]. They do this within panels of scientists, gathered from various specialized fields, which may propose appropriate solutions sometimes resulting from additional well-oriented research. **T**heir work as experts represents yet another social role, similar to the role in applying the results of basic science for military or economic goals. In these cases, the scientists are working as problem-solvers, pooling a large variety of competences in order to achieve concrete results.

While the role of the applied science in developing the economy in regions like Southeast Europe may not yet been quite clear, the building of expertise on a regional scale is obviously mandatory**,** *e.g.* in health care, environment, weather forecasting and the prevention of local natural catastrophes, clean and sustainable energy production, efficient transportation systems, etc. Scientific co-operation among regional academic institutions, working on collaborative projects in some fields of regional interest, can and should contribute to acquiring the problem-solving experience that is needed to provide regionally relevant expertise. Of course, it should go in parallel with and *via* the traditional fruitful collaboration schemes with big scientific countries of EU and the world at large, but with the clear understanding that there is never a knowledge available outside waiting only to be applied.

3/ Problems of transforming the national S&T systems in the Southeast European countries

The last thirty years are years of a transition, at least in the most developed scientifically countries, from the traditional scientific research by disciplines to trans- disciplinary and interdisciplinary organization of the Research and Development. The scholars like John Ziman[12] describe this process as a transition from academic to post-academic science. According to him, teamwork, networking and other modes of collaboration between researchers in different fields are not mere tributes to some new political fashion. They are the social consequences of accumulation of knowledge and technique. Science has progressed to a level, where its outstanding problems cannot be solved by individuals working independently and confined to their proper disciplines. What is more, these outstanding problems cannot be treated any more even by the national RDI systems alone. Others like Michael Gibbons[13] introduced the idea of the so-called second mode of producing knowledge, i.e. non academic one. For instance, he wrote: '*Experts must now extend their knowledge to widely disparate areas, and try to integrate what they 'know' now with what others want to 'do' in the future'.* It is easy to see that to a great extent this process is correlated to the increasing need of reliable scientific expertise discussed in the previous paragraph.

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[11] As often the economists put it: the objective knowledge is a public good, but not a free one; only highly-trained scientists could make a proper use of it

[12] J. Ziman, *op.cit.*

[13] see, for example, NATURE, vol.402, p.C82, 1999 and M.Gibbons et alii, The new Production of Knowledge, Sage Publications, London 1994

This transition to the '*new mode 2'*- or '*post- academic*' regime happens relatively smoothly, when and where the research -professionals educating institutions (mainly universities and other higher-education schools) are keeping at the highest possible level their basic- science disciplinary units. Only having a strong academic science as a ground, a country would be able to keep the pace with the transition to the post-academic modes of producing knowledge. As J.Ziman put it, "*The research apparatus of every "lonely seeker after truth" is integrated in fact, into an elaborated social apparatus, which contrives to be so transparent that remains invisible at first sight to the user. And this is exactly the problem of those who try to make 'good science' in countries with less developed or destroyed infrastructures*".

The good scientists in the countries with fragile RDI systems, as the SEE countries are, are very vulnerable. They are under double moral pressure: on the one hand, they have to keep the pace with the developments in their own narrow academic fields, make valuable contributions and receive the recognition of the peers, and on the other hand, to respond to the society demand for solving more and more complex practical problems.

It is interesting to note that the bibliometrical studies show that in the Central European Countries, now on the eve of full integration to the European Union, the main publication activities continue to be in the traditionally strong disciplines like mathematics, physics and chemistry with much less contributions to the life- and environmental transdisciplinary studies. Is it good for the countries or not? Do they need to change drastically the structure of the national research systems or they may continue along the traditionally strong paths? Unfortunately, it is not easy both to the scientific community and to Governments to solve the crucial problem of a small and fragile country, *i.e.* which basic disciplines- and to what extent- should be privileged out of the whole multitude, if and only if performance criteria within the academic disciplinary - organized science are applied[14]. In face of such a dilemma, the result could be a chronic under-funding of all disciplines, collapse of the knowledge-producing system, and gradual de-commitment of the Governments and societies. The solution, not always easy to be made alone on a national level, is to make choices and '*concentrate on a limited number of fields with approved strength in science with at least some potential of application in industry, and sufficient future potential'*[15]; in other words, to identify the Centres of excellence or competence of the country.

4/ Excellence versus Cohesion

[14] The same Michael Gibbons we mentioned above formulated the following rule of Gibbons: '**There is no known performance indicator which the Physics community cannot turn to its advantage before the next funding cycle**!"

[15] Gunther Tichy, in « Science and Society: charting the future », Proceedings of a Conference, organized by the Estonian Academy of Sciences (3-4 December 1998, Tallinn),

The role of the centres of excellence - as defined mostly by «their capacity to produce knowledge that can be used for industrial purposes » - in the global R&D activities is elucidated, for instance, in a paper of F. Meyer-Kramer. [16]

'*Whereas the 1980s were a period during which the internationalization of R&D was associated with decentralization and the 'dislocation' of activities, the 1990s are characterized by a continuing trend towards internationalization, accompanied by concentration, focusing and strategic emphasis. International enterprises that are leading performers of R&D are pursuing the strategy of a presence with R&D and product development at precisely those locations where the best conditions prevail, worldwide, for innovation and the generation of knowledge in their product segment or field of technology.* ***They are no longer satisfied with locations which 'just about keep up' with the global technology race; they deliberately seek out the unique centers of excellence.'*** This process is responsible at least partially of the increased heterogeneity of the scientific and research activities described in the first paragraph.

Unfortunately, Centres of that kind are rare in the whole region of the SEE countries. If existing on a modest scale, they also may have not a considerable impact on the local economy, because the production unities of the big multinationals with whom they are working are usually elsewhere. However, in Southeast Europe there are a good number of research institutes with excellent records not only in the basic research, but also in the applications related to their specific fields of activity. Some of them had extensive relations with the local industries. For various reasons, the majority of them were disconnected from the industrial co-operations, which existed before 1989, and are still seeking new relationships with modern small and larger-scale enterprises. The challenge was and still is to identify them and properly support them in their transition efforts. A useful and helpful action of the European commission aiming at identifying and supporting such kind of centres in the pre-accession countries has been carried out in 2000-02.

This was done by its Call for proposals for indirect RTD actions under the specific programme « Confirming the international role of Community research » (Inco):

'This programme aimed at putting the capabilities of the pre-accession countries (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia) at the *service of the social and economic needs of their region, in conformity with the interest of the Union as a whole* '. In this document (call identifier ICFP 99A1AM03) a Centre of excellence was defined as « *an existing working unit, either independent or functioning within a locally established research organisation of one of the countries concerned, having its own specific research agenda and preferably distinct organisational and administrative boundaries ».*

It is easy to note that the recommendations of Professor Tichy cited above gave a concise definition, which was not too different from the definition of the Centres of excellence of the European Commission. The procedure of proposals for Centres of excellence implied a competition among existing S&T institutions with research results acknowledged by

[16] F.Mayer-Kramer, "Internationalisation of Industrial R & D: Implications for STI efforts and Policies in Europe».Papers of EUROPOLIS Symposium, Maastricht 2000

their peers. The final selection was made by independent experts according to peer review schemes, so the attribution of the European label of excellence was not at all administrative. The support of the European commission to the national governments in identifying the excellence in their respective countries and supporting further the institutes chosen was *par excellence* a measure of cohesion. This operation demonstrated that what is '*excellence*' at a given level is '*cohesion*' at the level above, in other words, both kinds of measures are not excluding, but complementing each other[17].

Not only the selection of Centres of excellence in the pre-accession CEEC, but the very principle of project selection of the previous Framework programmes, having essentially "bottom-up" structure, stimulated the difficult process of national S&T priority setting, thus demonstrating the crucial role of the international cooperation and assistance by the European Union.

5/ Role of the regional networks within the UNESCO/ ESF/AE initiative for rebuilding the scientific co-operation in SEE

UNESCO has a long tradition in encouraging the co-operation in the world regions and sub-regions as a method for strengthening the security and stimulation of the development. Applied to the sciences, this approach found once again a concrete expression at the World Conference on Science held in Budapest in 1999. As a follow up specifically oriented to Southeast Europe (SEE) came the initiative of UNESCO and its Regional Bureau for Science in Europe, located in Venice and supported jointly by UNESCO and the Italian Government, for assisting the rebuilding the scientific co-operation among the countries in SEE and between them and the rest of Europe.

The so-called Venice process of rebuilding the scientific co-operation among the Southeast European countries and between them and the rest of Europe has essentially the same goals as the specific actions of the European commission described above with a stronger accent on the regional co-operation by encouraging the creation of regional networks, which may be considered as distributed Centres of excellence or competence. The process was initiated by UNESCO, ESF and Academia Europaea in November 2000, and officially launched at the Venice Conference of Experts (VCE) in March 2001[18]. It found the unanimous approval by the Ministers for Science and Technology of the countries concerned at the Round Table organized on 24 October 2001 in the framework of 31st General Conference of UNESCO with the participation of high representatives of EU member states and many supranational (European commission *e.g.*), international governmental and non-governmental (Euroscience *e.g.*) organizations[19]. The approval was reconfirmed by the Ministers or their representatives at the High-level Conference on the Co-operation with Southeast Europe held at UNESCO Headquarters, 4-5 April 2002.

[17] S.Anguelov, N.Kroo, P.Lasserre, P.Papon , Nature, 410, 627, 2001

[18] Reconstruction of the Scientific Co-operation in Southeast Europe, International Conference of Experts/ Proceedings, Pierre Lasserre and Simeon Anguelov, eds./ , Venice, Italy 2001 (copies available at UNESCO ROSTE)

[19] Proceedings of the Round Table of the Ministers of S&T of SEE countries, October 2001, Paris (copies available at UNESCO ROSTE)

All these events, in parallel to others organized by some countries (Austria, Germany, Greece and Italy, for instance) and the European Commission, created a political will in the Ministries for Science and Technology of the countries concerned to join their efforts in revitalizing the national S&T systems by a stronger intra-regional co-operation and co-operation with the rest of Europe for active participation in the construction of the European Research Area.

A series of meetings (Sofia, December 2001, Bucharest, April 2002 and finally Sofia, September 2002) of the Ministers responsible for the Science and Technology of nine countries of the region (Albania, Bosnia & Herzegovina, Bulgaria, Croatia, FYR of Macedonia, Greece, Romania, Yugoslavia and Turkey) were the concrete expression of this dynamics. They ended up with the adoption of an Action Plan, which contains, among other things, the recommendation that: "*Synergies will be ensured with the already existing and working task forces of experts, created with the support of UNESCO and its Regional Bureau for science in Europe (ROSTE), aiming at joining efforts to raise funds and organize a* ***donor's conference together with the RRCC for SEE***."

VCE-2001 identified some priority fields for co-operation among the SEE countries and between them and the rest of Europe: life sciences, environmental sciences, computer science and information technologies, materials science, sustainable development, social sciences. The Ministerial meetings recognized the up- grading of the electronic communication and research infrastructures and equipment as central priority for the region. According to them, the strategy of the reconstruction of the scientific co-operation among the SEE countries and between them and the rest of Europe may be represented as a development of three successive layers:

- a modern regional educational and research electronic network compatible with GEANT[20] as a base for any collaboration;
- networks of the properly up-graded research infrastructures in the priority fields;
- collaborative projects based on the two previous layers, aiming at solving some important problems for the region.

UNESCO/ESF/AE Task Force of Experts has been created to assist the implementation of the decisions taken. It charged some a*d hoc* Working Groups to elaborate proposals for development of a Regional Electronic Educational and Research Network and for up-grading the Research Infrastructures, thus creating conditions for identifying and encouraging the *excellence* throughout the region.

In the field of the electronic communication systems, the intention of UNESCO is to contribute to the definition of an overarching project or policies, helping the countries from the region to build a Regional Educational and Research Network capable to provide up to date services to the scientific communities. This should be done together

[20] GEANT stands for Gigabit European Academic Network. It is Gigabit oriented, meant to follow up the new wave of Terrabit connections in general and in the perspective of GRID computing projects in particular.

with other initiatives of the same nature promoted by the Greek Educational and Research network, GRNET, CERN, and the Max Planck Institute of Physics "Werner Heisenberg" in Munich. For instance, UNESCO Communication Sector together with the European Space Agency is proposing now a resolution of the connectivity problems by using satellite connections, whose prices became rather competitive**.** The use of satellites does not imply that the consensus on the priority of developing terrestrial fibre optics linkages is no longer valid; rather, it could be considered as a temporary and complementary solution.

The WG on the infrastructures made considerable work aiming at[21]:

- Identifying the research equipment necessary to enable the participating institutions to carry out common research on the principle of complementariness of the equipment;
- starting the definition of collaborative projects for solving important regional problems as it was recommended by VCE;
- proposing steering and standing committees of coordination of the future networks;
- proposing programmes of exchange and training of scientists, mostly young ones.

Up to now six proposals for creation of such sub-regional networks- containing reviews on the state-of-the-art in the respective fields, and estimations of the financing needed both for up- grading of the research equipment and some programmes for exchanges and training- have been approved:

SEE Functional Materials Network (FUMANET)

SEE Molecular Biology and Genetics Network

SEE Plant Biology and Plant Biotechnology Network

SEE Network for Earthquake Hazard Mitigation

SEE Network for astronomic observations and training

SEE Network for S&T Indicators and Statistics for Science Policy making

Natural sciences– based research for better health, healthier food production or sounder environment and sustainable development is rather regional-relevant. However, the co-operation in some transdisciplinary fields could be beneficial not only for the concrete problem-solving, but also for stabilizing the basic-science supporting infrastructures, including the human resources.

[21] The results of the first stage of the work are presented in a Report to the Director of ROSTE of Pierre Papon and Simeon Anguelov in September 2002 (copies available at UNESCO ROSTE).

Putting the selective stabilization and up-grading of the local research infrastructures and equipment facilities in the heart of the problem of reconstructing the scientific cooperation within the SEE countries and between them and the rest of Europe outlines well the logic of the initiative: good and meaningful projects should help the revitalization of the research capacities and stabilize the human resources and *vice versa*.

6/ EU-Balkan Countries Action Plan in Science &Technology

Another framework for co-operation among and with the SEE countries, complementing the one described in detail above, has been elaborated under the Greek Presidency of the European Union in the first half of 23003[22]. The Action Plan adopted in Thessaloniki in June 2003 "*specifies the objectives and the thematic priorities for the main goals, identifies the potential instruments for implementation of the policy and provides for the preparation of annual Workprogrammes of the actions to be undertaken"*. It refers to various actors, including UNESCO, and initiatives, which should collaborate in its implementation.

7/ Conclusion

Appropriate strategies for enhancing the regional scientific co-operations in Europe could be an important mean in the construction of the European Research Area; the underlying philosophy being that some geographical continuity and homogeneity is necessary for the viability of the overall structure. In doing this, it is a challenge to make better use of the various co-operation programmes and initiatives available. The scientists are asked to break the walls separating the traditional disciplines and to collaborate with their colleagues from other disciplines for solving some regional problems. The supranational and international governmental and non-governmental organizations might be asked in their turn to be more flexible in the collaborations with their sister organizations. Some efforts of EUROSCIENCE may be very useful in realizing such ambitious, but worthwhile goals.

[22] EU-Balkan Countries A1ction Plan in S&T, adopted at the Ministerial Conference in Thessaloniki (26-27 June 2003), Dr Georges Bonas editor.