



Establishing the EU-Mediterranean ICT Research Network

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Abstract	The Policy of the Future presents a proposed Vision and recommendations for enhanced EU-MPC R&D collaboration in the field of ICT. Moreover the key findings from the review of national ICT policies / strategies and regional policy documents are presented as well as key international trends in the ICT sector.
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1 FOREWORD / HOW THIS POLICY WAS DEVELOPED

The Policy of the Future presents a vision for EU-MPC ICT R&D collaboration. The vision is the outcome of a dedicated working group comprising four Join-MED partners coming from the MPC (CNI, CNRS, HIAST and ISGP) led by Professor Farouk Kamoun from Tunisia. Moreover, it incorporates the feedback of all Join-MED partners and their suggestions on specific objectives and means to accomplish these.

The initial version of the vision was presented during the 3rd Join-MED Networking Event that took place in Cairo (26-28 June 2011). The vision was discussed both within a ‘closed’ policy workshop as well as an ‘open’ session involving all event participants.

Following the Cairo Networking Event, the vision was discussed with MPC policy makers (during face-to-face meetings in July, August and September 2011) who gave a positive appraisal and suggested some improvements.

An updated version of the vision was discussed during the Final Conference in Tunis, where the Secretary General of the Arab Information and Communication Technologies Organization (AICTO) welcomed the policy recommendations from the Join-MED project.

It should be noted also that the working group has taken into account the initiative of the Arab League and AICTO to develop an “Arab Strategy for Scientific and Technical Research and Innovation”. In particular, the working group aims to deliver its results to AICTO and other relevant regional organisations with a view to enhancing the R&D collaboration between the Arab world and Europe.

The final version of the vision is the outcome of the feedback during the 3rd Networking Event in Cairo, the Final Conference in Tunis, as well as from MPC policy makers and the analysis of global ICT trends.

The final vision will be presented at the Euro-Mediterranean Conference on Research and Innovation organised by the EC in Barcelona, in April 2012 where the Join-MED project will be represented.

2 INTRODUCTION

Policies to foster and guide research and development play an important role for the development of a country, for its ability to become or remain competitive, for making full use of its innovation potential and hence successfully meet the challenges of a globalised world. In this sense research policies have a much wider impact than just to strengthen the academic world; they directly affect the socio-economic development. Research policies also have to take into account the necessity of co-operation across nations that in a sense has become a crucial survival factor in our globalised world. Europe with its Framework Programme for Research and Development (FP) is an excellent example for moving from national policies to a joint European one. The FP represents the pan-European research policy and at the same time provides the implementation mechanisms. Such a move is not yet visible in the MPC region.

However, both research co-operation with Europe as well as the topic of ICT have become an integral part of the ongoing development of research policies in all MPC. Already four countries (Egypt, Morocco, Tunisia, and Jordan) have signed a Science and Technology Co-operation Agreement with the EU and other countries from the region will follow. Under this agreement legal entities from the MPC can participate in the EU Framework Programme under the same conditions as European entities. Consequently, there is pressing need for the MPC to focus their own research strategies towards a closer co-operation with Europe and to learn more about the concrete Framework opportunities and procedures in the field of ICT.

It is worthwhile to observe that the need for a regional ICT strategy (a stepping stone for a regional ICT strategy for R&D) was already recognised some years ago, however, results are still sparse:

“The most important reason to justify the adoption of an Arab ICT strategy should not be assessed on the basis of profitability, which is certainly great, but should be calculated on the basis of loss likely to be incurred if such a strategy is not implemented.” WSIS, Cairo, 2003

At the Second Euro-Mediterranean Ministerial Conference on the Information Society in Cairo in February 2008 the Ministers stressed the necessity for greater participation of researchers and experts of the MPC in European R&D and asked for new ways and facilities for exchange and collaboration.

In order to achieve an effective cooperation, national policies need to be balanced among the MPCs. The countries will have different priorities in certain areas and overlap in others, but these policies should be complementary to be mutually beneficial for all countries. To support this, the Join-MED project has initiated an open dialogue among MPC policy makers and has developed harmonised policy recommendations for enhanced EU-MPC R&D co-operation in the field of ICT.

3 THE EU-MEDITERRANEAN ICT POLICY CONTEXT

The Euro-Mediterranean Partnership, formerly known as the Barcelona Process, was re-launched in 2008 as the Union for the Mediterranean at the Paris Summit for the Mediterranean in July 2008. The new network of relations was endorsed at the Marseille Meeting of the Euro-Mediterranean Ministers of Foreign Affairs in November 2008.

The Partnership includes all 27 member states of the European Union and 16 partners across the Southern Mediterranean and the Middle East. The creation of the Union for the Mediterranean aims to raise the political level of the strategic relationship between the EU and the Mediterranean Partner Countries.

Some of the most important features of the Union for the Mediterranean include the rotating co-presidency with one EU president and one president representing the Mediterranean partners, and a Secretariat based in Barcelona that is responsible for identifying and promoting projects of regional, sub-regional and transnational value across different sectors.

The foreign ministers of the participating countries meet every 18 months in order to discuss the progress of the partnership in Euro-Mediterranean Conferences of Foreign Ministers.

In accordance with the final statement of the Marseille Meeting of the Euro-Mediterranean Ministers of Foreign Affairs (November 2008), the fields of co-operation between the EU and Mediterranean countries to be pursued in 2009 were: (a) political and security dialogue, (b) Maritime Safety and (c) economic and financial Partnership in various sectors including **Information Society**, energy, agriculture, transport etc. and (d) social, human and cultural cooperation. In this field, one stated priority is the development of a Euro-Mediterranean Higher Education and Research Area.

3.1 EU-Med collaboration in Information Society Development

With respect to EU-MED collaboration in the field of information society, the final statement of the Marseilles ministerial meeting reiterates the main conclusions of the Cairo Declaration of the 2nd Euro-Mediterranean Ministerial Conference on 27th February 2008 in Cairo “*Building an Enabling Environment for the EUROMED Information Society*”¹.

In the Cairo declaration, Ministers agreed to undertake the following key measures to build the Euromed information society:

- intensify cooperation in regulatory issues, connectivity, **research and ICT for development** in the areas of **multilingual e-content, e-learning, e-science, e-health, e-inclusion and e-government**.
- reinforce the work of the EUROMED Forum on the Information Society that should convene at least once a year. Among the key functions² are to prepare a Work Programme with specific initiatives and projects within an appropriate time frame, to

¹ http://www.mcit.gov.eg/events/Euromed_Conf_Declaration20083613334.pdf

² Note that only the key functions of the Forum are listed here. For the entire list, please refer to the Cairo Declaration, 27th February 2008, 2nd Euro-Mediterranean Ministerial Conference on the Information Society “*Building an Enabling Environment for the EUROMED Information Society*”.

carry out a mapping exercise to match existing programmes with identified priorities of the Euro-Mediterranean region, to **promote more active participation in the 7th Framework Programme for Research and Technological Development, in particular in the ICT theme and to report to the Ministerial Conferences on Information Society**

In the Cairo Declaration, Ministers also stressed the need to ensure interconnection of research networks to support the creation of grid-enabled scientific e-infrastructures able to make ICT research and development co-operation between the EU and Mediterranean countries more efficient.

3.2 EU-Med collaboration in Research & Technological Development

Collaboration on Research & Technological Development in various fields including Information and Communication Technologies is promoted by the EU-Med partnership process.

In the First Euro-Mediterranean Ministerial Conference on Higher Education and Scientific Research held in Cairo in June 2007, Ministers examined ways and means of developing co-operation in the field of scientific research and further developing the quality of higher education and vocational training. The guidelines for future co-operation among EU-Mediterranean countries were published in a joint declaration entitled “Towards the Creation of a Euro-Mediterranean Higher Education and Research Area”³.

With respect to research and innovation (across scientific fields, including ICTs), the common objective of the Euro-Mediterranean Ministers for Higher Education and Scientific Research is to create a Euromed Research Area.

An Expert Group on Higher Education was launched after the Ministerial Conference in Cairo in June 2007, with a view to implementing the objectives and actions of the Conference and joint declaration.

Moreover, a Monitoring Committee for Euro-Mediterranean RTD Cooperation (MoCo)⁴ has been established, which is currently operating as a forum of Senior Official representatives from the Mediterranean Partner Countries (MPC) and the EU Member States and Associated Countries, responsible for RTD issues.

Among the key responsibilities of the MoCO are to: (i) acts as a forum for the exchange of information and views and recommendations on RTD policy in the Mediterranean region, and establishes a common information base on this subject; (ii) identify issues of regional importance to be addressed by RTD and requiring cooperative Euro-Mediterranean activities; (iii) propose concrete actions to be taken in the context of the Euro-Mediterranean Partnership and the bilateral cooperation activities among MPC (iv) monitor RTD policies, developments and activities in the Euro-Mediterranean context, (v) informs the Euro-Mediterranean Committee of the Barcelona Process of its opinion on Euro-Mediterranean cooperation in RTD.

Currently, the functioning of the MoCo is supported by the ‘Mediterranean Innovation and Research Coordination Action – MIRA (<http://www.miraproject.eu/>). MIRA is an INCONET

³ http://www.bmbf.de/pub/cairo_declaration-e.pdf

⁴ <http://www.miraproject.eu/moco>

type project funded by the 7th EU Framework Programme for RTD, dedicated to the EU – MPC bi-regional policy dialogue and priority setting in S&T.

4 ANALYSIS OF THE ICT R&D POLICY ENVIRONMENT IN THE MPC

The analysis in this section is based on the review of national policies and strategies in the MPC as well as existing EU-MPC and intra-MPC regional policy initiatives. Note that a more detailed presentation of the analysis is available in the document “Overview and analysis of MPC policies and strategies”.

4.1 Key findings from the analysis of national ICT policies / strategies and existing funding mechanisms

The analysis of national ICT policies and strategies reviewed (the list of policy documents identified is provided in Annex I) was performed vis a vis two overall parameters:

- 1) the extent to which national policies/strategies effectively support R&D in the field of ICT within the countries (i.e. availability of implementation mechanisms, dedicated funds, priority setting)
- 2) the extent to which these policies/strategies promote R&D collaboration in the field of ICT with other countries (bilaterally and multilaterally).

The main findings that can be derived from the analysis of national policies/strategies are as follows:

- the vast majority of Mediterranean Partner Countries do **not** have *dedicated*⁵ policies/strategies for research and development specifically in the field of ICT.
- at a policy/strategy level the most relevant documents focus on the development of the ICT sector and the promotion of ICT education.
- The *common* national ICT priorities identified in the national policies and strategies reviewed are presented in the table below. The following six priorities are shared by at least five out of the 8 countries addressed:
 - **Digital Content (Arabic content)** –identified by 7 out of 8 countries
 - **Internet, Broadband and Mobile Technologies** – identified by 7 out of 8 countries
 - ICTs for Learning / Education
 - ICTs for Government
 - ICTs for Enterprises

⁵ Out of the MPC countries addressed, only Jordan has a “Research & Development Strategy for Information & Communication Technologies”.

- ICTs for All (refers to the provision of universal, easy and affordable access to PCs and internet for all citizens and accessibly of all social groups to information and knowledge through the internet)

ICT Priorities	ALGERIA	EGYPT	JORDAN	LEBANON	MOROCCO	PALESTINE	SYRIA	TUNISIA
Digital Content (Arabic content)	✓	✓		✓	✓	✓	✓	✓
Internet, Broadband & Mobile Technologies	✓	✓	✓		✓	✓	✓	✓
ICTs for Learning / Education	✓	✓			✓	✓	✓	✓
ICTs for Government	✓	✓			✓	✓	✓	✓
ICTs for Enterprises	✓		✓	✓	✓			✓
ICTs for All	✓	✓			✓		✓	✓
ICTs for Health	✓	✓				✓		✓
ICTs for social and economic sustainable development		✓				✓	✓	
Arabized Software Technologies		✓		✓		✓	✓	
Infrastructure development	✓				✓		✓	✓
Security	✓	✓			✓			✓

Table 1 – National ICT priorities of reviewed ICT policy/ strategy documents

- ICT priorities are defined in detail with R&D objectives in Morocco, Syria and in Tunisia for some priorities. In the remaining countries there is no detailed description of objectives (due to the more generic scope of the documents)
- In all documents except Algeria, there are foreseen institutional/legislative mechanisms for the promotion of R&D in the field of ICT. The predominant mechanisms are support for incubation projects, establishment of research centres of excellence, establishment of national R&D committees.
- With the exception of Palestine, all documents *foresee* a national funding mechanism for R&D activities in the field of ICT (however note that this does necessarily mean that this is implemented in practice).
- The policy documents of Jordan, Morocco, Palestine, Syria and Tunisia foresee specific measures/incentives for academia-industry partnerships for joint R&D activities in ICT.
- The weakest point of the examined policy documents is the lack of specific measures / incentives supporting international R&D collaboration in the field of ICT. Although international collaboration is a strategic objective mentioned in most policy documents, only the policy documents of Syria have specific measures/ incentives foreseen supporting R&D collaboration in ICT.

The findings from the analysis of the *actual situation* with respect to R&D funding mechanisms in the 8 MPCs is as follows:

- Only Egypt, Morocco, Syria and Tunisia have dedicated national / public funding for R&D activities in ICT.

- All countries except Palestine have national funding available for various fields including ICT.
- None of the countries have a dedicated national R&D programme⁶ solely for ICT in place.
- Egypt, Lebanon, Algeria, Morocco, Syria and Tunisia have generic R&D programmes⁷ funding activities across various fields including ICT, however with the exception of Lebanon none of these have future R&D priorities defined.
- In Lebanon, Morocco, Algeria, and Tunisia there are periodic open calls for R&D proposals in ICT with defined (top-down) priorities.
- On the other hand, in Egypt, Jordan, Lebanon and Syria, there are periodic open calls for R&D proposals in ICT inviting (bottom-up) ideas.
- All countries have institutional/legislative measures in place that support R&D activities in the field of ICT (e.g. Jordanian law mandating 1% from annual gross profit to be spent on R&D, encouragement of public-private companies to give 5% of their budget to fund R&D activities in Syria and 0.5% respectively for Tunisia, Prizes in Morocco and Tunisia for best R&D publications etc.)
- The majority of countries have institutional measures/incentives in place supporting academia-industry partnerships for joint R&D activities in ICT.
- Finally, all countries have measures *in place* supporting R&D collaboration in the field of ICT with other countries (in Europe, other MPC and other countries) including bilateral agreements and memoranda of understanding.

The following matrix gives an overview of the key findings per country.

	Algeria	Egypt	Jordan	Lebanon	Morocco	Palestine	Syria	Tunisia
<i>Types of strategies/ policies available</i>								
1. Availability of a <u>dedicated strategy</u> for R&D in ICT	n/a	n/a	✓	n/a	n/a	n/a	n/a	n/a
2. Availability of a generic R&D / Science and Technology strategy addressing various fields including ICT	✓		n/a	✓	✓	n/a	✓ ⁸	✓
3. Availability of a national strategy for ICT development with provisions for R&D in ICT	✓	✓	n/a	n/a	✓	✓	✓	✓

⁶ A national R&D ICT programme is defined as a programme/document describing national public funding given to companies, public research institutes or universities etc, through calls or similar procedures to be used for research and technological development in the field of ICT (solely).

⁷ A generic R&D programme is defined as a programme/document describing national public funding given to companies, public research institutes or universities etc, through calls or similar procedures to be used for research and technological development in various fields, that may or may not address the field of ICTs.

⁸ Referring to the Science part of the Tenth Syrian Five-Years Plan

Types of funding mechanisms available								
4. Existence of <u>dedicated</u> national funding for R&D activities in ICT	n/a	✓	n/a	n/a	✓	n/a	✓	✓
5. Existence of national funding for R&D activities across various fields including ICT	✓	✓	✓	✓	✓	n/a	✓	✓
Type and availability of R&D programmes								
6. Existence of a <u>dedicated</u> national R&D programme for ICT (only)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
7. Existence of a generic R&D programme funding activities across various fields including ICT	✓	✓	n/a	✓	✓	n/a	✓	✓
8. If a dedicated or generic R&D programme is available, <u>definition of future medium to long-term R&D priorities</u> in the field of ICT	n/a		n/a	✓	Under preparation	n/a	n/a	n/a
9. Existence of periodic open calls for proposals for R&D in ICT with <u>defined (top-down) priorities</u>	✓		n/a	✓ ⁹	✓	n/a	n/a	✓
10. Existence of periodic open calls for proposals for R&D in ICT inviting <u>bottom-up proposals/ideas</u>	n/a	✓	✓ ¹⁰	✓ ¹¹	n/a	n/a	✓	n/a

Table 2 – Matrix on positioning of countries *vis a vis* key issues

4.2 Key findings from the analysis of EU-MPC regional policy initiatives

With respect to regional policies, the aim was to identify the existing joint EU-Mediterranean as well as intra-MPC regional policy initiatives and examine to what extent they effectively support R&D collaboration *between* the region and Europe as well as *within* the region. The policy documents that were reviewed are listed in Annex I.

The key findings on EU-MPC regional policy initiatives are as follows:

- A dedicated intra-MPC regional policy or strategy for Research and Development in the field of Information and Communication Technologies does not exist until now.
- Similarly, there is no dedicated EU-MPC policy promoting R&D Collaboration (between the EU and MPC) in the field of ICT.
- On the other hand, there are a few proposals for the development of the information society (containing elements on R&D collaboration) in the EU-Mediterranean region and proposals addressing overall EU-Mediterranean R&D collaboration (across thematic fields, *not specific* to ICT).
- Based on the analysis of the above proposal documents, the following common/regional ICT priorities emerge:

⁹ Yes, but not dedicated only to ICT

¹⁰ The calls invite R&D projects across fields, including ICT

¹¹ Ibid 14

- **Multi-lingual eContent**
- **eLearning**
- **eHealth**
- **eGovernment**
- The above regional priorities are in line also with the common priorities identified from the analysis of national policies / strategies.
- All the regional proposal documents suggest certain actions and mechanisms for the promotion of EU-Mediterranean R&D collaboration in the field of ICT.
- Finally, a total of 6 regional funds for R&D in ICT are identified at this point of time, in addition to the FP7's ICT work-programme that provides collaborative funding opportunities to R&D organisations across the region (these are listed and presented in the document "Overview and analysis of MPC policies and strategies".)

Moreover, since mid-2011 the League of Arab States has started an initiative, in collaboration with the Arab Information and Communication Technologies Organization (AICTO) to develop an "**Arab Strategy for Scientific and Technical Research and Innovation**". The draft objectives of the strategy currently being developed are the following:

- Setting up a research & development and innovation system related to social and economic development,
- Increasing the budget allocated to R&D and innovation to become more than the global average rate (currently 1.4% of the domestic income),
- Developing modern administrative and financial systems that contribute to the promotion of R&D and innovation,
- Promoting Arabic technical and scientific publishing in top level specialized magazines reflecting the Arab economic and human capacities, in addition to the dissemination of scientific culture within the society,
- Setting up cooperation mechanisms between the scientific research institutions and educational institutions aiming at taking advantage from human resources in schools and universities, as well as in laboratories and research centers, and increasing such resources on the level of quantity and quality,
- Inviting the private sector to participate in financing research and development and innovation with rates not less than 30-40% from the total expense in the country,
- Creating an adequate environment encouraging intellectual property and copyright registration,
- Promoting an environment that protect Arab brains and benefit from those who are abroad.

5 VISION FOR EU-MPC ICT R&D: TOWARDS A EURO-MEDITERRANEAN ICT AREA

“ICT is not only a prime mover for economic growth and development, it is also an economic sector on its own, which can offer employment opportunities for young people and contribute to social development and to the improvement of the quality of life.

An Arab-EU partnership in ICT research will expand the pools of research areas and researchers. It will also facilitate the formulation of medium-to-long term research programmes that address the economic and social needs of both regions and are relevant to the existing and evolving capacity of the MPC researchers. Moreover, it will nurture the inter-MPC ICT research cooperation.

This EU-MPC partnership can contribute to both advancing the research capacity of the MPC ICT researchers and academic, research and industry institutions and establishing an internationally competitive Arab MPC ICT sector through developing ICT products and innovative solutions for the region and its common challenges and becoming a major player in providing ICTs and ICT-enabled services.

Enabling the emergence, through partnerships, of a strong MPC ICT sector capable of providing ICT and ICT-enabled services for the EU-MPC region and internationally, will be instrumental for the acceleration of the MPCs’ socio economic development and the creation of the much needed high valued jobs. Moreover, EU-MPC partners can develop through collaboration, ICT enabled solutions to common needs and problems”.

5.1 Aims and objectives

1. Advance the research capacity of the MPC ICT researchers and research institutions:
 - a. Strengthen ICT graduate studies in MPCs, foster joint EU-MPC MS and PhD degrees, and achieve **1000** joint degrees per year by 2020, meeting recognized international standards.
 - b. Strengthen MPCs research and technology transfer infrastructures by installing collaborative platforms accessible to all partners (cloud platform, high speed networks etc.) and developing joint incubators in cooperation with EU partners.
 - c. Create consortia / networks and establish bi or multi-lateral agreements among EU and MPC institutions including academic, research and innovative industrial actors. Such networks should concentrate on R&D issues of common (EU-MPC) interest and priority.
 - d. Support MPCs in elaborating their national ICT research strategies and updating their legal framework with a focus on providing flexible and participative governance and creating real synergies between research and industry.
 - e. Support MPCs in elaborating a regional ICT research strategy in line with MPCs common priorities and EU/MPC vision.

2. Develop ICT products and innovative solutions for the region and its common challenges:
 - a. Identify priority areas with a market driven approach such as:
 - **e-governance and e-participation**
 - **ICT for renewable energy and energy saving**
 - **ICT for agriculture and water management,**
 - **intelligent transport systems**
 - **mobile technologies and services** etc.
 - b. Launch specifically tailored EU-MPC market oriented applied research programmes to develop, experiment and transfer ICT innovative solutions dealing with identified priority areas. As an example, a program could be developed to deal with e-governance (e-participation, e-democracy, e-government, e-services etc.) which is a high priority for MPC and especially in regards to the major changes occurring throughout the region. The objectives of an e-governance programme could focus on:
 - developing context successful e-services using local languages
 - adapting already existing solutions to new context
 - creating specific solutions related to the specific ways of governance used in some MPC localities.
 - c. Involve in these programmes EU and MPC research institutions, ICT firms, users (citizens, private and public enterprises, and public administrations), and potential stakeholders.
3. Boost MPC ICT sector through partnerships with EU to become a major player in providing ICT and ICT-enabled services for the EU-MPC region and internationally:
 - a. Foster the creation and/or the development of ICT **regional** players with **critical mass** through EU-MPC partnerships (today many EU companies run operations in several MPC countries but seemingly without a regionally scoped approach).
 - b. Reach at least 100 joint large firms within the MPCs with a total of more than 100,000 employees by 2020.
 - c. Develop policy measures at the national level (such as tax breaks) that will attract investments on R&D by ICT companies.

5.2 Means

- a. Elaborate an EU/MPC ICT research and innovation cooperation strategy and plan of action based on the proposed vision and objectives.

- b. Create a joint institutional mechanism to implement and monitor EU-MPC research and innovation cooperation strategy and plan of action. AICTO could play a major role **on behalf** of the MPCs.
- c. Create joint EU/MPC research and innovation institutes/centers of excellence.
- d. Create a specific EU/MPC ICT research and innovation programme in the context of the future **Horizon Programme** to enable the implementation of the vision and its objectives.
- e. Invite AICTO, with the collaboration of other regional organizations such as the Union for The Mediterranean, to create a regional ICT research and innovation fund.
- f. Launch an annual EU/MPC ICT research and innovation forum to exhibit the outcome of EU/MPC cooperation, and to foster joint projects, research and business partnerships.

5.3 Implementation Plan

- a. Submit the final policy vision to EU and MPC Joinmed partners appropriate governmental structures. Request MPC Joinmed partners to submit, through diplomatic channels, a request to AICTO and to EU to elaborate “the EU/MPC ICT research and innovation cooperation strategy and plan of action based on the proposed vision and objectives”. Proposed time schedule:
 - Submission of Request to EU and AICTO by February 2012
 - MOU between AICTO and EU to be signed by June 2012
 - Launch the study according to appropriate mechanisms by September 2012 to end by December 2012
 - Approval and publication by march 2013
 - Implement the plan of action and resolutions starting September 2013
- b. Transitory measures: period January 2012 - 2013
Identify appropriate existing funding mechanisms to implement actions in line with the policy objectives and in particular as regards objective 1: “advancing the research capacity of the MPC ICT researchers and Submit proposals”.

ANNEX I – LIST OF NATIONAL & REGIONAL POLICY DOCUMENTS REVIEWED

The identification of national policies and strategies on Research & Development in the field of Information and Communication Technologies in the Mediterranean Partner Countries is not a straightforward task. With the exception of Jordan, the remaining MPC countries do not have a dedicated national R&D policy for ICT¹². It should be noted though that the non-existence of R&D strategies for ICT is not a phenomenon particular to the region. Very few European countries have such dedicated policies/strategies (at a national level).

As a result, other official policies/strategies were examined in order to obtain the most relevant information. Based on a set of criteria provided, a total of thirteen most relevant documents were identified in the participating 8 MPC countries, listed below.

Country	Title of official document	Primary scope of document
Algeria	“e-Algeria 2013”, (2008)	ICT sector development
Egypt	“Egypt’s ICT Strategy 2007-2010”	ICT sector development
Jordan	“Research & Development Strategy for Information and Communication Technology” (2007)	Promotion of scientific research & development in the field of ICT
Lebanon	“Science, Technology & Innovation Policy for Lebanon”, (2006)	Promotion of scientific research in various fields including ICT
Morocco	“eMorocco 2010 Strategy” (2007)	ICT sector development
	Morocco 2025 Research Strategies	Research perspectives for 2025 for various fields (not only ICT)
Palestine	“Palestinian National Strategy of Telecommunications and Information Technology 2005-2008”, 2005	ICT sector development
	“A Word from the Ministry of Education and Higher Education” (2009) Draft White Paper	Overview of the Science, Engineering, Technology, and Innovations (SETI) system and recommendations of policies for SETI
Syria	“National ICT Strategy for Socio-Economic Development in Syria” (2004)	ICT sector development
	“Tenth Syrian Five-Year Plan” (2006-2010)	Planning for various sectors. Includes a plan for Sciences, Technology, Research and Development that contains qualitative and quantitative objectives of R&D in Syria.
	“National Profile of the Information Society in the Syrian Arab Republic” (2007)	Current status of information society
Tunisia	“Scientific Research and Technology	Promotion of scientific research across

¹² c.f. “Research & Development Strategy for Information & Communication Technology (2007)”. To a great extent however the content of this strategy is oriented also to the development of the ICT sector in the country.

Country	Title of official document	Primary scope of document
	Innovation in Tunisia” (2006)	fields
	“Tunisia ICT Strategy” (2009)	ICT sector development

Table 3 – Purpose and scope of National Policies / Strategies reviewed

Moreover, the following intra-regional and EU-MPC policy documents have been identified (listed below). These are mainly proposals for the development of the information society (containing elements on R&D collaboration) in the EU-Mediterranean region and proposals addressing overall EU-Mediterranean R&D collaboration (across fields, not specific to ICT).

Title of document	Key document info	Primary scope of document
“Building an Enabling Environment for the EUROMED Information Society”, February 2008	Declaration of Ministers at the 2 nd Euro-Mediterranean Ministerial Conference on the Information Society held in Cairo on 27 th February 2008. Also referred to as Cairo Declaration	Presents agreed measures for the intensification of co-operation in the EUROMED region and the reinforcement of the work of the EUROMED Forum on the Information Society
“Towards the Creation of a Euro-Mediterranean Higher Education and Research Area”. June 2007	Joint Declaration of Euro-Mediterranean Ministers of Higher Education and Scientific Research adopted at the first Euro-Mediterranean Ministerial Conference on Higher Education and Research held in Cairo on 18 June 2007	To propose ways of developing EUROMED co-operation in the field of scientific research, higher education and vocational training
“Investing in our Future: Building Together our Information Society”, June 2007	Proposal of the Arab Mediterranean countries’ common position to the work of the 2 nd Euro-Mediterranean Ministerial Conference on the Information Society	To propose areas/priorities for joint collaboration in the field of ICT between the Arab Mediterranean countries and Europe.
“Towards an Arab Information Society : Common Action plan for Collaborative Work”, June 2003	Pan-Arab Document drafted by representatives of 19 Arab states in a Pan-Arab Regional Conference in Cairo on 18 th June 2003	To identify key axes for the development of the Information Society

Table 4 – Key regional policy documents on R&D and Information Society Development

ANNEX II – LIST OF POLICY MAKERS CONSULTED FOR THE VISION

The following is the list of policy makers that were consulted on the draft version of the vision between July and September 2011.

Algeria:

- Dr. Mohamed Damou from the ICT Ministry
- Pr. Mohamed Ahmed Nacer, Pr. Zaia Alimazighi and Dr. Kamel Boukhalfa from USTHB
- Pr. Badache Nadjib and Dr. Djamel Tandjaoui from CERIST
- Pr. Nasr Eddine Berrached from USTO
- Dr. Salim Bitam from the University of Biskra

The policy makers provided suggestions for the enhancement of the vision, while endorsing its main objectives and means.

Egypt

The International Relations division of the Ministry of Communications and Information Technologies (MCIT), that is also a partner in the Join-MED project endorsed the vision.

Jordan

The vision statement was reviewed by a team from the Directorate of Policies and Strategies at the Ministry of Information and Communications Technology (MOICT). They agreed on its content and endorsed it via an official letter to the Join-MED project (see below). They provided two comments for consideration (creation of stronger links among industrial actors, educational institutions and research institutions in the region with an aim to harmonize different R&D directions and inclusion of private sector companies as a key funding source for R&D activities).

Lebanon:

- Dr. Mouin Hamze, the secretary general of the LNCSR (Lebanese National Council for Scientific Research)
- Dr. Hassan Diab, from the Ministry of Higher Education

Both policy makers became aware of the vision policy and have not presented any negative comments on it.

Palestine

A meeting held with Dr. Mashhour Dakka, minister of telecommunication and IT in the Palestinian Authority. The meeting was held in the presence of the minister's advisors. Dr. Dakka praised the work done by the consortium (activities in the framework of both JOIN-MED and MED-IST) and he offered any possible assistance from the ministry in any future

planned actions. He and his advisors reviewed the VISION statement and agreed on its content and endorsed it.

Syria:

Dr. Bassel Alkheshi - the Syrian Deputy Minister of Communication & Technology MOCT was consulted. He mentioned that the “vision is very good, the initiative is very important , and that MOCT will support it”.



Tunisia

The vision was discussed with Ms. Kjedija Ghariani, the Secretary General of AICTO who welcomed the recommendations of the Join-MED project. Moreover, the vision was endorsed by the Centre National d’Informatique (CNI) that is a partner in the Join-MED project.

ANNEX II – BRIEF OVERVIEW OF INTERNATIONAL ICT TRENDS

ICT is a fast moving domain and future trends need to be identified and understood to adapt policies in due time. The annex presents an overview of key international trends in the area of ICT.

1. Key Drivers of change in the ICT sector

Transformation and change in the sector of Information and Communication Technologies is based on a chain process: technology enables and promotes innovation, while innovation stimulates new changes in technology. Based on the ICT Regulation Toolkit¹³ the key drivers that shape the ICT sector can be grouped in four categories:

- **Technological changes** that derive from new ways of producing, transmitting, storing and managing the entire life cycle of information and data in order to meet the needs of modern societies and economies.
- **Emergence of new services and products** as a result of technological changes. New ICT enabled services and products are the outcome of innovative business activities that exploit new technological possibilities.
- **Changes in the level of competition** that have an impact on the structure of the ICT market and the composition of ICT sub-sectors.
- **Financial forces that have an impact on the sector** that are closely related to the increased competition in the market.

This section focuses on the first two drivers that are expected to have an impact on R&D developments.

2. Key technological trends in the field of ICT

Five key areas of technological change are having a significant impact on the structure of ICT markets, and are expected to continue to do so for the foreseeable future:

- **The shift from analog to digital:** Historically technologies for communication have used analog signals (e.g. conventional telephony, music cassettes and records). Modern technologies convert analog signals into a digital format for processing, storage, and transport. Digital signals do not degrade when duplicated, nor do they accumulate noise and other interfering signals when amplified. Moreover, devices such as computer hard drives can quickly store, retrieve, and duplicate digital files. Finally, modern digital networks can simultaneously transport bitstreams representing many different types of communication (such as data, text, audio, video, and voice).
- **The shift from voice to data:** until recently voice communications were the primary mode of communication. While voice services are still dominant in revenue terms, the importance of voice compared to other information services appears to be declining. On

¹³ ICT Regulation Toolkit, Module 2. Competition and Regulation, 1.1 Key Developments in the ICT sector, InfoDev-ITU

the other hand, demand for information services and data transmission is continuing to grow steadily. This shift reflects a number of factors, including: increased business data requirements, growing consumer demand for bandwidth services such as online music, movies, and games and Migration of some voice calls from conventional networks to VoIP. On the transmission side, digital technologies are increasingly playing a central role. In addition to digital services, much voice traffic is now digitized, for at least part of the transmission circuit. Furthermore, the shift from voice to data has important consequences for network design.

- **From circuit switching to packet switching:** in response to growing demand for data and digital voice, ICT networks are shifting from circuit switching to packet switching. Networks configured primarily for analog voice communications typically use a technology called circuit switching to set up and break down links between the caller and call recipient. Packet switching is a superior, more efficient, way to manage data traffic. The network breaks traffic down into small packets that can be routed over any available network link. Network links not needed by one set of communicators can become available for others, in effect making it possible for many communicators to use a network link at the same time. The digital nature of packet switching means that a single network can handle a variety of different packet-based services including voice, data, text, images, sound, and video. However, it should be noted that packet switching can result in higher latency than circuit switching. When packets are routed over multiple networks and across large distances, some packets may be delayed or lost, or packets may arrive out of order.
- **From narrowband to broadband networks:** A further consequence of the shift from voice to data services is a shift from narrowband networks to broadband networks. Data services typically require broadband networks. Broadband networks are able to transmit more information, faster. Unlike narrowband networks, broadband can accommodate demanding data traffic and transmit large and complex files.
- **Intelligence migrates from the core to the edge:** In conventional circuit-switched telephone networks the “intelligence” is located centrally on telephone company premises. User devices are generally quite simple (for example telephone handsets). Centralized intelligence is efficient where most users have similar requirements, as in a telephone network. However, this approach offers limited opportunities to customize services, and optimize the network, for individual user requirements. The architecture of the Internet moves intelligence from the core network to users operating at the edges of the network. Users can use on-site information processing to configure their own services, through software and other customized applications, and can treat the network as a generic information transport service.
- **The Increasing Role of Wireless:** consumers have readily and quickly embraced wireless telecommunications. Wireless service removes the need to be “tethered” to the network, and provides greater mobility for users. Wireless connections are often easier to install and can involve lower capital expenditure than wired ones. In many rural and remote areas, wireless provides a cost-effective alternative for achieving universal service. Some of the traffic growth in wireless networks is due to customer migration from wireline networks, (rather than from new telecommunications customers), as wireless and mobile services become increasingly effective substitutes for wireline services.

3. The emergence of new services and products

Ongoing technological changes in the ICT sector are driving the emergence of new services, and changing the way in which existing services are delivered. For example:

- The Internet provides a platform for new information services, and an alternative delivery mechanism for existing services. Initially a medium for traffic associated with research and education, the Internet now delivers a wide range of information services including (but not limited to) text, images, music, audio, movies, and news services (text and video clips).
- The shift from analog to digital is driving convergence of communication services. Many different types of communication (such as data, text, audio, video, and voice) can now be transported over the same networks and, in some cases, sent and received over the same user equipment. For example users can now download movies from the Internet and view them on a personal computer, or can send e-mails from a digital television unit.
- Voice over the Internet Protocol (VoIP) is a converged service that has important implications for conventional voice operators and regulators. VoIP provides voice service over data networks, rather than conventional voice networks. Consequently, VoIP providers are able to bypass traditional interconnection and regulatory arrangements.

Moreover, new services have emerged that are available only in digital form via the internet such as:

- Certain types of software offered as services
- a plentitude of online information services (that do not involve transactions)
- e-commerce services and the possibilities offered by constantly changing business models for online transactions.
- e-Government services and the new ways of delivering services to citizens and businesses.
- e-Procurement services and the transformation of supply chains.
- e-Learning services and the possibilities offered for self-learning.
- Services and applications for social networking and entertainment offered by a combination of means
- Services and software applications that enable an integrated business environments (such as via cloud computing services)
- Services and software applications related to environmental preservation (i.e. energy monitoring services for home appliances).

It should be noted that the emergence of new online services goes hand in hand with the globalization of their delivery and has an impact on the level of competition experienced by companies offering such services.

With respect to the emergence of new products, there is a trend for an increase in “smart” products that are already offered in the market. Such ICT products include:

- Portable products that combine processing abilities and internet access (i.e. laptop, notebook, netbook, tablets) with a special focus on products that combine internet access, communication and entertainment services¹⁴.
- “Smart” mobile phones that integrate information and entertainment services.
- “Smart” TV that goes beyond internet access to models such as tablets and/ smart phones.

Overall, the next decade is projected to focus on ICT services, applications and products related to the creation and transfer of digital content that in turn will constantly shape the orientation of ICT manufacturers and providers as well as R&D actors in the field of ICT.

4. The impact of ICT technological trends

The rapid technological changes have marked the evolution of the ICT field during the last decades. Analysts predict that during the next years, the focus will be on the development and commercialization of past achievements and innovations¹⁵ in order to secure the return on investments made. Indeed there is always a time lag on the impact of innovative changes and R&D on entrepreneurship and society at large.

During this period of global economic crisis and given its catalytic impact on business and R&D activity that is calling for a new socio-economic model, the role of ICTs is determinant: it can bring down costs, increase the return of investments and enhance competition through the introduction of new services and products.

The key operational and regulatory implications of technological trends are presented in the next table.

The Shift from Analog to Digital	<p>The shift to digital communications makes it easier for users to tailor services to meet their individual needs, and to reduce costs. For example users of separate voice and data services can combine them using a single leased line, typically at a reduced price. This means that carriers can no longer engage in price discrimination by charging different rates for interchangeable services. In a digital environment users can switch to cheaper services, and services that trigger lower regulatory fees.</p> <p>At the same time, new types of Quality of Service issues arise, including the possibility of carriers offering different levels of service priority for different types of data at different price levels. This in turn has raised concerns about lack of "net neutrality" from third-party service providers, worried that their access to carrier networks will be limited by price discrimination.</p>
Data replaces voice	<p>In the past, many incumbent carriers have relied on voice traffic to generate higher per unit revenues and profits than data and leased line services. This approach is becoming less sustainable. In particular, as more users migrate to lower cost Internet telephony services, this is likely to adversely impact on revenues from conventional voice telephony.</p>
Packet switching replaces circuit switching	<p>Network operators seeking to provide packet switched services will need to overhaul existing networks, and install new equipment. This will involve significant costs for incumbent telecommunications operators. Regulators may have to find ways to support the</p>

¹⁴ Frost & Sullivan, ICT Outlook 2011

¹⁵ "The Promise of Technology," César Alierta (Telefónica) στο The Global Information Technology Report 2010–2011, Transformations 2.0, INSEAD – World Economic Forum

	migration from analog to digital equipment, for example by recognizing the lowered economic value of existing equipment and authorizing shorter depreciation lives for this equipment.
Broadband replaces narrowband networks	Incumbent operators will have to make sizable investments in new facilities, in order to offer broadband service. For operators with limited access to funds, this will involve a trade-off between improving the quality of service and coverage provided by existing facilities, and installing next generation infrastructure that can provide both narrowband and broadband services.
Intelligence migrates from the core to the edge	Digitization and the development of the Internet give users greater control over networks and more flexibility to optimize the services they consume. Regulators and carriers have less control over how consumers interact with and manipulate networks. This means that neither carriers nor regulators may be able to fully limit what network users can (and cannot) do with the lines they lease, or the services they acquire.
The increasing role of wireless	<p>The migration from wired to wireless services underscores the need for flexibility in how we use radio spectrum. National governments allocate spectrum, and often specify the uses for each portion of spectrum. These decisions may adversely affect the flexibility, cost, and accessibility of spectrum for ICT services. In particular, historical spectrum allocation decisions may limit the scope for service providers to roll-out new, innovative wireless services. Mobile wireless ventures offering next generation features, such as broadband Internet access, may need more spectrum than was previously made available. However, in many developing countries, making spectrum available may be less costly than in developed economies as it typically is used less intensively.</p> <p>As wireless telecommunications increasingly becomes a substitute for wireline services, regulators may have to rethink how to achieve universal service goals. This may involve a combination of wireline and wireless technologies.</p>

Source: ICT Regulation Toolkit

5. The international experience: impact of ICT technological trends

Overall, countries that have a positive score in the development of the ICT sector manifest a number of competitive advantages¹⁶ that can be summarized as follows:

- High quality scientific and research infrastructures that are jointly used by academic and research institute in close collaboration with innovative ICT companies that invest in Research and Development.
- Strong process manufacturing base that is able to exploit ICT achievements by investing in products and services that are competitive in the international markets.
- Presence of international key players who promote active collaboration and transfer knowhow to local players in the ICT field.
- A significant size of the internal market and advanced infrastructures that can host added value ICT products and services.
- A stable investment framework with measures that attract foreign direct investments and financial tools that contribute to the development of new ideas and innovative initiatives.

¹⁶ Global Innovation Index 2009-2010, Confederation of Indian Industries-INSEAD

A variation of the above trends can be developed for smaller countries which is the case for most of the addressed Mediterranean Partner Countries. Countries that have a small internal market should focus more on medium rather than large-scale Research and Development and focus more on the transfer of knowhow from abroad. In parallel, externalization and foreign trade can overcome the disadvantages of a small internal market. On the other hand, the parameters of competitiveness, research and academic excellence and international cooperation are key prerequisites for innovation and growth.