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Contents

1 Introduction

This country report is produced by the "Information Office of the Steering Platform on Research for Western Balkan Countries" and reviews the situation of Science and Technology (S&T) in Croatia.
The report summarises the main papers published by the United Nations Educational, Scientific and Cultural Organisation (UNESCO), the South-East European ERA-NET (SEE-ERA.NET), the Austrian "Gesellschaft zur Förderung der Forschung", and several independent scholars on the issue of S&T in Croatia. For the complete table of references please see References in chapter 8, starting on page 40 of this report.

The objective of this study is to enhance our understanding of the national innovation system in Croatia. An overview of the situation in S&T regarding the main stakeholders, input and output indicators, the national strategies and priorities and the main documents and laws in the field is given below.

The 'system of innovation' approach was taken into account when compiling this report, and covers important factors influencing the development, diffusion and the use of innovations, as well as the relations between these factors. It does not place emphasis on individual firms or research organisations, but rather on innovation as an interactive and interdependent process.
Relevant organisations in this respect are firms, higher education institutions, government agencies, etc. interacting to create knowledge and innovation. The macro-level of the system is analysed using indicators such as R&D personnel ratios, R&D expenditure, patent application intensity rates, etc.

The report was compiled in autumn 2006 by the Information Office and reviewed by the following actors:
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1.1 Croatia – A Brief Profile

Before the dissolution of the SFRY (Socialistic Federative Republic of Yugoslavia), Croatia was (after Slovenia) the most prosperous and industrialised region in the country. The economy emerged from a mild recession in 2000 with tourism, banking and public investments leading the way. Although the macroeconomic situation has largely been stabilised, structural reforms generally lag behind.
Today, Croatia is a presidential, multi-party parliamentary democracy with a population of 4.4 million and a GDP of EUR 30.95 billion in 2005 or EUR 6,968 per capita. Administratively, the country is divided into 20 counties (županije) plus the city district of the capital Zagreb. The Croatian population represents about 0.96 % of that of the European Union, while its economy in 2005, was about 0.28 % of the EU's in GDP terms. According to the European Union's official stand, the country is a functioning and stable democracy. Following the

launch of accession negotiations, Croatia needs to focus on the substantial tasks ahead in terms of adopting EU legislation and building the administrative structures and capacity necessary for its correct enforcement' (Becic, Svarc 2007; European Commission 2006).

Croatia has undergone a difficult de-industrialisation process since gaining its independence. The importance of industry, including the energy sector, declined to some 23.2 % of total gross value added (GVA) in 2005, while the service sector represented about 64 % of total GVA. The share of agriculture, hunting and fishing has slowly declined during the last few years, but still stood above 7 % of total GVA in 2005. Overall, Croatia is an open economy and its main trading partners are from the EU (accounting for over 50 % of all imports and exports) – its most prominent partners being Italy, Germany and Austria, while Croatia itself also represents the EU's main trading partner in the Western Balkans region. Moreover, since the opening of the EU market under the Autonomous Trade Measures in 2000 and the trade provisions of the Stabilisation and Association Agreement in 2002, trade between the European Union and Croatia doubled between 2000 and 2004. In 2005, the European Commission concluded that Croatia is a functioning market economy able to cope with competitive pressure and market forces within the Union, provided that it continues to implement its reform programme to improve the remaining weaknesses. There is, however, a potential risk to Croatia's macroeconomic stability due to certain external and fiscal imbalances. Furthermore, administrative and judicial barriers need to be removed in order to allow the development of a more prominent private sector and to encourage foreign direct investment. In addition, state interventions in the economy remain significant and little progress has been made with regards to large state-owned enterprises, thus the strengthening of financial discipline within state-owned enterprises remains a particular economic policy challenge. It is clear that Croatia will need to address the identified weakness with much will and determination (Becic, Svarc 2007; European Commission 2006).

1.2 Relations between Croatia and the EU

Croatia was the second country to sign a Stabilisation and Association Agreement (SAA) with the EU in October 2001, an agreement which entered into force in February 2005. The SAA is an essential instrument for the EU's Stabilisation and Association Process with the Western Balkans, providing a contractual framework for relations between the EU and Croatia, until Croatia's final accession to the EU. Full implementation of the SAA will aid Croatia in its preparation for EU membership, while the progress and dynamics of the integration process will depend upon Croatia's fulfilment of its SAA commitments. The European Commission will help Croatia in the implementation of the agreement by providing technical advice and financial assistance (European Commission 2006).

Croatia presented its application for EU membership in February 2003. The Commission published its response to the application in April 2004, maintaining that Croatia is both a functioning democracy and a functioning market economy, which should not face major difficulties in complying with the objectives of the

acquis, providing it continues in its efforts to make the necessary adjustments. Following the positive assessment by the Commission, the European Council of June 17-18, 2004 decided that Croatia should receive candidate country status. However, there was still one important pending issue between the EU and Croatia that needed to be resolved before the country could actually start the negotiation process – full cooperation with the ICTY (UN International Criminal Tribunal for the former Yugoslavia). A positive review of such cooperation arrived on October 3, 2005 allowing the Council to open negotiations with Croatia that same day. The first stage of negotiations – the so called "screening" – enables the EU to decide to decide when to open individual chapters for negotiations. The first field to face scrutiny after the negotiations were officially opened was cooperation in Science and Research (Chapter 25), which opened and (temporarily) closed on June 13, 2006. The draft screening reports have been transmitted to the Council for discussion within the Member States. The degree of convergence between the national policy of Croatia and the European Research Area was satisfying and no major difficulties in accepting the EU *acquis* on research are expected. Overall assessment of the current situation in the field of science and research was very good; Croatia has expressed determination to further increase the level of financing of the sector and to fulfil all remaining prerequisites for cooperation with the European Framework Programmes for S&R. A milestone in this respect was Croatia's accession as a fully associated country to the Sixth Framework Programme (FP6) for the remainder of 2006. The next chapter scheduled in the negotiation process for Croatia will be Education and Culture (Government of the Republic of Croatia 2006b).

As a candidate country, Croatia benefits from all three pre-accession financial instruments – Phare (*Pologne, Hongrie Assistance à la Reconstruction Economique)*, ISPA (Instrument for Structural Policies for Pre-Accession) and SAPARD (Special Accession Programme for Agriculture and Rural Development). Croatia was also eligible for the CARDS Regional Programme in 2005 and 2006. Pre-accession financing was estimated at EUR 105 million in 2005 and EUR 140 million in 2006, which represents a substantial increase in overall EC assistance compared to the amounts pledged by CARDS (EUR 60 million and EUR 62 million in 2005 and 2006 respectively). An overall total of EUR 262 million was allocated to Croatia from the CARDS programme between 2001 and 2004 (European Commission 2006). From January 1, 2007, the Commission will use a new financial tool, the Instrument of Pre-Accession (IPA), for promoting modernisation, reform and alignment with the *acquis*. This will entirely replace all previous assistance instruments – such a single set of rules and procedures with emphasised flexibility should result in greater impact and value for money in the allocation of EU funds. 'As a region, the Western Balkan countries and Turkey will benefit from almost EUR 11.5 billion of pre-accession financial instrument money between 2007 and 2013.

Under the objectives laid out in the Negotiating Framework, the negotiations will be based on Croatia's own merits and the pace will depend on the country's progress in meeting the membership requirements. Although the shared objective of the negotiations is accession, the very nature of discussions implies an open-ended process whose outcome cannot be guaranteed beforehand (European Commission 2005b). The European Council laid out the principles, priorities and conditions for all principal areas regarding the Accession

Partnership with Croatia in its decision of February 20, 2006. A distinction was made in terms of defining short-term and medium-term priorities, the former to be accomplished within one to two years and the latter within three to four years. Science, research and education were placed amongst medium-term priorities, advising the country to start designing and applying an integrated research policy, to step-up its efforts for creating a modern vocational education and training system and to ensure the implementation of the Bologna criteria for higher education (European Council 2006).

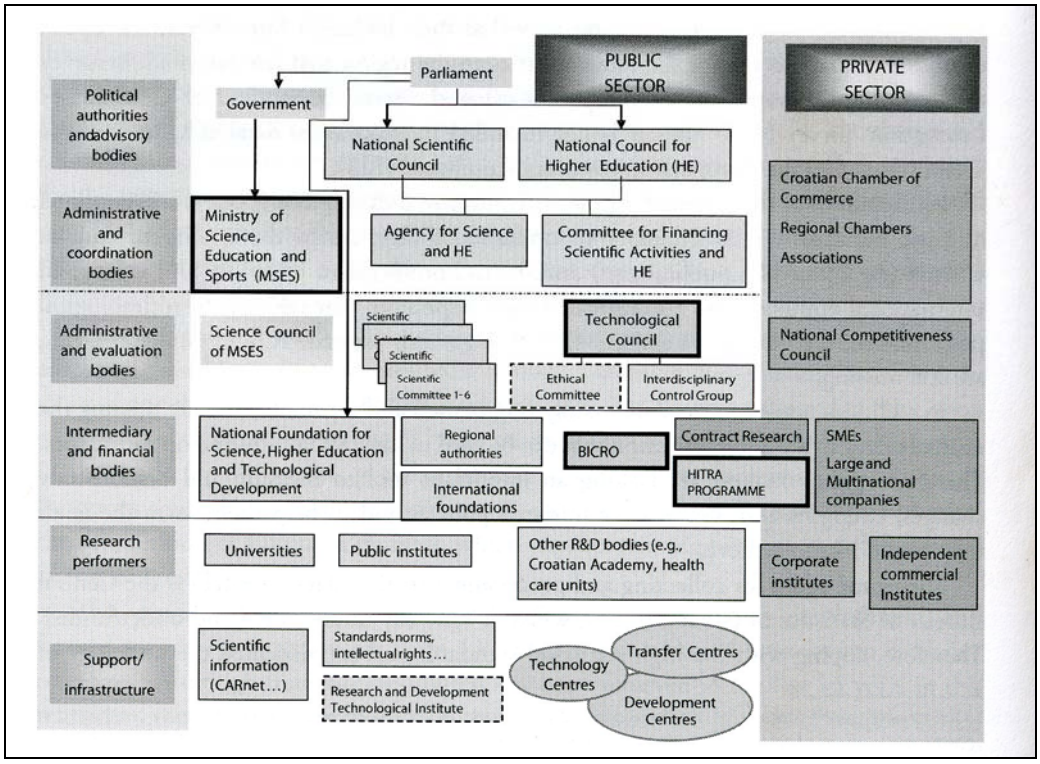
The 2006 "National Programme for the Integration of the Republic of Croatia into the European Union", which is the fourth annual national programme for the implementation of the SAA, has also laid out ongoing and upcoming activities for the Ministry for Science, Education and Sports regarding the creation of required capacities in the field of RTD (The Government of the Republic of Croatia 2006). Implementation capacity refers to the conditions necessary for effective participation in the Framework Programmes, thus in the field of RTD, Croatia will need to create attain a certain implementation capacity, including an increase of personnel for the Framework Programmes´ activities. Due to its specificity, the *acquis communautaire* in the field of science and research does not require any transposition in the national legal order (European Commission 2004).

It is rather difficult to predict the possible accession date for Croatia, bearing in mind the internal issues within the European Union that need to be resolved before accommodating any new members after 2007 (under the Treaty of Nice, the EU can function with no more than 27 member states). This problem would have been solved with the approval of the EU Constitution in all 25 EU member states, but its rejection has made any future accession more difficult, requiring additional administrative reforms. Nevertheless, the closure of negotiations for all 35 chapters of the *acquis communautaire* is expected in 2008 or 2009, while the signing of the Accession Treaty could happen the following year. A new EU Treaty, which has been set for 2009, should erase any legal obstacles currently preventing Croatia's accession to the European Union.

2 Contemporary Institutional Landscape

After experiencing typical transitional problems in the field of S&T, Croatian official policy has started to pay this field more attention since the year 2000. The infrastructural system for promoting RTD (research and technological development) in Croatia has been enhanced with a variety of new institutions. Institutional measures for the formation and strengthening of the national system are ongoing and will also continue in the future (Dall 2006).

Figure 2.1: Institutional Set-up for R&D in Croatia (Becic, Svarc 2006)



2.1 Main Stakeholders Involved in Policy Making in Croatia

Over the last few years, measures have been implemented to create new institutional capacities in the Croatian innovation system and to strengthen the existing ones. Numerous initiatives have been promoted and it is almost impossible to track them all. The national network of institutions engaged in the development, transfer, application and financing of new technologies and innovative entrepreneurship is constantly being updated and enlarged (Dall 2006).

At the end of the year 2006, the infrastructure of the S&T stakeholders in Croatia included 26 public research institutes, five technological centres, one business and innovation centre, seven research institutes in industry and six private scientific institutes. The Croatian higher education system comprises seven universities (including 81 faculties, academies and other accredited constituent parts offering programs of study), 16 public colleges and polytechnics and 16 accredited private schools and polytechnics (Becic, Svarc 2007; Government of the Republic of Croatia 2006c). Furthermore, there are about 50 legal scientific research entities (in business, cultural, health and state institutions), the Interuniversity Centre in Dubrovnik (an association of about 200 Croatian and foreign universities), the Croatian Academy of Sciences and Arts, the Medical Academy, the Academy of Technical Sciences, the National and University Libraries, and the Croatian Academic and Research Network (CARNet) - a large network of Croatian academic and research institutions (European Commission 2004).

Science and research in Croatia are under the authority of the Ministry of Science, Education and Sport (MSES). Administration and other tasks related to R&D are carried out by the following Ministry units: The Science Directorate, The Directorate for Higher Education, The Directorate for Information Society, and The Directorate for International Co-operation.

The National Science Council and the National Council for Higher Education are advisory bodies which formulate and monitor the functioning of R&D programmes and higher education organisations. The National Science Council appoints Scientific Field Councils for Natural, Technical, Biomedical, Bio-technical and Social Science, Humanities and Art. The MSES carries out administrative activity along with other tasks concerning the development of scientific research, scientific-technical information and communication. For example, the ministry works for the foundation and development of science and the application of scientific achievements, it harmonises the financing programmes for permanent research activity, contracted projects and scientific projects of special interest, as well as planning, harmonising and developing IT activity and its integration into the overall information system in the Republic of Croatia. In addition, the MSES monitors, documents and implements scientific, technical and technological cooperation with foreign countries and international organisations according to international agreements, it sends Croatian experts abroad and helps to integrate foreign experts with activities in the Republic of Croatia. The Ministry prepares draft laws and ordinance in the areas of science, research, technology, education and sport to be submitted to the Croatian Parliament by the Government of the Republic of Croatia. The MSES also manages the budgetary funds for these areas (European Commission 2004).

In July 2004, the government established the Agency for Science and Higher Education which carries out administrative tasks related to the evaluation of scientific activity, scientific projects, collaborative scientific programmes and higher education,. It also carries out tasks related to the National Network for Quality Assurance of Higher Education and its integration into the European Quality Assurance Network. The agency is a state institution with autonomous powers to carry out the aforementioned tasks for the National Science Council and the National Council for Higher Education, thus complying with the European standards in science and higher education. The act envisages the National Science Council as a strategic body responsible for the development and the quality of overall scientific activity in Croatia. Its major functions are to evaluate scientific organisations, to determine scientific disciplines and interdisciplinary fields of science and arts, setting detailed requirements for attaining authority to conduct a procedure for appointment into science ranks, evaluation of scientific projects, collaborative scientific programs etc. The National Science Council shares the task of submitting proposals to the Croatian government on the allocation of budgetary financial resources for scientific activity and higher education with the National Council for Higher Education.
The Technology Council of the MSES focuses on the establishment of a national network of institutions engaged in the development, transfer, application and financing of new technologies. It also works to gain specific measures of governmental support for technological development and innovative entrepreneurship.

Regarding industrial R&D and innovation, the Business and Innovation Centre of Croatia (BICRO) is of central importance – it focuses on financing technology development programmes, such as RAZUM (which supports the development of knowledge- and new technology-based enterprises) and the promotion of Venture Capital in Croatia (which emphasises the commercialisation of R&D results and the development of private firms and research organisations), BICRO also finances the development of technology centres, incubators and R&D centres (which support the development of local technology-based companies), as well as sponsoring the "Research and Development Programme" (grants for financing of research projects of SMEs) (European Commission 2004).
In March 2006, the government founded the Croatian Institute of Technology (CIT) under the authority of the MSES. The institute was founded in order to assist the government in its ambitious aim to develop Croatia into a contemporary, S&T oriented economy. In line with the official S&T policy objectives, the role of CIT will be co-ordinated with the role of the future European Institute of Technology (EIT). Hence, CIT will mainly focus on strengthening the education, research and innovation sectors (i.e. the "knowledge-triangle") by integrating the contributions of various important stakeholders in their unique goal of creating a knowledge society. CIT has also been entrusted to implement TEST (a sub-programme of HITRA – the Croatian Innovation Technology Development Programme, which deals with technology research and development) (CIT 2006).
Business related affairs are also dealt with within the Euro Info Correspondence Centre (EICC) Zagreb. The main activity of the EICC is to inform, advise and assist SMEs on EU legislation and other non-legal related affairs of practical importance. EICC Zagreb is hosted and financed by the Croatian Chamber of Economy and co-financed by the European Commission (CARDS). It is part of a large group of more than 260 Euro Info Centres and 13 Euro Info Correspondence Centres located in 40 European and Mediterranean countries (EICC Zagreb 2006).

Another very important funding body in the field of science is the National Foundation for Science, Higher Education and Technological Development of the Republic of Croatia (NFS). This organisation was established in 2001 with the objective of promoting science, higher education and technology development, as well as strengthening the links between research institutes, higher education institutions and industry. The NFS supports scientific, higher education and technological programmes and projects, with the aim of producing innovations and patents. It also provides student grants and promotes mobility. The NFS contributes to Croatia's transformation into a society of knowledge, enhancing the development of a globally recognised research and knowledge-based economy through the strategic investment in people and ideas essential to outstanding research, and through its support of projects which could foster the development of Croatia (NFS 2006).

The Ministry of Science, Education and Sport co-ordinates work with other involved ministries. For example, the Ministry of Economy, Labour and Entrepreneurship manages budgetary funds and adapts policies in education and science to suit economic needs. The Ministry of Defence funds the Institute for Research and Development of Defence Systems. The Ministry of Finance is engaged in removing a number of regulatory constraints in order to create an

environment conducive to investors and to promote the development of venture capital in accordance with the government's EU Accession Action Plan (World Bank 2005b).

Control over the proper implementation of innovation and technology programmes and initiatives is executed by the Interdisciplinary Control Group and the Committee for Ethics in Science and Higher Education (Government of the Republic of Croatia 2003b; Ministry of Foreign Affairs and European Integration of the Republic of Croatia 2005). Other important institutions within the framework of the Croatian innovation system are the National Competitiveness Council founded in February 2002; the Agency for Science and Higher Education, the Agency for Accreditation and Quality Assurance established in 2004; and the Croatian Innovation Council and the Croatian Accreditation Agency, both established in 2005 (National Competitiveness Council 2004; World Bank 2005a, 2005b). Furthermore, the Croatian innovation system is supported by the Croatian Standards Institute, the State Office for Metrology, the State Office for Intellectual Property Rights and the State Bureau of Statistics. Jointly, the aforementioned institutions create the core technical infrastructure necessary for technological and innovation development (Svarc, Becic 2006).
The Croatian Academy of Sciences and Arts comprises nine scientific departments, 25 councils/committees and 20 research units. The "Ruđer Bošković" Institute is the most renowned non-university public research centre in the country. Scientific centres of excellence are a new feature envisaged by the new Science and Education Act passed in 2003. These centres should comprise groups of scientists or scientific organisations which have been assessed by relevant evaluation bodies and proclaimed centres of excellence by the minister. As an additional method for encouraging innovation, higher education institutions and scientific institutes establish technology parks in order to commercialise scientific results, encourage cooperation between scientists and the business community, and enhance the knowledge-based economy (Dall 2006).

Table 2.1: Main S&T Stakeholders of Croatia (Becic, Svarc 2007; Dall 2006)

The main ministry in Croatia with control over S&T:	- Ministry of Science, Education and Sports - National Science Council - National Council for Higher Education
Other ministries with importance to the S&T sector:	- Ministry of Finance - Ministry of Economy, Labour and Entrepreneurship - Ministry of Defence
Other important stakeholders:	- Business and Innovation Centre of Croatia (BICRO) - National Foundation for Science, Higher Education and Technological Development - Council for the Financing of Scientific Activity and Higher Education - Croatian Institute of Technology (CIT) - Technology Council of MSES - Croatian Innovation Council - National Competitiveness Council - Committee on Education, Science and Culture

	- Committee for Ethics in Science and Higher Education - Technology and Innovation Centres (Centre for Technology Transfer (CTT), Zagreb; Technology Centre Split (TCS); Centre for Innovative Technology Rijeka (TIC); Technology and Innovation Centre, Osijek) - Research and Development Centre for Mariculture, Dubrovnik - Agency for Science and Higher Education - Research and Development Technology Institute - Committee for Ethics in Science and Higher Education - National Network for Quality Assurance of Higher Education - Rector's Conference - State Office for Intellectual Property Rights - Croatian Accreditation Agency - Croatian Standards Institute - State Office for Metrology - Agency for Accreditation and Quality Assurance - Central Bureau of Statistics (CBS) - Croatian Innovation System Group - Croatian Academy of Sciences and Arts (HAZU) - National and University Library - Croatian Academic and Research Network (CARNet) - Institute "RUĐER BOŠKOVIĆ" - Interuniversity Centre of Dubrovnik - Euro Info Correspondence Centre (EICC)
Universities:	- University of Zagreb - University of Split - University of Rijeka - University of Osijek - University of Zadar - University of Dubrovnik - University of Pula

2.2 International Cooperation

Croatia has been experiencing a constant renewal of international cooperation and support, especially in the last five years. This cooperation has been substantially supported by many international organisations, as well as through the assistance of developed countries in bilateral programmes (also providing significant benefits to the R&D sector). The largest part of financial support in this respect came from the funds of the Stabilisation and Association Process, the

CARDS programme, the Stability Pact for South Eastern Europe, the European Investment Bank, and the European Bank for Reconstruction and Development.
The European Union's Tempus programme has been important in the area of higher education, while Croatia's inclusion into the Framework Programmes for R&D and the European Research Area (ERA), has also been of particular importance. Inclusion of the country into the European Investment Bank's Innovation 2000 Initiative ought to prove useful as well. Regarding multilateral cooperation in the area of science and research, Croatia has established close cooperation with many specialised United Nations (UN) agencies, such as UNESCO, UNIDO, UNDP, UNECE[1], while some other international organisations, such as the World Bank, have also been important donors and have helped in the area of R&D (Uvalic 2006).
The Croatian Ministry of Science, Education and Sports allocates a relatively small percentage of its budget to international S&T cooperation (0.45% in 2001, increasing to 0.62 % in 2005) (Becic, Svarc 2007). At the time of drafting this report, there were about 176 ongoing international projects, involving approximately 600 researchers, or about 3-4 Croatian scientists per project. The number of research scholarships based on bilateral inter-governmental programmes has been increasing in recent years, and amounted to 143 in 2002. 15 scholarships were awarded under the Marie Curie Programme (mobility within the FP6) in 2004 and 2005. Moreover, there has been an increase in the number of scholarships for foreign researchers coming to Croatia: in 2002, 98 scholarships for 523 research months were granted on the basis of bilateral inter-governmental programmes. The most frequent countries and regions participating in exchange of R&D personnel are Slovenia, Hungary, Austria, Germany, France, the United Kingdom, and the USA (Uvalic 2006).

The European Research Area (ERA) was established with the objective of creating a genuine "internal market" in research in order to increase pan-European cooperation and co-ordination of national research activities. The main financial instruments of the ERA are the EU's Research Framework Programmes (EurActiv 2006). In FP5, Croatian participation was limited, mostly due to its third country status - the European Commission approved only 9 projects with consortium members from Croatia. In FP6, although still with a third country status, Croatian partners significantly increased their activities. Between 2002 and September 2005 Croatian scientists submitted 417 project proposals, of which 98 proposals received a positive evaluation and 47 contracts were signed.
Croatia has demonstrated a high absorption capacity for FP6 projects and is one of the most successful countries in the region in terms of its utilisation of EU financial resources. As a fully associated member state, Croatia has participated in FP6 with 6.4 million euro in 2006, of which 3.18 million euro was provided by the state budget and the remaining came from the PHARE programme. Between 2003 and July 2006, Croatian scientists concluded 95 research contracts with a total value of 7.8 million euro. Only in 2006, did the total value of research contracts amount to 3.6 million euro, exceeding the national contribution (MSES 2007 according to (Becic, Svarc 2007))
According to statistics, the greatest absorption capacities were in the fields of Information and Communication Technologies, Medicine and Biotechnology, Food Biotechnology, Constructions, Microelectronics and Physics (EurActiv 2006).

[1] Please see the List of Acronyms, chapter 9.

Following a positive evaluation by the European Commission, partners from Croatia are eligible to request the reimbursement of costs for the MSES proposal preparation. The activities of the National Contact Points for the Framework Programmes are carried out by the MSES Department for European Integration. The dissemination of information about FP6 is mainly performed through workshops at higher education institutions and research institutes, and through video-conferences. In March 2005, the MSES submitted a Memorandum of Understanding for full participation in the FP6 to the European Commission, in order to change the *"third country"* status into the *"associated candidate country"* status (Uvalic 2006). The memorandum was signed in autumn 2005 and consequently, the EC announced that, depending on the accomplishment of internal procedures, Croatia can participate as an Associated Candidate Country and receive Community contribution in all FP6 projects contracted after January 1, 2006 (MSES 2006a).

Upon expiration at the end of 2006, FP6 will be replaced by FP7, designed to help the EU fulfil the goals set in Lisbon and become the backbone in the construction of the European knowledge economy. FP7 will run from 2007 – 2013, with the main objective of achieving the European Research Area by 2010 (EurActiv 2006).

Croatia is also participating in SEE-ERA.NET – a fully fledged regional ERA-NET co-ordinated by Austria, and funded by the European Commission for a period of five years. The programme came into operation on September 1, 2004 and incorporates 17 partners from 14 countries. The Croatian SEE-ERA.NET partner is the Ministry of Science, Education and Sports. The idea behind SEE-ERA.NET is to co-ordinate existing bilateral science and technology agreements and corresponding unilateral activities, which on their own often lack the level of threshold needed to progress and make unnecessary repetitions. Isolated activities are thus intended to be brought together under a system of flexible multilateral initiatives to support regional RTD cooperation. The regional approach adopted by SEE-ERA.NET was an attempt to compensate for the general lack of regional (i.e. international sub-European) RTD cooperation opportunities. It ensued with the inauguration of the FP6 for RTD and the introduction of its new main instruments, and aimed in particular to complement the modest RTD cooperation opportunities in the Western Balkans provided under FP6 (the region is due to gain more importance under FP7). Finally, SEE-ERA.NET aims to bring bilateral cooperation programmes to the level of multilaterally co-ordinated RTD collaboration activities (Schuch 2006).

Croatia has been a full member of COST (European Co-operation in the field of Scientific and Technical Research) since 1992; its partners are currently participating in over 50 COST actions co-financed by the MSES. Throughout the last decade, COST has developed into one of the largest frameworks for research cooperation in Europe, with over 200 actions and 30,000 scientists from 46 countries involved in various projects. Croatian partners have also participated in the EUREKA programme with 15 projects, eight networks, and two cluster projects. Croatia gained full membership status in the EUREKA programme in 2002 and the MSES has co-financed all EUREKA projects that received positive evaluation. National contact points for all mentioned programmes are at the MSES Directorate for International Co-operation (MSES 2006a).

In the field of higher education, Croatia has been actively involved in the Tempus III programme – the 36 Joint European Projects approved for Croatia include

Curriculum Development, Institutional Building and University Management. Up-to-date statistics show that Tempus projects contributed to increased inter-university cooperation (MSES 2006a).

Other international organisations which have cooperated with Croatian partners in the field of science and research include the IAEA (International Atomic Energy Agency) working on infrastructural projects, scientific research and regional projects, as well as having prepared an additional five project proposals for the new biennial project cycle 2007/2008; UNECE (UN Economic Commission for Europe), which established cooperation through work groups and seminars, as well as through an international conference on technology transfer held in Zagreb in 2001; and NATO. There is also ongoing cooperation with the World Bank (TAL-2) within the *Science and Technology Project*, a project of high priority for the development of the national innovation system. Croatian teams participate successfully in various multilateral scientific organisations such as CERN (Geneva), the International Centre for Theoretical Physics (Trieste), and the International Centre for Genetics and Biotechnology Engineering (Trieste) (Uvalic 2006). The wide range of international organisations which have established cooperation with Croatian scientific institutes in the last decade also includes the ICSU (International Council for Science), the IUPAC (International Union of Pure and Applied Chemistry), the EERO (European Environmental Research Organisation), the ALLEA (All-European Academies), the IAP (Inter-Academy Panel), the IAMP (Inter-Academy Medical Panel), the UAI (*Union-Académique International*) etc. In the period between 1991 and 2003, the MSES signed 49 bilateral agreements and co-operative programmes in the area of science, technology and higher education. Croatian higher education institutions, as well as the Croatian Academy of Sciences and Arts also have their own cooperation agreements with foreign partners (European Commission 2004).
Good cooperation has also been established with the German Research Foundation (*Deutche Forschungsgemainschaft*) through Research Units (DFG *Forschergruppen*), Collaborative Research Centres (*Sonderforschungsbereiche*, SFBs) and DFG International Research Training Groups (*Internationale Graduiertenkollegs*, IGKs), of which, the Research Units are the most flexible instrument of these co-ordinated programmes, as they bring together a group of five to ten individual research projects. In the scope of the SFBs, Croatian scientist could theoretically act as project leaders (NFS 2006).

In the field of intellectual property, Croatia has been cooperating in the CARDS 2002 Regional Project – "Industrial and intellectual property rights". The total value of the project was EUR 2.25 million. Although originally envisaged for a duration of three years, the project was later extended according to a European Commission initiative, and expired in December 2006. The focus during the last year of implementation shifted from educational activities to promoting expert cooperation between the region's countries (SIPO 2006).

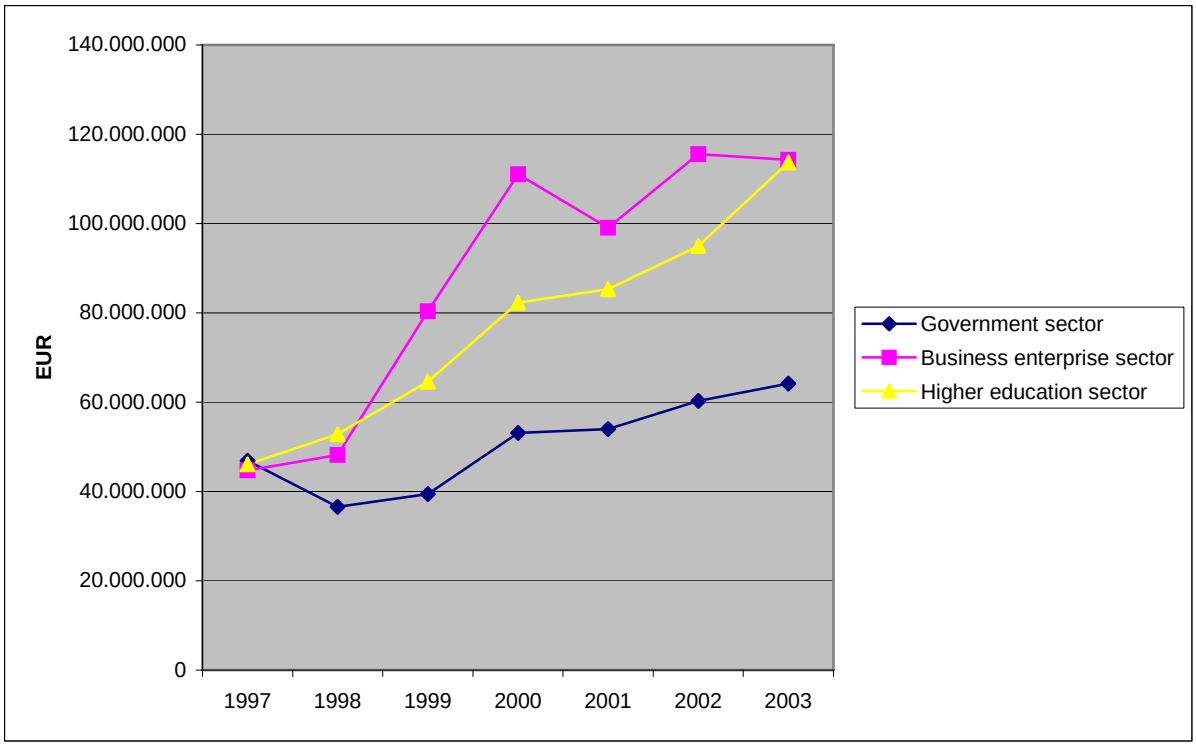
3 The Input Side of the National Innovation Systems

Scientific institutions play a key role in the economic and social development of a country, with state-funded research and educational institutions occupying a particularly central position. The quality and efficiency of their work has a crucial impact on the readiness of the private sector to invest in research and development. A country's ability to develop and maintain its competitive advantage largely results from its public and private sector scientific activities, thus there is no alternative to the continuous and significant investment in science, regardless of the source of funding (budgetary or non-budgetary). According to leading world experts, economic growth in this century will be driven by sectors with dominating high levels of technology, which highlights the need to further increase investments in science and innovation (Government of the Republic of Croatia 2003a).

3.1 Development of Financial Resources Allocated to R&D

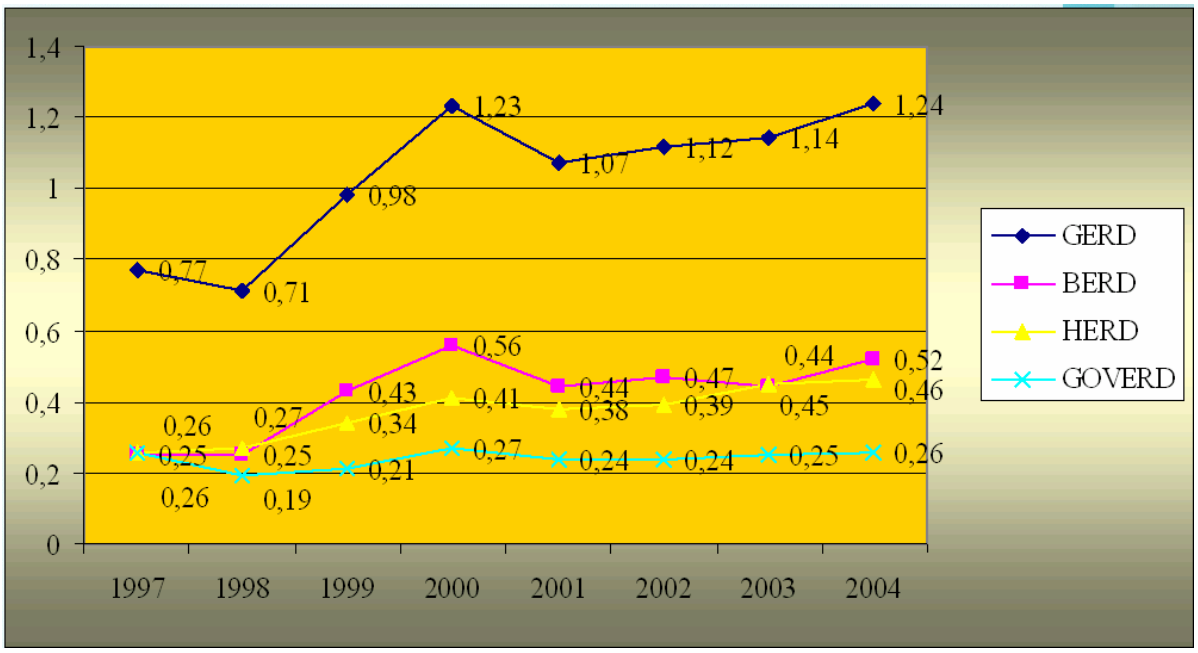
Regarding the general situation in the field of science, research and innovation in Croatia, various studies have shown that the country is still considerably lagging behind the EU countries. The difficult economic situation and the collapse of major businesses brought about an end to corporate financing of R&D and largely severed the links between higher education institutions and professional R&D organisations. Furthermore, those companies that did survive the difficult transition period rarely preserved their internal R&D as a resource for normal functioning and future development. Therefore, economic activities mainly rely on the import of knowledge, mostly under unfavourable and poorly regulated conditions (European Commission 2004). Nevertheless, it seems interesting that even with such a low R&D intensity (GERD, General Expenditure on R&D, was 1.24 % of GDP in 2004 according to (Svarc, Becic 2006)), Croatia still surpasses the R&D intensities of some EU-15 member countries, such as Greece, Portugal, Spain and Italy (0.68 %, 0.77 %, 0.96 % and 1.11 % respectively; 2002) and the R&D intensities of most of the newly accessed countries (apart from Slovenia and the Czech Republic). According to DG Research, the EU-15 average in 2001 (GERD as % of GDP) was 1.98 % (Government of the Republic of Croatia 2006a). Compared to the other Western Balkan countries, Croatia has the highest R&D intensity and is one of the few with detailed statistics on R&D expenditure by sector (government sector expenditure - GOVERD, business sector expenditure - BERD and higher education expenditure - HERD).

Figure 3.1: Dynamics of Expenditure on R&D per Sector (Central Bureau of Statistics Croatia 2006) for (Fischer 2006)



These measures are presented in Figure 3.2 as a percentage of GDP (compiled by Svarc and Becic).

Figure 3.2: Dynamics of Expenditure on R&D as Percentage of GDP per Sector (Svarc, Becic 2006)

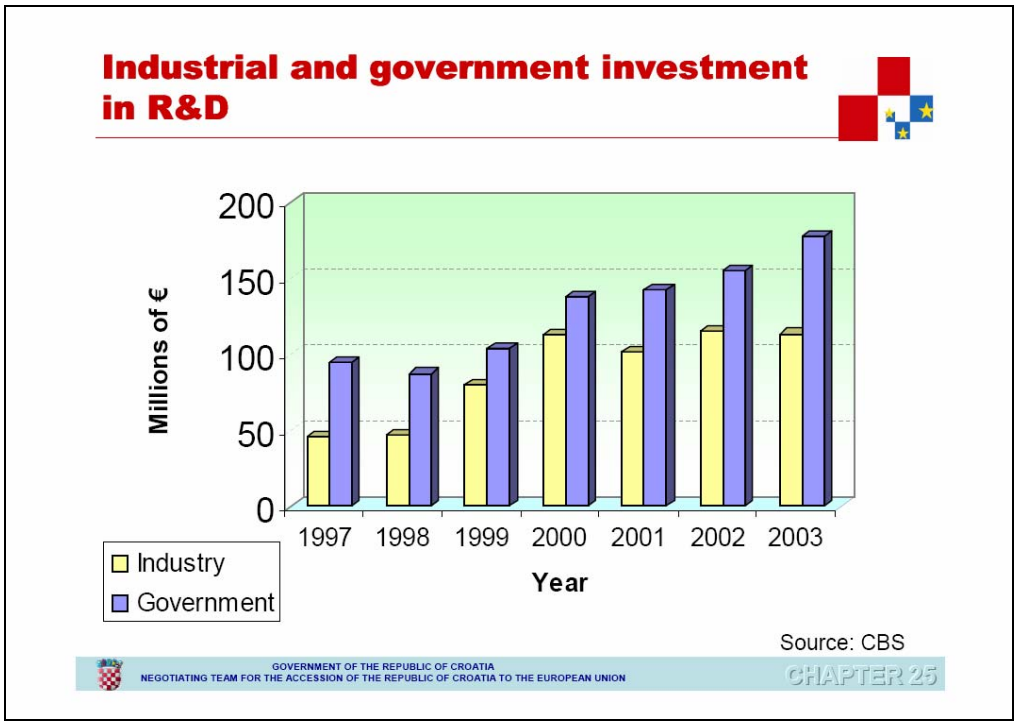


3.2 Government Sector Expenditure on R&D

It is obvious that the investment in Croatian science today is characterised by many weaknesses and structural problems.
One of the most striking particularities in this respect is the domination of the public sector over the private sector in S&T. As reported in 2004, the higher education and government sectors combined employ the vast majority of researchers in Croatia, almost 85%, and together invest 0.70 % of the GDP in research and development. This represents a respectable pool of national knowledge and expert skills. However, the business sector in Croatia employs a modest 15 % of researchers and invests 0.44 % of GDP. The contribution of the private sector to GERD is 42 %, while the state contributes 55 % of GERD. (Becic, Svarc 2007)

Another problematic feature is the structure of the MSES budget. In most developed countries, the ratio regarding the proportion of salaries to investments to expenses is approximately 40:30:30, whereas in Croatia, the ratio is 55:12:33, indicating an intolerably amiss investment capability of research institutions. Experts who have been analysing this discrepancy have concluded that mere fact that Croatia is allocating 55 % of its total science and research budget to salaries, signifies its intent purely on maintaining the number of employees, without providing any real possibility for future development perspectives (The Government of the Republic of Croatia 2003).

Figure 3.3: Industrial and Governmental Investment in R&D (Government of the Republic of Croatia 2006a)



Between 1997 and 2002, a slight upward trend has been registered in available financial resources from the Ministry's budget for science. Since 2003 the share

of total expenditure for science as a percentage of the MSES's total budget has been about 9 % and is increasing continually.

However, in terms of the share of GDP, GOVERD (the Government Sector Expenditure on R&D) has remained more or less constant, fluctuating at around 0.26 % of GDP from 1996 to 2004 (Svarc, Becic 2006).

Some new areas, such as technological development and informatics, have received a financial contribution from the budget since 2000, while the increased budgetary funds have also permitted an increase in the number of projects financed in all six scientific disciplines, especially in Medical Sciences, Technical Sciences and Humanistic Sciences - in each case, the number of projects during 1996-2003 has almost tripled (Uvalic 2006).

Croatian experts are warning of the possible dangers if the country fails to pursue its planned increase in investments – inevitably this would jeopardise not only the recovery of Croatian science, but also the competitiveness of the whole economy, triggering long-term negative effects (The Government of the Republic of Croatia 2003).

Table 3.1: Budget for Research Projects Financed by the MSES, by Fields of Science 1996-2003 (MSES 2005b)

Science discipline	Number of projects 1996	Number of projects 1997	Number of projects 1998	Number of projects 1999	Number of projects 2000	Number of projects 2001	Number of projects 2002	Number of projects 2003	Funding (in Euros) 2003
Natural sciences, Mathematics	193	215	221	223	230	240	306	316	4.043.438
Technical sciences	134	227	249	251	271	290	327	344	3.004.543
Medical sciences	124	190	206	209	239	267	387	436	4.682.107
Biotechnical sciences	76	113	119	119	125	131	153	173	1.610.453
Social sciences	93	133	148	155	167	182	219	261	1.609.931
Humanistic sciences	85	120	130	148	159	179	245	269	1.663.329
Total	**705**	**998**	**1073**	**1105**	**1191**	**1289**	**1637**	**1799**	**16.613.801**

Note: The data have been converted into EUR according to the exchange rate on December 31 of each year on http://europa.eu.int/comm/budget/inforeuro

3.3 Business Sector Expenditure on R&D

Business expenditures on R&D reflect the formal creation of new knowledge within firms and are particularly important in science-based sectors (pharmaceuticals, chemicals and some areas of electronics), where most new knowledge is created in or near R&D laboratories (European Commission 2005a).

The business sector in Croatia invests 0.45 % of GDP (2002), which means it ranks well amongst countries of the region, but its position is still unfavourable in comparison to the EU average. The business sector of the EU-15 invests more than 1 % of GDP (an average of 1.26 % in the year 2000, ranging from 0.27 % in Portugal to 3.32 % in Sweden). The reason for such discrepancy between the Western Balkans and the EU can be found in the (still) developing private sector in the WB region (European Commission 2005a).

The business sector's input into R&D activities in comparison to overall R&D activity reveals the relative importance of profit-oriented knowledge creation and absorption. In Croatia, a very low proportion of the total R&D expenditure was spent on business research, thus reflecting a relatively low level of business sector knowledge investment in comparison with knowledge investment by the government and higher education sectors (Fischer 2006). Countries of the EU strive to achieve a business sector input amounting to two-thirds of all investments (GERD). This goal is based on the strategic priority that indicates the strength of the economy. Hence, Croatian companies are seriously lagging behind EU standards in preparing for the future, especially since the general perception is that a globally successful economy cannot be established merely on imported ideas, services and products (The Government of the Republic of Croatia 2003).

3.4 Higher Education Sector Expenditure on R&D

University research represents one of the key activities within the higher education sector regarding the national innovation systems, providing scientific and technological knowledge to be disseminated in and utilised by the economy. However, as primary suppliers of fundamental research, higher education institutions do not only contribute to the economy through the direct provision of applicable results, but also through the diffusion and adoption of skills and techniques and through professional networks and other forms of communication channels created by academic research. Taking account of the various tasks of the higher education system, as well as the challenges of a knowledge-based society, a large increase in public sector R&D spending on the higher education sector is required (Fischer 2006).

Statistical data shows that Croatia mainly satisfies this expectation. According to data compiled by Fischer, Croatia spent EUR 46.1 million on HE in 1997, this amount doubled in 2000 to EUR 82.3 million, and reached EUR 113.7 million in 2003. Croatia also had the highest level of HERD relative to GDP (0.45 % in 2003) compared to the other countries of the region, a level which is on a par with the EU-15 average (0.42% in 2003)[2]. If population is taken into account, Croatia is once again the leading country in the region with EUR 25.6 per capita in 2003. Although Croatia is slowly catching up, it is still investing less per head than Portugal or Greece for example (EUR 31 and EUR 37 per capita respectively in 1999) (Becic, Svarc 2007; Fischer 2006).

[2] Data was updated based on the lastest available data from EUROSTAT during a review by Becic/Svarc.

The comparison between Higher Education R&D Expenditure and other sources of funding can be observed in Figure 3.1 on page 14.

3.5 R&D Infrastructure

Modernisation and renewal of R&D infrastructure are among the key priorities of policymakers throughout the Western Balkans region, including Croatia. These initiatives include purchasing new equipment, modernising laboratories and research facilities, promoting ICT systems, updating bibliographical databases and supplying university libraries with specialised literature. The main obstacle preventing a faster pace of reform is the limited financial resources. Private funding from the enterprise sector remains low and international donors show little interest in the modernisation of research facilities and laboratories (Uvalic 2006).

Nevertheless, positive trends can be observed, especially in Croatia, which has recently been investing heavily in scientific infrastructure and technical equipment, funded by the large capital investment loans taken out by higher education institutions. The Ministry of Science, Education and Sports has allocated over EUR 30 million in equipment grants since 2002, significantly improving the technical equipment at higher education and research institutes. The private sector has also made significant investments in the research infrastructure, particularly in the pharmaceutical and the telecommunications sector. However, significant investments are still needed, especially in higher education institutions outside Zagreb. Croatia still lacks large research equipment, some of which is compensated for through international cooperation schemes.
Regarding computer networks, the Ministry of Science, Education and Sports established CARNet (Croatian Academic and Research Network) in 1991. One year later Croatia obtained its internet domain (.hr) and the MSES is demonstrating a high level of awareness regarding the importance of the information society. In 2006, 176 institutions at 263 locations, in 31 towns throughout the country, were connected to CARNet (with links of 2Mbit/s and more), including all science and higher education institutions. The capacity of the CARNet link with the rest of the world is 622 Mbit/s. CARNet is working intensively to promote "Open Access", encompassing all scientific publications, dissertations, scientific research outcomes etc., regardless of whether the user's library or institution is subscribed to a certain scientific magazine, thus making scientific resources accessible to the widest range of users. CARNet plays multiple roles in the education system – it encourages the use of new technologies in the learning process, providing its users with concrete help through the purchase of software and project-financing (CARNet 2006).
The University Computing Centre (SRCE), founded in 1971 by the University of Zagreb, is the oldest infrastructural institution for establishing and using Information and Communication Technologies (ICT) in the academic community – today it is one of the foundations for planning, designing, establishing, maintaining and using the ICT system in Croatia's academic community. SRCE encourages intensive cooperation between all institutions involved in establishing information infrastructure and using ICT in the Republic of Croatia, especially

with the MSES and CARNet. Moreover, the University Computing Centre has been actively participating in international (mostly European) Information Technology projects for more than 30 years. SRCE actively participates in EU projects like EQIBELT - Education Quality Improvement by E-Learning Technology, GÉANT2 - a multi-gigabit pan-European data communications network, reserved specifically for research and education use, and EGEE II - Enabling Grids for E-science (SRCE 2006).

The Ministry of Science, Education and Sports financially supports the establishment and operation of referral centres for issuing programme licences to different branches of science (for instance Mathematica, Mathlab, Statistica, SAS, etc). The Scientific Information System (SIS) organises and finances the design of an information system, allowing any member of Croatia's academic and research community to get scientific and research information. Furthermore, the SIS supports the on-line database centre (Internet access to commercial reference databases) and CROSBI (Croatian Scientific References – data on scientific papers published by Croatian scientists) (MSES 2006b). In 2002, there were 12 active referral centres which received funding from the Ministry.

The National Library Information System (NISKA) is a joint project of the Ministry of Science, Education and Sports and the Ministry of Culture, launched in 1996. NISKA connects all libraries in Croatia, irrespective of their type (school, university, scientific and city libraries), with the aim of establishing a system that will enable the collections of all libraries to be accessible to both the Croatian public, and the foreign public, in electronic, multimedia format.

The Young Scientists Network (MLAZ) was established in 2005 with the objectives of promoting and improving the role of postgraduate students and young scientists in society, enhancing the exchange of information and ideas, encouraging national and international cooperation, and stimulating legislative initiatives etc. On the European level, MLAZ actively co-operates with EURODOC (European Council of Doctoral Candidates and Junior Researchers) and WAYS (World Academy of Young Scientists) (MLAZ 2006).

3.6 Human Resources in R&D

Human resources play a key role when it comes to knowledge production and, subsequently, economic and technological development, thus their current state and future potential are of critical importance. The quality of human resources is a major determinant of knowledge creation and the transmission and application of new knowledge. Generally, indicators of human resources are divided in two groups: education and learning, and employment (Aralica, Bacic 2005). According to Fischer, the availability and quality of human resources (being both producers and users of knowledge) in S&T, are crucial elements on the path towards a knowledge society (Fischer 2006). Awareness of the importance of scientific activity in the overall development of a state is clearly demonstrated by the increasing number of people with a higher education and the intensified employment opportunities for young scientists. Within this category, Croatia ranks relatively well in comparison to other countries of the region, but not compared to the EU average (Aralica, Bacic 2005).

In 1990, the number of full-time employees in R&D was 18,361, of which 8,772 were researchers. In 1999, these values had dropped to 10,764 and 6,805 respectively, showing a severe fall in both the total number of R&D employees and the number of researchers during the last decade. However, this decline is still smaller compared to other transitional countries, including some new EU member states such as the Czech Republic. The distribution of scientists by different scientific fields is illustrated below (European Commission 2004).

Table 3.2: Researchers by Scientific Fields in 1991 and 2001 (European Commission 2004)

	1991		2001	
Scientific Field	**Number**	**%**	**Number**	**%**
Natural sciences	1,914	18.7	1,941	21.4
Technical sciences	2,681	26.2	1,747	19.2
Medical sciences	2,195	21.4	2,519	27.8
Bio-technical sciences	907	8.8	590	6.5
Social sciences	1,370	13.4	1,239	13.6
Humanities	1,178	11.5	1,040	11.4
Total	**10,245**	**100.0**	**9,076**	**100.0**

Another key indicator of the S&T sector's structure is the qualification of the research personnel. The share of researchers with academic degrees in Croatia demonstrates how highly qualified the country's scientific personnel is, with more than half of all researchers holding a PhD degree (European Commission 2004). According to the Croatian Central Bureau of Statistics, there were 760 new Masters and Masters of science (MSc) titles awarded in 2004/2005 and 357 Doctors of science in the same year. These numbers have remained more or less constant, with slight annual growth in recent years (Central Bureau of Statistics Croatia 2006).

Table 3.3: Qualification Structure of Researchers in 1991 and 2001 (European Commission 2004)

	1991		2001	
Academic Degrees	**Number**	**%**	**Number**	**%**
B.A, B.Sc.	3,635	35.5	1,053	11.6
M.A, M.Sc.	2,992	29.2	2,919	32.2
Ph.D., Dr.	3,618	35.3	5,104	56.2
Total	**10,245**	**100.0**	**9,076**	**100.0**

The number of new graduates with training in S&E is indicated using the number of tertiary science and engineering graduates. Degrees in the S&E fields of study formally qualify their holders for employment as researchers, scientists and engineers. All newly accessed EU countries (except Lithuania) have fewer S&E graduates than the EU average (11.3 S&E graduates in 2003; according to the European Innovation Scoreboard). The value of the Croatian indicator (around 10 S&E graduates in 2003; source: the European Innovation Scoreboard) is slightly lower than the EU average, and places the country in line with Belgium and

Germany. Croatia is leading, along with Lithuania, among the countries of Central and Eastern Europe (Aralica, Bacic 2005).

According to the Eurostat database for tertiary education graduates, in the EU25 in 2004, 10.5 % of all graduates were in the fields of Science, Mathematics and Computing, compared to 5.6 % in Croatia in the same year (but 7.3 % in 2003). In the EU25, 13.1 % of students graduated in the fields of Engineering, Manufacturing and Construction, which is comparable with the 12.3 % in Croatia (Becic, Svarc 2007).
According to Fischer, around 30 % of all students in Croatia in 2003/2004 were enrolled in science, engineering and technology programmes (science students with 26.08 % account for most of the S&E students). There has also been a constant increase of S&E students in Croatia between 1997 and 2003 with an annual growth rate of 7.2 % (Fischer 2006). However, it is important to stress that the high share of S&E graduates only reflects the orientation of the Croatian education system and not necessarily its quality. Life-long learning in Croatia is rather neglected and the population with tertiary education is low - 15.9 % (or 26 % lower than the EU average in 2003; source: the European Innovation Scoreboard). The reason behind this could be the absence of any co-operative links between higher education institutions and the business sector (Aralica, Bacic 2005).

Another important indicator of human resources in R&D is the share of researchers in the labour force. Since countries differ considerably in terms of their population and labour force sizes, this indicator signifies the relative importance of RSE jobs (Researchers, Scientists and Engineers) in the labour market and can thus be seen as an appropriate indicator of the knowledge base of an economy (Fischer 2006). According to the CBS and Eurostat-2001, Croatia has reported 3.9 researchers per 1000 labour force, which is below the EU-15 average of 5.9 researchers per 1000 labour force and far below the average of Finland, the most advanced European country in this respect (13.9 researchers per 1000 labour force).
There have been 7,140 full-time equivalent researchers in 2004, more than half of which were employed in the higher education sector (3,705). The distribution of the FTE by sectors in Croatia dramatically differs from that of the EU-15 and especially the USA, where only 35 % and as little as 15 % of researchers respectively are employed in the higher education sector. The ratio resulting from the 'full-time equivalent' indicates the number of personnel engaged full-time in R&D, while the headcount equivalent (HC) indicates those typically working half-time or having two jobs. According to Fischer, this ratio in Croatia fluctuates around 53 % (2003), demonstrating that, on average, Croatian R&D personnel were generally employed part-time in any given R&D job (Fischer 2006).

Table 3.4: Researchers by Full time Equivalent (FTE) (Central Bureau of Statistics Croatia 2006)

	2002	**2003**	**2004**
Business sector	1 253	913	1 015
Government sector	2 022	2 158	2 420
HE sector	5 297	2 790	3 705
Total	**8 572**	**5 861**	**7 140**

Table 3.5: R&D personnel (HC), by Scientific Field (MSES 2005b)

	1997	1998	1999	2000	2001	2002	2003
Natural sciences, Mathematics	2 093	1 776	2 146	2 359	2 467	2 523	2 363
Technical sciences	3 926	3 881	4 281	4 242	3 969	4 217	4 335
Medical sciences	5 522	1 469	1 822	2 245	2 353	3 731	4 127
Biotechnical sciences	1 139	1 273	1 333	1 320	1 496	1 751	1 708
Social sciences	5 399	1 908	2 539	2 679	2 905	3 422	3 831
Humanistic sciences	889	554	980	983	927	871	852
Total	**18 968**	**10 861**	**13 101**	**13 828**	**14 117**	**16 515**	**17 216**

Quoted source: Central Bureau of Statistics, www.dzs.hr

Table 3.6: Number of Doctors in R&D (Uvalic 2006)

	1997	1998	1999	2000	2001	2002	2003
Natural science	635	569	678	683	648	739	757
Engineering	674	718	799	938	856	880	868
Medical science	288	212	304	522	416	705	1 068
Biotechnological science	302	305	322	358	364	361	356
Social science	605	409	667	685	698	726	762
Humanities	263	131	389	378	408	359	397
Total	**2 767**	**2 344**	**3 159**	**3 564**	**3 390**	**3 770**	**4 208**

Quoted source: Central Bureau of Statistics, www.dzs.hr

Like other countries of South Eastern Europe, Croatia did not avoid the phenomena of brain-drain in the last decade. In addition to the massive and continuous brain-drain, the region has also experienced negative effects from "brain waste" – specialists leaving their professions for better paid jobs in the private and/or informal sector of the economy. In response to this severely damaging trend, UNESCO (in cooperation with HP) launched the "Piloting Solutions for Alleviating Brain Drain in South Eastern Europe" in 2003, in order to provide higher education institutions with grid computing technology and to provide financial support to encourage young scientists to remain in the region and co-operate with the Diaspora. More specifically, the project aims to re-establish links between researchers who have stayed in their native countries and those who have left (with a focus on IT and physics) by connecting scientists with international colleagues and university resources. Staff and students at beneficiary universities are able to interact with the international scientific community, working on major collaborative research projects with other institutions around the world. As a result, higher education institutions in South Eastern Europe can bid for public and private sector funded research. The project

also helps encourage scientists to remain in the area to continue their research (UNESCO & Hewlett Packard 2003).

Two years after its creation, the joint UNESCO-HP project has resulted in the development of websites, databases and new research projects at several of the higher education institutions involved. Moreover, faculties and students from across South Eastern Europe have explored collaborative efforts with their international colleagues and improved research capacities, encouraging scientists to remain in the region. At the University of Split, UNESCO representatives linked the faculties of Natural sciences, Mathematics and Education, creating various possibilities for active participation in European projects and providing an opportunity to use EU funds to develop and expand as an institution. Hewlett Packard resources have helped the university to use new high-tech equipment and a number of new activities and projects. In addition to other activities, the University of Split created a database and an interactive website of Croatian physicists around the world to share information with educational and research institutions abroad (UNESCO & Hewlett Packard 2003).

4 The Output Side of the National Innovation Systems

The output of an innovation system is manifested through the new knowledge, new products and processes which are produced. Indicators such as the 'Gross Expenditure on Research and Development' and the 'Number of Researchers' provide a measure of the resources allocated to the innovation system. This chapter focuses on the results of the innovation processes and its output indicators.

4.1 Patenting Activities in Croatia

Among other approaches (Hörlesberger 2006), innovative output can be measured by patent data, the most important advantage of which, is the wealth of the information supplied. A patent file granted by the European Patent Office (EPO) provides data on the invention, which is protected by the patent through the title, abstract and technological classification. Furthermore, patent data provide the only output measure available for almost all countries in the world, including the Western Balkan countries (Hörlesberger 2006). Patenting behaviour in countries of South and Eastern Europe has undergone a process of change of the same degree and scope as other transitional changes which started in 1989. Nevertheless, the patenting of inventions has become an important part of business activity in the new, innovative climate, contributing to the process of innovation capacity building in the region (Kutlaca 2002).

European inventors today have access to alternatives when seeking patent protection for their inventions: the European Patent Office (EPO), the World Intellectual Property Organisation (WIPO), the World Trade Organisation (WTO) and national patent offices. The EPO provides patent protection through a single procedure, defining the granting of patents in some or all of the contracting

states of the European Patent Convention (EPC). In contrast to national patents that are valid in only one country, a European patent gives its proprietor equivalent rights to a national patent in each member state. Moreover, European patents may also be effective in some countries that have not yet acceded to the EPC, including Croatia, which signed a "Co-operation and Extension Agreement" with the EPO in June 2003, entering into force in April 2004. Since this date, it has been possible to extend the protection conferred by a European patent to the Republic of Croatia. Extended European patent applications and patents enjoy essentially the same protection in the Republic of Croatia as patents granted by the EPO for its current 28 member states. Articles 99 to 109 of the Croatian Patent Act, enforced since January 2004, govern the extension of European patents in the Republic of Croatia (European Patent Office 2006).
The World Intellectual Property Organisation (WIPO) offers inventors and industries a simplified, cost-effective route for obtaining international patent protection. By filing a single "international" patent application under The Patent Co-operation Treaty (PCT), protection for an invention can be sought simultaneously in any of more than 125 countries (WIPO 2005).

However, the costs associated with a patent application can result in a further barrier to patenting. Although it is difficult to calculate precise figures, estimates start from EUR 2,000 to EUR 14,000-20,000 for more complicated patent applications. Studies estimate that the cost of an application and the 10-year maintenance of a patent at the EPO are approximately EUR 32,000 (Roland Berger Market Research 2004). Applications to national patent offices, in contrast, may be less expensive (Hörlesberger 2006). Whether an inventor decides to file an application at a national patent office or at the EPO will depend, among other factors, on the countries where he/she wishes to commercialise the invention (European Patent Office 2006).

According to Uvalić, the number of patent applications in Croatia has substantially increased during the last few years, reaching 1,086 applications in 2003. However, the number of applications that have actually been granted a right to patent has generally been declining and is very low – only 13 in 2003, which is probably a result of the stricter criteria used in recent years (Uvalic 2006). The number of patents granted directly reflects the registration of innovative ideas. Many experts believe a parallel can be drawn between the economic growth of a country and increase in the number of patents.

Table 4.1: Number of Patents, 1996-2003 (Uvalic 2006)

	1997	1998	1999	2000	2001	2002	2003
Number of patent applications	697	645	398	884	959	1034	1086
Number of granted patents	228	190	78	133	122	59	13

Quoted source: State Intellectual Property Office of the Republic of Croatia, www.dziv.hr

Patents in Croatia are granted by the State Intellectual Property Office. At the turn of the millennium, the number of patents in Croatia was still negligible, with an innovation coefficient ten times smaller than the EU-15 countries (and as much as fifty times smaller than countries traditionally characterised by high

levels of innovation – e.g. Finland, Ireland or USA). Interestingly, on each patent application in Croatia there are 100 internationally refereed publications (The Government of the Republic of Croatia 2003). A total of 13,623 patent applications have been filed with the State Intellectual Property Office in Croatia between 1992 and August 2006 (5,207 from residents and 8,416 from non-residents). 1,203 of those applications were granted (276 to residents and 927 to non-residents) (SIPO 2006).

Table 4.2: Number of Patent Applications to the EPO, 1997-2003, Source (EUROSTAT) provided by (Becic, Svarc 2007)

Indicator	1997	1998	1999	2000	2001	2002	2003
Total number of patent applications to the EPO	23.09	30.83	42.0	55.78	54.61	87.83	80.78
Number of patent applications to the EPO per million inhabitants	:	6.729	:	12.212	12.307	19.763	18.185
European high-technology patents (per million inhabitants	:	0.437	:	1.04	1.596	1.238	0.806
Number of patents granted by the USPTO per million inhabitants	:	2.51	:	3.065	:	:	:

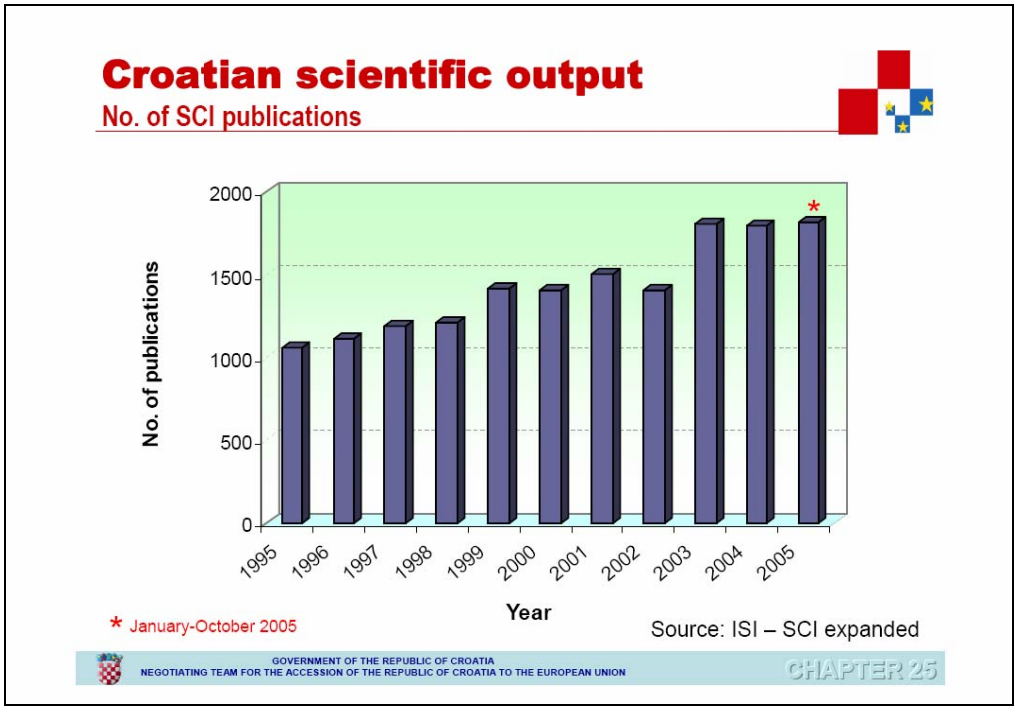
Croatia has made progress regarding the number of patent applications to international organisations like the EPO and USPTO. (see Table 4.2). In comparison with EU member countries, countries such as Lithuania, Latvia, Romania, Slovakia, Bulgaria, Estonia as well as countries like Cyprus or Portugal fell behind Croatia in terms of their total number of patent applications to the EPO in 2003. According to the indicator, the number of patent applications to the EPO per million inhabitants, the situation is very similar, behind Croatia are countries such as Bulgaria, Estonia, Czech Republic, Greece, Cyprus, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Turkey. However, Croatia occupies an unfavourable position regarding European high-technology patents per million inhabitants in comparison with EU-15 countries (according to the EPO statistics data). This unfavourable position could be improved through the promotion of patenting in companies using financial provisions provided by the government (Aralica, Bacic 2005; Becic, Svarc 2007). An analysis of Croatia's position according to the number of patents granted by USPTO per million inhabitants for most recent available data (2000), shows that many new EU member states (excluding Hungary and Slovenia) lag behind Croatia with its 3,065 patents per million inhabitants (Becic, Svarc 2007).

4.2 Publication Activity in Croatia

There has been a substantial increase in the number of scientific publications in Croatia, in particular in the natural and medical sciences, where the number in both cases has doubled between 2001 and 2003. On the contrary, however, in scientific disciplines, such as bio-technological science, the number of

publications has declined. The largest number of scientific publications is produced by researchers in the higher-education sector (around 65 %). Research projects and programmes in Croatia are evaluated by one of 45 peer review groups, and each project proposal is evaluated by a group of nominated evaluators. Projects are contracted for a period of three to five years and principal researchers are required to submit a report of their research once a year. Based on the evaluation of the report, the ministry decides whether to continue financing the project. Following the completion of the project, a final report is submitted and is evaluated by its respective peer review group. Projects are classified according to the field of science, and priorities are set within each area (Uvalic 2006).

Figure 4.1: Croatian Scientific Output – Number of SCI Publications (Government of the Republic of Croatia 2006a)



The Ministry of Science, Education and Sports launched CROSBI – the Croatian Scientific Bibliography project - in 1997, with the objective of collecting data on the scientific output of the current research projects financed by the MSES, and making them publicly available. CROSBI stores scientific papers published from 1997 to the present. There are over 115,000 records in the CROSBI bibliography, more than 2,000 with full-text available. The CROSBI bibliography has improved the publicity of scientific output, creating a positive impact on the scientific community, as well as establishing a permanent archive. There is now a comprehensive overview of all literature produced by Croatian scientists: journal articles, books, book chapters, conference papers, theses, reports, manuscripts, etc. Very often scientists submit their data to the database even before the paper has been published. Furthermore, CROSBI provides a digital archive of full-text papers and offers "on demand" access to institutions and scientists. Librarians are also active in database maintenance – they correct the data and communicate with scientists in order to improve the accuracy of the data.

CROSBI has gradually evolved into a comprehensive bibliography, covering all scientific publications in Croatia. The data stored in the database are used for various purposes, such as in annual project reports to the MSES, new project application evaluations, and for scientific advancement etc. (CORBIS 2006).

Table 4.3: CROSBI, Statistical Data on October 2, 2006 (data refreshed every four hours) (CORBIS 2006)

YEAR	1997	2003	2004	2005	2006	TOTAL
Books	278	535	551	489	100	4 068
Book chapters	614	1 412	1 318	928	137	9 477
Textbooks and scripts	126	236	227	146	40	1 717
Scientific papers in CC journals	882	1 416	1 527	1 505	712	13 699
Professional and other papers in CC journals	76	81	98	92	26	736
Articles in a journal stated in NN 2/97	723	1	0	0	0	5 927
Papers in other journals	2 234	4 091	4 120	3 088	597	30 110
Conference report in CC journals	19	149	153	191	32	929
Papers in the publishing process	0	0	212	778	762	1 754
Invited lectures	392	831	990	916	184	6 301
Conference papers with international peer-review	1 112	2 221	2 149	1 926	528	17 265
Other conference papers	634	1 190	1 023	1 114	227	9 468
Abstracts in book of abstracts and unpublished papers	1 573	3 127	3 240	3 050	666	23 110
Dissertations, master thesis	414	681	731	684	141	5 987
Graduation thesis	789	1 269	1 397	1 224	283	10 328
Other papers	602	1 077	1 122	1 455	135	9 259
Patents	27	36	44	12	4	323
TOTAL	**10,495**	**18,353**	**18,902**	**17,598**	**4,574**	**150,458**

The distribution of the bibliography by scientific field shows that most works are published in Natural and Technical sciences (30,174 and 32,561 respectively). To date, 23,674 works were published in Humanities; 21,615 in Social sciences and 9,804 in the field of Bio-technical sciences.

HRCAK is an on-line portal of scientific journals in Croatia, which promotes the so-called "Open Access" initiative. Established through a co-operative project between the Croatian Information and Documentation society (HIDD), the SRCE and the library of the "Ruđer Bošković" Institute, HRCAK encompasses 83 journals and 3,599 full-text articles, covering all fields of science (2006). To its users, HRCAK offers easy access to scientific journals and works, while editors benefit from tools which help them publish their journals in electronic version free of charge. Through the OAI-PMH protocol (Open Archives Initiative Protocol for Metadata Harvesting), HRCAK provides metadata on every newspaper and article created to the Dublin Core standard[3] to all interested information servers (HRCAK 2006).

The Science Citation Index (SCI) places Croatia low on the scale of developed and relatively developed European countries, thus it is important to further increase the quality of scientific work and, particularly, increase the number of scientific innovations. This would result in the improved relevancy, actuality and openness of research projects in Croatia, as well as improving the quality of the overall research process (The Government of the Republic of Croatia 2003).

5 National R&D Strategy and Legal Framework

Both innovation policies and entrepreneurship-related policies are key pillars of the European Union's Lisbon Strategy. There is obviously a general understanding of the importance of innovation as a concept among the South Eastern European countries, but the kind of policies required to encourage innovation in a wider policy setting have not yet been properly implemented across the region. The transition to a knowledge-based society requires national strategies to be set up in order to sustain this new concept. Appropriate institutional regimes, skilled and creative human resources, a dynamic information and communication infrastructure and economic incentives, among other things, need to be provided in order to achieve an efficient innovation system (Dall 2006).

R&D policy development in the Western Balkans region is often intertwined with the European Union accession process, although only Croatia has actually started the negotiation process with the European Union. In order to withstand the competitive pressure of the common market and become a fully fledged knowledge-based economy, it is of vital importance for the country to implement the required policies and strategies (Dall 2006). As stated in the "Shared Vision" of the *Thessaloniki Agenda for the Western Balkans*, the citizens will need to exploit their high level of motivation for social mobility and their relatively good

[3] The Dublin Core metadata element set is a standard (NISO Standard Z39.85-2001) for cross-domain information resource description.

educational background, but also combine scientific and technological knowledge with entrepreneurship. In this respect, science, research and technological development are seen as essential tools for future economic stabilisation and growth in the region (CORDIS 2003).

5.1 Legal Framework for National R&D System

The importance of science and technology is crucial for the development, progress and prosperity of a modern state. As part of the process of creating an effective and contemporary scientific and technological system, the adoption of a functioning legal framework which effectively regulates the organisation of R&D institutes, the innovation infrastructure and issues grants to research organisations and innovative companies, is indispensable. Even though the legislation in Western Balkan countries is still largely undergoing a process of transition, it has already profited from the stabilisation and association processes. As a leading country in the Western Balkans region, Croatia started accession negotiations with the European Union in October 2005, recently opening (and closing) the 25th Chapter of the EU's *acquis communautaire* on Science and Research (Dall 2006).

Table 5.1: Important Laws in the Legal S&T Framework of Croatia (Becic, Svarc 2007; Dall 2006)

Law on Scientific Activities and Higher Education	Stipulates the systems of scientific activity: scientific research, development and higher education
Law on the National Foundation for Science, Higher Education and Technology Development of the Republic of Croatia	Regulates the National Foundation for Science, Higher Education and Technology Development (NZZ)
Law on the Croatian Academy of Sciences and Arts	
Law on Croatian State Science Awards	
Laws on IP Protection: Law on Patents, Copyright and Related Rights Law, Trademark Law, Law on Industrial Designs, Law on Indications of Origins of Products and Services, Law on Protection of Topographies of Semiconductor Products	The Croatian Intellectual Property Rights regime was supported by a CARDS project and comprises the Law on Patents and related laws.
Law on the Recognition of Foreign Education Qualifications	
Law on Professional and Academic Titles	

Most frequently, laws are prepared separately for the areas of S&T and education. However, in Croatia, the fundamental law in the field of science is the Law on Scientific Activities and Higher Education (see Table 5.1), which was adopted in 2003 as an attempt to harmonise national legislation with EU practices following the merger of the Ministry for Science and Technology and the Ministry of Education. This act stipulates the systems behind scientific research, development and higher education, emphasises the freedom and autonomy of scientific activity and lays out the framework for reforming the S&T system. It

paves the way for strengthening university autonomy through the initiation of lump-sum financing, providing the framework for the implementation of the Bologna process (Becic, Svarc 2007).
Furthermore, it defines research and higher education activities and stipulates the tasks and structure of the National Science Council and the National Council for Higher Education, as well as defining procedures for establishing scientific institutions (in terms of their basic structures and the registration process), the framework of scientific and technological parks, and a structure for the categorisation of researchers and research assistants. In order to facilitate its implementation, the law was amended in 2004 (Dall 2006). In 2005, the National Council for Science initiated a project to electronically register Croatian scientists – there are 10,700 scientists and researchers registered in the existing application, as well as some 2,800 Doctors and 3,300 Masters of science. Since September 2005, the Council has been working intensively to update the application in line with the provisions of the new Law and Regulation (The Government of the Republic of Croatia 2006).

Intensive reform of the Croatian higher education system commenced in 2003 with intensive legislative and institutional preparation, and continued in 2004 with the adoption of necessary amendments to the Law on Scientific Activity and Higher Education, and the adoption of a new Law on the Recognition of Foreign Educational Qualifications. In 2005, the government adopted five Rules of Procedures covering the field of higher education. Currently, at the timeof writing this report, the MSES is preparing new amendments to the Law on Scientific Activity and Higher Education, the Law on Recognition of Foreign Educational Qualifications and the Law on Professional and Academic Titles (The Government of the Republic of Croatia 2006).

Other important laws and subordinate legislation include the Law on the Croatian Academy of Arts and Sciences, the Law on Croatian State Science Awards, the Law on the National Foundation of Science, Higher Education and Technology Development, as well as several specialised ordinances, decisions and regulations, such as the Law on Geological Research and the Ordinance on the Conditions and Manner for Taking the Examination of Independent Geological Research and Contents of the Examination. Under the responsibility of the MSES, several decisions and guidelines on implementing the Croatian Programme for Innovative Technological Development (HITRA) and the Programme for the Development of Knowledge-Based Companies have also been included in the legal framework for technology and innovation policy (Government of the Republic of Croatia 2003b).

In the field of telecommunications and information society, the government has amended the Telecommunications Law, adopted the Law on Electronic Identification and the Law on Information Security (all 2005). A number of strategies, recommendations and programmes were adopted for the efficient implementation of R&D policy, which will be discussed in the chapter below (The Government of the Republic of Croatia 2006).

Intellectual property protection and patenting are regulated by the Patent Law, the Trademarks Law, the Law on Geographical Indications and Designations of the Origin of Products and Services, the Law on the Protection of the

Topographies of Semiconductor Products, the Industrial Designs Law and the Copyright and Related Rights Law (all adopted in 2003). There are also several by-laws regulating the implementation of the above mentioned laws. The State Intellectual Property Office (SIPO) is the pivotal institution in the Croatian National Intellectual Property System which also maintains institutional connection with the international intellectual property system (EPO, OHIM, WIPO and WTO), as well as national offices in the Member Countries of the mentioned intergovernmental organisations[4] (The Government of the Republic of Croatia 2005).

The Croatian tax system allows imported scientific research equipment to be exempt from customs duty, and reimburses the value added tax paid for the procurement of scientific research equipment in Croatia and abroad. The broad Investment Funds Law aims to influence the development of venture capital, which is not yet at an advanced stage in Croatia (Dall 2006).

5.2 Main Documents Reflecting National Innovation Strategies

Too often, innovation is a topic subordinated to science or research policy, or even to development policy. Most S&T policies in the Western Balkans region encourage sustainable support for basic research at higher education and research institutions, for the development of human resources and for cooperation in the framework of the European Union's RTD Programmes, joint research programmes with the European Science Foundation and bilateral agreements (Dall 2006).
The national innovation system (NIS) in Croatia is a complex, but not fully coherent, set of institutions. The most critical components of the Croatian NIS are the absorption capacity and the human capital, especially regarding quality-control management, the number of researchers in industry, the computerisation of the country, the investment in tertiary education, the number of new scientists in engineering etc. Science policy in Croatia is a standard policy based on a linear model of innovation, in which science is the main driving force behind technology development. In order to create conditions for the sound development of the innovation system, Croatian policymakers will need to follow the objectives of the Lisbon agenda, which requests a shift from conventional science policy towards an integrated and pro-active innovation policy. In other words, the integration of science, industry and technology policy (Svarc, Becic 2006).

Table 5.2: Documents Relevant for Innovation Policy in Croatia (Svarc, Becic 2006)

1996	The National Science and Research Programme
2001	Croatian Programme for Innovative Technological Development (HITRA)
2002	"Croatia Based on Knowledge and Application of Knowledge" adopted by HAZU
2003	Strategy of Development of the Republic of Croatia in the 21 Century – Science

[4] Please see chapter 4.1 for more information on Croatia's patent activity.

2004	Strategic Plan of the National Foundation for Science 2004-2008
2004	55 Recommendations of The National Competitiveness Council for Increased Competitiveness in Croatia
2006	Science & Technology Policy of the Republic of Croatia 2006-2010 adopted by the Government of the Republic of Croatia
2006	Strategic Development Framework for 2006-2013, adopted by the Government of the Republic of Croatia

The basis of the Croatian innovation system was laid out in the first "National Science and Research Programme" of 1996, with the main objectives being the establishment of institutional technology infrastructure, adoption of adequate measures, and the development of a programme for technological development. However, the turning point in innovation policy development came in early 2001, when programmes to promote cooperation between industry and R&D systems were introduced. The national technology policy is based on the "Programme for Innovative Technological Development" (HITRA) adopted in 2001 (see paragraph below). In 2003, the government adopted the "Strategy of Development of Croatia in the 21st Century – Science", which replaced the "National Scientific Research Programme" of 1996. In April 2004, a Co-operation Agreement was signed between the Ministry of Science, Education and Sports and the Ministry of Economy, Labour and Entrepreneurship, regarding the harmonisation of education policies with the country's economic needs, and the development of the national innovation system (Uvalic 2006).
The building of the national network of technological centres will require the establishment of business and innovation centres, centres for technology transfer, financial institutions, institutions for planning and control, innovation and engineering associations and other centres of technological excellence (Government of the Republic of Croatia 2005).

HITRA, the Croatian Innovation Technology Development Programme was launched in 2001 by the Ministry of Science and Technology, specifically aimed to support the transfer of technology to new technology-based firms using both financial and non-financial incentives. There are three strategic long-term goals of the HITRA program: the creation of incentive policy measures for technology policy, the creation of a technological institutional structure and the establishment of control mechanisms for innovation and technology policy. HITRA is especially targeted at public-private partnerships or science-industry cooperation and provides a framework for direct cooperation between entrepreneurs, industry, Croatian higher education institutions and research institutes. The target groups are individuals, legal entities and technology-based companies, all with commercially and technically viable ideas (European Commission 2004). HITRA is being implemented through two complementary sub-programmes - TEST (Technology Research and Development Projects) and RAZUM (Development of Knowledge-Based Enterprises). TEST is designed to support pre-commercial research activities in the development of new products, processes and services, until the design phase is complete. Its main objective is to achieve cooperation between the research and economic sectors. RAZUM is designed to support entrepreneurial projects based on new technologies and higher value-added products (Government of the Republic of Croatia 2005). The Business and Innovation Centre of Croatia (BICRO) is implementing the RAZUM

sub-programme. The most important features of this service are the high professionalism of implementation, the absence of administrative constraints on decision-making, as well as the development of specific knowledge and a network of experts for financing, assessing and managing entrepreneurial projects. Until 2004, BICRO has analysed 70 entrepreneurial projects, 15 of which received financial support (European Commission 2004). Implementation of TEST has been entrusted to the Croatian Institute of Technology (CIT), established in March 2006 under the authority of the Government of the Republic of Croatia. Since the establishment of HITRA, 482 projects have been submitted to TEST, 252 of which received positive evaluation and financial support. To this date, 150 projects have been completed, while 102 are still being financed (CIT 2006).
Overall monitoring of the performance of HITRA is organised through the submission of annual reports to the MSES and the government. In 2001, the government founded an Interdisciplinary Control Group for controlling the use of public resources for the HITRA programme. The budget for HITRA has been steadily increasing, from EUR 7.2 million in 2001, to EUR 11.7 million in 2003 (European Commission 2004).
The introduction of these programmes was a step to modernise the approach to innovation policy in terms of the "Triple Helix" model. This model consists of three basic actors with intertwined actions – the government, higher education institutions and business – working to shorten the time-span between discovery and utilisation. However, the programmes did not manage to strengthen all elements of the model; in particular they failed to promote links between R&D and business. So far, the Croatian National Innovation System has been characterised by a weak industrial R&D sector and a low level of technological capability in the business sector. The implementation of HITRA and its contribution to the development of the Croatian NIS has so far been insufficient (Aralica, Bacic 2005).

Experts from the Institute of Economics in Zagreb have published an in-depth study evaluating Croatia's innovative capability using the framework of the European Innovation Scoreboard (EIS). According to their findings, Croatia ranks well in comparison to other countries of Central and Eastern Europe, but has not made significant progress in its innovation potential and policy with respect to the European Union. Innovation policy in Croatia has so far been developing under the umbrella of R&D policy, resulting in the relative neglect of innovation policy's potential to contribute to higher economic growth - it is only in the last few years that the first elements of innovation policy, in the form of technological programmes, have appeared. The significance of innovation policy for the economy has traditionally been better recognised in advanced economies, which have promoted it as the main strategic tool for achieving competitiveness in industry, paving the way to the knowledge-based society. Some indicators of Croatia's human resource potential (e.g. the share of science and engineering graduates), offer encouraging results, while others (e.g. life-long learning), are totally neglected. While the high-tech service sector in Croatia appears relatively developed, the high-tech manufacturing sector is clearly underdeveloped. Furthermore, policies have mostly failed to create knowledge – expenditures on R&D, both public and business, are insufficient, while patenting applications made by Croatian residents to the EPO are the lowest among countries of Central and Eastern Europe (Aralica, Bacic 2005). The key problems contributing to

Croatia's low innovation capacity can be found in the low demand for innovation and technologies, the low investment rates in R&D by the business sector, the poor orientation of R&D towards the business sector, the undeveloped system of technology transfer and undeveloped statistical system, all of which are inappropriate for a knowledge-based society (Government of the Republic of Croatia 2005).
The European Union has eased this transition process by establishing a European Area of Research and Innovation, in an attempt to encourage key interfaces in innovation networks; namely between companies and financial markets, R&D and training institutions, advisory services and technological markets (Aralica, Bacic 2005).

The Croatian government has put the establishment of a modern innovation system among its microeconomic and structural priorities, defining its goal as a system that encourages cooperation among the education and science systems, government institutions and private enterprises, in order to achieve successful technological development. On the national level, a politically independent advisory body – the National Competitiveness Council (NCC) – put the development of innovativeness and technology as one of the top political and economic priorities. The results of the council's work are embodied in a document entitled "55 Recommendations for Improving Croatia's Competitiveness". The council outlined several principles to help the country attain a modern approach to innovation policy which will strengthen the components of innovation capability (absorptive capacity, demand, innovation diffusion and R&D), lead to productivity growth, and strengthen the knowledge component behind new investments (Aralica, Bacic 2005). The general objectives of R&D policies are to restructure the scientific research sector, increase investment in science in order to reach 3% of GDP, financially diversify (increase private sector finance), utilise regional research methods and achieve optimal scientific research through international cooperation.

Regarding the development of an information society, the government of the Republic of Croatia adopted a strategic document in 2002 entitled "Information and communication technology – Croatia in the 21st century". The document encompasses seventeen recommendations for Information and Communication Technology-related activities (MSES 2006b). During 2006, the government was working intensively on the preparation of the "Strategy of Broadband Internet Access Development and Strategy of Telecommunication Development in Croatia". In 2005, the "National Programme on Information Security in Croatia" was adopted, following the adoption of the "Declaration of Principles and Action Plan" (World Summit on Information Society, 2003). Furthermore, the government adopted an "Operative Action Plan 2005-2008" for the successful implementation of the "National Programme on Information Security" (Government of the Republic of Croatia 2006b).

Dynamic governmental activity was also present in the education sector. The MSES adopted an 'Education Sector Development Plan 2005-2010' and a number of support programmes in order to ensure the efficient implementation of the plan, with the assistance of the International Bank for Reconstruction and Development (IBRD). The programme design is built upon four broad pillars that form the basis of the sector reform priorities: *Creating Learning Schools*,

Improving Management and Leadership, *Strengthening Monitoring and Evaluation*, and *Supporting Regional Development and Innovations*. Taking account of the current situation, in terms of the process of globalisation and stabilisation, economic restructuring and the pressures of competition, demographic factors, as well as the need for modernisation and the development of a knowledge-based society and economy in Croatia, there is a clear need for effective changes in the development of the education system. To ensure continuity, new educational policies rely on preserving the fundamental values of Croatian society, while also utilising new guidelines and activities in order to develop the Croatian educational system in line with the state-of-the-art standards of Europe and the rest of the world (MSES 2005a).

The State Intellectual Property Office of the Republic of Croatia drafted a "National Strategy for the Development of the Intellectual Property System of the Republic of Croatia 2005-2010", which was adopted by the government in October 2005. By adopting this strategy, the government secured fundamental conditions regarding the level of intellectual property protection, similar to those implemented by the European Union. The strategy should create the grounds for further implementation and development of intellectual property, as one of the key factors of the overall economic, social, cultural and scientific development of the country (SIPO 2006).

5.3 Main Fields of Intervention and Research Priorities

Innovation policy as such has only recently re-emerged in the Western Balkan countries, after having been reduced to a secondary role during the transition process. According to Radošević, innovation policies in the WB region should recognise the structural weaknesses of their individual innovation systems and apply country-specific solutions, as opposed to the rather imitative mode that has so far prevailed (Radosevic 2005). Investment in R&D and high-tech orientation are regarded as the dominant paradigm in innovation policy (Dall 2006).

Serious long-term structural problems that affect the S&T sector need to be solved in order to assure further development. Amongst these structural problems are budgetary constraints and public debt, a generally low level of development, the need for industrial restructuring, widespread unemployment and massive migrations, pointing to the need for industrial restructuring in largely de-industrialised economies (Uvalic 2005). Due to the overall lack of resources, prioritisation is of utmost importance and research orientation needs to be steered towards the economic and social needs of the present in order to make provision for the future. International programmes need to use foresight and support the process of prioritisation, as simply focusing on the RTD Framework Programme or imitating the strategies of other countries will not bring about the desired results (Uvalic 2006).

Priority setting in S&T is intended to facilitate the efficient performance of certain identified S&T fields, by providing a predictable allocation of critical-size funds. The need to define thematic S&T disciplines and fields has been generally

recognised across the region, especially in Croatia (Uvalic 2006). The government of the Republic of Croatia has laid out strategic priorities for RTD funding in the upcoming period – amongst key priorities are the reform of the higher education system, brain-gain, Information and Communication Technology, Biotechnology, new materials and new production processes, Environmental Sciences and sustainable development, and the socio-cultural transition from an industrial- to a knowledge-based society etc. In the process, Croatia will surely benefit from the European funds which have become available since the start of the EU negotiation process.

The majority of financed projects demonstrate that researchers and institutes are interested in specific topics ("curiosity-driven research"). The overall distribution of funds reveals that the majority of research in Croatia falls within the Biomedical, Technical and Natural sciences. As mentioned above, most research activity is conducted at higher education institutions and public institutes. According to the MSES, 1,307 research projects covering all scientific areas were financed in 2000 and 1,702 were financed in 2002. The distribution by scientific fields was following:

- Natural sciences 18 %
- Engineering sciences 20 %
- Biomedical sciences 24 %
- Social sciences 10 %
- Humanities 14 %

The Croatian government and governmental bodies have recently been adopting development strategies and implementation policies with an accelerated pace. Achieving EU accession country status and beginning the negotiation process have had a positive impact on Croatia's development process, while access to EU financial funds and the distribution of know-how have also had a beneficial effect. In the field of Science and Technology, the MSES started the preparation of a broad-based Technology Programme in October 2002, building on the earlier efforts and successes and prioritising the economy's needs in a systematic way. This work, supported by the World Bank Technical Assistance Project for Institutional and Regulatory reform (TAL-2), resulted in the "Science and Technology Project". The project was created with the objective of securing accession to the European Union, as well as building a dynamic and competitive economy that can rapidly achieve convergence to EU living standards. The project supports Croatian industry through various programmes, including the modernisation of the S&T system, maintaining high-quality science infrastructure, upgrading the technological capabilities of firms, and developing a means of non-traditional financing, e.g. venture capital. The high level of externalities which characterise these activities justifies the public assistance in these areas as firms invest at sub-optimal levels in R&D and once diffused, knowledge can be accessed by anyone as a public good. Increased productivity, an improved technological base, and strengthened links between research and development institutions, the scientific community and industry will help enterprises compete more effectively and facilitate Croatia's economic integration into the global market. The project consists of three main components (MSES 2006b):

1. Restructuring of Research and Development Institutions (RDIs)
2. Establishing the Business Innovation Centre of Croatia (BICRO)
3. Unity Through Knowledge Fund

The restructuring of R&D institutions aims to strengthen the capacity of selected Croatian R&D institutions and to reorient their research infrastructure to serve the economy. The restructuring of RDIs, including the "Brodarski" Institute and "Ruđer Bošković" Institute is also supported in order to increase their applied and contractual research capacity, both within Croatia and in international markets. The project finances the purchase of equipment, consulting services and training; furthermore, it envisages support for the establishment of Science Parks (MSES 2006b).
The BICRO aims to upgrade technological capabilities of enterprises, finance technology development programmes (e.g. RAZUM Programme), promote Venture Capital in Croatia, develop technology centres, incubators and R&D centres, and establish a Sponsored Research and Development Programme (to provide grants to finance SME research projects).
The Unity Through Knowledge Fund (UKF) is a facility aiming to attract Croatian Diaspora, specifically scientists and researchers living abroad. The UKF supports the following activities: motivating expatriate Croatians to do scientific research, setting up a network of "Croatian Scientific Diaspora" and financing short-term visits of eminent Croatian expatriates to Croatia, attracting expatriate Croatians to launch start-up companies and other related initiatives in line with the project motto *Connectivity – Co-operability - Creativity* (MSES 2006b).

The National Foundation for Science (NFS) developed a programme in cooperation with the Croatian Academy of Sciences and Arts, also a member of European Science Foundation (ESF), to include Croatian scientists in ESF programmes. The main goal of the programme was to include Croatia in the European Research Area. The NFS provides financial support to Croatian scientists – to be eligible, scientists must be citizens of the Republic of Croatia, be working at a Croatian institution, have an independent research career, provide excellence in project leadership and any publications must fulfil the appropriate international standards. The NFS will also finance the inclusion of Croatian scientists in scientific and EUROCORES programmes of the European Science Foundation. An ESF Scientific Programme is a networking activity covering all domains in the research spectrum, bringing together key researchers and research groups to address a major scientific issue at European level. EUROCORES Programmes (European Science Foundation Collaborative Research Programmes) aim to create the conditions necessary for scientific excellence by enabling researchers from different European countries to collaborate and develop scientific synergy (NFS 2006).
The NFS also provides the so-called EMBO (European Molecular Biology Organisation) Installation Grants. The aim of this new scheme is to strengthen Croatian science by allocating grants to help scientists set up laboratories in Croatia, allowing them to rapidly establish a reputation in the European scientific community. Successful applicants receive EUR 50,000 annually (for 3-5 years) from the NFS via EMBO (NFS 2006).

6 Summary and Draft Conclusion

In today's globalised world economy, enhanced by the constant pressures of competition markets, economic restructuring in transition countries is unavoidable. The transition towards a knowledge-based society is perceived as a way of keeping pace with the EU's global competitors. Unfortunately, countries of the Western Balkans region mainly disregarded the role of R&D systems and innovation activities during the 1990s, with public innovation policies only emerging at the end of the 1990s. Growth and innovation in the economy are globally recognised to be dependent on R&D, on the capability to absorb and diffuse technology and on the demand for its generalisation and utilisation. In Croatia, innovation policy has been marginalised, mostly due to the shifting of priorities towards macroeconomic policy and obsolete understanding of innovation policy in general. In order to improve such conditions, the ministry should adopt adequate measures to re-establish the vast national R&D base, educational system and the business sector. Knowledge will have to be applied and used commercially, as opposed to the current situation, where there is no incentive to turn to the market. Such a transformed market-oriented research and education system will be forced to monitor signals from the marketplace and improve its capacity to supply innovation. However, experts have warned about the possible outcomes of such shock-therapy, which could leave the national university and research system entirely dependent on the market. Such a turn would probably result in a shift from one extreme to another – from an emphasis on fundamental research to an emphasis on applied research (Aralica, Bacic 2005).

Notwithstanding the devastating effects of war between 1991 and 1995, Croatia has managed to maintain the activities of all higher education institutions and scientific institutes, as well as its involvement in regional and international projects. Following its political efforts in gaining candidate country status to the EU accession process, Croatia has been adopting reforms with an accelerated pace. Research and development in Croatia is well integrated in the world R&D system and about 30 % of its potential was oriented to international research projects. Substantial efforts were invested in formulating scientific and technological policies and commencing their implementation process. Reforms in the science and research sector include substantial institutional and legislative reform, emphasising the importance of creating synergy between science and economic development. Further incentives were provided by introducing new technologies, creating new knowledge, developing new products and services etc. The government has clearly expressed its determination to implement further policies which support and encourage the development of the RTD sector, since research, technology and development are perceived to be the driving forces behind employment, economic development and overall competitiveness of a state. Since 2003, Croatian science policy has been based on the concepts of the "Strategy of Development of the Republic of Croatia in the 21st Century – Science", and the "Science and Education Act". The overall goals of Croatian RTD are as follows: restructuring the scientific research sector, increasing investment in science (in order to achieve the goals adopted in the Lisbon Agenda – 3 % of GDP allocated to science and research), financial diversification (i.e. more intensive integration of the economic and private sectors into financing science),

regional diversification of research activity and optimal use of scientific research through international cooperation. The main targets of technology policy include the revitalisation of industrial research, the commercial use of scientific research, building-up technology capabilities of companies and developing private incentives for financial investments into technology-based entrepreneurship (European Commission 2004).

Innovation and higher education indicators represent another aspect of Croatian R&D policy which requires further improvement, especially in terms of their construction and their inclusion in relevant European databases. Although participation in Eurostat significantly improved during 2005, it is still confined to basic indicators. Sophisticated data, especially that relevant to technological performance, such as patent activity (EPO), high-tech exports, ICT expenditures, etc. are still missing.
According to Becic and Svarc (2006), the status of R&D and innovation indicators reflects, in essence, the old paradigm of economic growth concentrated on labour- and capital–intensive sectors and production/service sectors with low R&D and innovation consumption (Becic, Svarc 2006). However, the main boost towards the formation of a knowledge-driven economy and the modernisation of the S&T system in Croatia comes from Croatia's accession negotiations with the European Union. With candidate country status, the Lisbon goals were brought into Croatian national development plans, promoting research and innovation as the important drivers of development. Nowadays, it is commonly accepted that there is an urgent need for Croatia to integrate into global economic processes, primarily into the European Union. The role of science, technology and education is perceived as an important factor for European integration and for the transition from an industrial- to knowledge-based economy. The best illustration of this new orientation is the new *Science and technology policy of the Republic of Croatia 2006-2010* accepted by the Croatian government in June 2006. The main challenge for science policy is to increase the funding for S&T in order to meet the "3 % of GDP for research investment" as laid out in the Lisbon Strategy. The main aim is to promote economic growth and job creation through research and innovation. Therefore, the main objectives for the science and innovation policy in the near future are as follows: to focus publicly-funded research projects on national priority areas and industrial needs, to encourage research partnerships, mobility and cross-sector cooperation, as well as to introduce new measures to promote the commercialisation of academic research

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MSES Ministry of Science; Education and Sports of the Republic of Croatia (2005a): Education Sector Development Plan 2005-2010. Available from: http://public.mzos.hr/DOWNLOAD/2006/02/13/Education_Sector_Development_Plan_.pdf, accessed 19.09.2006.

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MSES Ministry of Science; Education and Sports of the Republic of Croatia (2006a): Co-operation with the European Union. Available from: http://public.mzos.hr/default.asp?ru=959&gl=&sid=&jezik=2, accessed 30.09.2006.

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NFS National Foundation for Science; Higher Education and Technological Development of the Republic of Croatia (2006): The National Foundation for

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8 List of Acronyms

ALLEA - All-European Academies

BERD – Business Sector Expenditure on R&D

BICRO - Business and Innovation Centre of Croatia

CARDS – Community Assistance for Reconstruction, Development and Stabilisation

CARNet - Croatian Academic and Research Network

CBS – Central Bureau of Statistics of Croatia

CEEOL - Central and Eastern European Online Library

CEI – Central European Initiative

COST – Co-operation in Science and Technology

CROSBI - Croatian Scientific References

CTBTO - Comprehensive Nuclear-Test-Ban Treaty Organisation

DFG - *Deutche Forschungsgemainschaft*

EERO - European Environmental Research Organisation

EGEE - Enabling Grids for E-science

EICC - Euro Info Correspondence Centre (Zagreb)

EIT - European Institute of Technology

EMBO - European Molecular Biology Organisation

EPC – European Patent Convention

EPO – European Patent Office

ERA - European Research Area

ERA-NET - European Research Area Network

ESF - European Science Foundation

EUROCORES - European Science Foundation Collaborative Research Programmes

EURODOC - European Council of Doctoral Candidates and Junior Researchers

EQUIBELT - Education Quality Improvement by E-Learning Technology

FP5, FP6, FP7 - European Community Framework Programmes RTD

FTE - Full Time Equivalent

GÉANT - A multi-gigabit pan-European data communications network

GERD - General Expenditure on R&D

GOVERD - Government Sector Expenditure on R&D

GVA - Gross Value Added

HAZU - Croatian Academy of Sciences and Arts

HC - Headcount Equivalent

HE - Higher Education

HERD - Higher Education Sector Expenditure on R&D

HIDD - Croatian Information and Documentation Society

HIT - Croatian Institute of Technology

HITRA - Croatian Innovation Technology Development Programme

HRCAK - On-line Portal of Scientific Journals in Croatia

IAEA - International Atomic Energy Agency

IAMP - Inter-Academy Medical Panel

IAP - Inter-Academy Panel

ICSU - International Council for Science

ICT - Information and Communication Technology

ICTY - UN International Criminal Tribunal for the former Yugoslavia

IGK - *Internationale Graduiertenkollegs*

IPA - Instrument for Pre-Accession Assistance

ISOTEIA - Integrated System for the promotion of Territorial-Environmental Impact Assessment

ISPA - Instrument for Structural Policies for Pre-Accession

IUPAC - International Union of Pure and Applied Chemistry

MLAZ - Young Scientists Network of Croatia

MSES - Ministry for Science, Education and Sports of Croatia

NCC - National Competitiveness Council of Croatia

NIS – National Innovation System

NISKA - National Information System in Croatian Libraries

NRDP – National R&D Programmes

NFS - National Foundation for Science, Higher Education and Technological Development of Croatia

OAI-PMH - Open Archives Initiative Protocol for Metadata Harvesting

PHARE - *Pologne, Hongrie Assistance à la Reconstruction Economique*

R&D – Research and Development

RDI - Research and Development Institutions

RTD – Research and Technological Development

SAA – Stabilisation and Association Agreement

SAP – Stabilisation and Association Process

SAPARD - Special Accession Programme for Agriculture and Rural Development

SCI – Science Citation Index

S&E - Science and Engineering

SEE – South-Eastern Europe

SEE-ERA.NET – Southeast European Era-Net Project

SEEFIRE - South-East Europe Fibre Infrastructure for Research and Education

SEE-GRID - South Eastern European GRid-enabled e-Infrastructure Development

SEEREN - South Eastern European Research & Education Network

SFB – *Sonderforschungsbereiche*

SIPO - State Intellectual Property Office of Croatia

SIS - Scientific Information System of Croatia

SMEs – Small and Medium Size Enterprises

SRCE - University Computing Centre (Zagreb)

S&T – Science and Technology

STI – Science, Technology and Innovation

TAL – World Bank's Technical Assistance Project for Institutional and Regulatory Reform

TEMPUS – Trans-European Mobility Scheme for University Studies

TERENA - Trans European Research and Education Network Association

TRIPS - Trade-Related Aspects of Intellectual Property Rights Agreement

UAI - *Union-Académique International*

UKF - Unity Through Knowledge Fund

UNDP – United Nations Development Programme

UNECE – United Nations Economic Commission for Europe

UNESCO – United Nations Educational, Scientific and Cultural Organisation

UNIDO – United Nations Industrial Development Organisation

WAYS - World Academy of Young Scientists

WIPO - World Intellectual Property Organisation

WB – Western Balkans

WBC – Western Balkan countries

WMO - World Meteorological Organisation

WTO – World Trade Organisation

Annex I – Main Institutions in Croatia

Quoted from Government of the Republic of Croatia (2006c): Science and Technology Policy of the Republic of Croatia 2006-2010. Available from: http://public.mzos.hr/lgs.axd?t=16&id=11958, accessed 15.02.2007.

STATE INSTITUTIONS AND BODIES

1. Agency for Science and Higher Education http://www.azvo.hr
2. Meteorological and Hydrological Service http://www.dhmz.htnet.hr
3. State Intellectual Property Offi ce http://www.dziv.hr
4. State Offi ce for Metrology http://www.dzm.hr
5. Central Bureau of Statistics http://www.dzs.hr
6. Croatian Academic and Research Network - CARNet http://www.carnet.hr
7. Croatian Accreditation Agency http://www.akreditacija.hr
8. Croatian Institute of Technology - HIT, Ltd. http://www.hiteh.hr
9. Croatian Parliament - Committee for Education, Science and Culture http://www.sabor.hr
10. Croatian Standards Institute http://www.hzn.hr
11. Ministry of Science, Education and Sports http://www.mzos.hr
12. National Foundation for Science,
Higher Education and Technological Development http://www.nzz.hr
13. National Council for Information Society
14. National Council for Higher Education http://www.azvo.hr
15. National Science Council http://www.nvz.hr
16. Business Innovation Center of Croatia - BICRO, Ltd. http://www.bicro.hr

IMPORTANT SCIENTIFIC ORGANIZATIONS

1. Croatian Academy of Sciences and Arts* http://www.hazu.hr
2. Academy of Medical Sciences of Croatia http://www.amzh.hr
3. Croatian Academy of Engineering http://www.hatz.hr
4. "Miroslav Krleža" Lexicographical Institute* http://www.lzmk.hr

*Institutions of special interest for the Republic of Croatia

PUBLIC INSTITUTES

1. Institute of Economics http://www.eizg.hr
2. Croatian Geological Survey http://www.hgi-cgs.hr
3. Croatian Institute for Bridge and Structural Engineering http://www.himk.hr
4. Croatian Historical Institute http://www.isp.hr
5. Croatian Veterinary Institute http://www.veinst.hr
6. Institute for Anthropological Research http://www.pub.srce.hr/antro/hrv/naslov
7. Institute of Archeology http://public.carnet.hr/iarh/
8. Institute for Social Research http://www.idi.hr
9. Institute of Social Sciences "Ivo Pilar" http://www.pilar.hr
10. Institute of Ethnology and Folklore Research http://www.ief.hr
11. Institute of Philosophy http://www.ifzg.hr
12. Institute of Physics http://www.ifs.hr
13. Institute of Croatian Language and Linguistics http://www.ihjj.hr
14. Institute of Public Finance http://www.ijf.hr
15. Institute for Adriatic Crops and Karst Reclamation http://www.krs.hr
16. Institute for Medical Research and Occupational Health http://www.imi.hr
17. Institute for International Relations http://www.imo.hr
18. Institute for Migration and Ethnic Studies http://www.imin.hr
19. Institute of Oceanography and Fisheries http://www.izor.hr
20. Institute of Art History http://www.hart.hr
21. Ruđer Bošković Institute http://www.irb.hr
22. Institute for Tourism http://www.iztzg.hr
23. Institute for Agriculture and Tourism http://www.iptpo.hr
24. Agricultural Institute Osijek http://www.poljinos.hr

25. Old Church Slavonic Institute http://public.carnet.hr/staroslavenski-institut/
26. Forest Research Institute http://www.jaska.sumins.hr

PRIVATE SCIENTIFIC INSTITUTIONS

1. Bc Institute for Breeding and Production of Field Crops* http://www.bc-institut.hr/
2. Brodarski Institute, Ltd. http://www.hrbi.hr/
3. Tobacco Institute Zagreb*
4. Energy Institute Hrvoje Požar http://www.eihp.hr/
5. Ericsson Nikola Tesla* http://www.ericsson.com/
6. GlaxoSmithKline Research Center Zagreb, Ltd. http://www.pliva.com
7. INA* http://www.ina.hr
8. Civil Engineering Institute of Croatia* http://www.igh.hr/
9. Energy Institute* http://www.ie-zagreb.hr/
10. I3 Information Innovation Institute http://www.svetikriz.com
11. Končar - Electrotechnical Institute* http://www.koncar-institut.hr/
12. Mediterranean Institute Grga Novak http://www.mign.org
13. Mediterranean Institute for Life Sciences http://www.medils.hr

*Joint stock company

TECHNOLOGY AND RESEARCH AND DEVELOPMENT CENTERS

1. Technology-Development Center Osijek, Ltd. http://www.tera.hr
2. Technology-Innovation Centre of Rijeka, Ltd. http://www.ticri.hr
3. Technology Center in Split, Ltd. http://www.tcs.hr
4. Center of Technology Transfer - Ctt, Ltd. http://www.ctt.hr
5. Research and Development Centre for Mariculture, Ston http://www.unidu.hr/ric.php
6. Center for Karst, GospiE

UNIVERSITIES AND COLLEGES

Universities

1. University of Dubrovnik http://www.unidu.hr
2. Josip Juraj Strossmayer University of Osijek http://www.unios.hr
3. University of Pula*
4. University of Rijeka http://www.uniri.hr
5. University of Split http://www.unist.hr
6. University of Zadar http://www.unizd.hr
7. University of Zagreb http://www.unizg.hr

*Currently being established

Public Colleges and Polytechnics

1. Social Science Polytechnic of Zagreb http://dns.pravo.hr/veleuciliste/
2. "Lavoslav Ružička" Polytechnic of Vukovar http://www.vevu.hr
3. "Marko Marulić" Polytechnic of Knin http://www.veleknin.hr
4. "Nikola Tesla" Polytechnic of Gospić
5. Polytechnic of Karlovac http://www.vuka.hr/
6. Polytechnic of Požega http://www.vup.hr
7. Polytechnic of Rijeka http://www.veleri.hr
8. Polytechnic of Slavonski Brod
9. Polytechnic of Šibenik http://www.vstsi.hr
10. College of Electrical Engineering in Varaždin http://www.vels.hr
11. Teachers Education Academy in Čakovec http://www.vus-ck.hr
12. Teachers Education Academy in Petrinja http://www.vusp.hr
13. Police Academy - Zagreb http://pa.mup.hr
14. Agricultural College in Križevci http://www.vguk.hr
15. Technical Polytechnic of Zagreb http://www.tvz.hr
16. Health Polytechnic in Zagreb http://www.zvu.hr

Accredited Private Colleges and Polytechnics

1. American College of Management and Technology in Dubrovnik http://www.acmt.hr
2. International Graduate Business School Zagreb http://www.igbs.hr
3. RRiF Graduate School for Financial Management in Zagreb http://www.rrif.hr
4. "Matija Vlačić Ilirik" Faculty of Theology in Zagreb http://www.tfmvi.hr

5. Polytechnic College Velika Gorica http://www.vvg.hr
6. Business Administration College in Višnjan http://www.manero.hr
7. "Libertas" Academy in Zagreb http://www.vps-libertas.hr
8. "Utilus" Business School, Zagreb http://www.utilus-zg.com
9. "Agora" Academy in Zagreb http://www.vs-agora.hr
10. "Vern" Business School, Zagreb http://www.vern.hr
11. College of Business and Management "Baltazar Adam Krčelić", Zaprešić http://www.vspu.hr
12. Work Safety College in Zagreb http://www.vss.hr
13. Technical College - Polytechnic Studies in Pula http://www.politehnika-pula.hr
14. Evangelical Theological Seminary in Osijek http://www.evtos.hr
15. Zagreb School of Economics and Management http://www.zsem.hr
16. Entrepreneurial Economics College in Zagreb http://www.zsm.hr

Computing Centre

University Computing Centre - SRCE, University of Zagreb http://www.srce.hr

WEB PAGES OF IMPORTANT PROGRAMS AND PROJECTS OF THE MINISTRY OF SCIENCE, EDUCATION AND SPORTS

1. Scientifi c projects http://zprojekti.mzos.hr
2. HITRA - Technology projects http://tprojekti.mzos.hr/
3. Croatian Scientifi c Portal* http://www.znanstvenici.hr
4. Center for on-line databases* http://www.online-baze.hr
5. Cooperation with the European Union http://www.mzos.hr

*Joint projects of the Ministry of Science, Education and Sports, CARNET and "Ruđer Bošković" Institute

(Government of the Republic of Croatia 2006c)

The Project

The Information Office of the Steering Platform on Research for Western Balkan Countries (***see-science.eu***) acts as a source of high quality targeted information on research in the Western Balkan countries (WBCs) by supporting the Steering Platform through a regular eJournal, analytical studies and reports and directories.
The Information Office contributes to a dialogue on S&T issues between the EU and the Western Balkan countries and the integration of the research and innovation systems of the WBCs into the European Research Area (ERA).
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Reviews and Contributions

The readers are invited to contribute to the development of the report. It is planned to update it on a continuous basis and to publish the results in a book in the end of 2007. Please send your remarks to Ms. Elke Dall at dall@zsi.at