



Establishing a Sustainable EU-Mediterranean ICT Research Network

Edward Jaser¹, Thies Wittig², Raphael Koumeri³

¹Princess Sumaya University for Technology, Jordan

²IT-Consult GmbH, Germany

³Planet S.A., Greece

ABSTRACT

Within the international Cooperation scheme of the European Commission Framework Programme 7 (FP7), the Mediterranean Partner Countries play an important role. The Mediterranean Partnership was initiated at the Barcelona Conference in 1995 to establish a comprehensive partnership among the participants – the Euro-Mediterranean partnership. Interest in the Mediterranean Partnership was revived through another initiative, the Mediterranean Union, with 43 members from Europe and the Mediterranean Partner Countries. Within this context, the Framework Programme for Research and Development has funded support projects in the ICT sector aiming at a closer cooperation in R&D in the ICT field between the two regions. In this paper we report on our investigation to obtain a clearer picture of the ICT R&D landscape in the Arab region and to identify the ICT R&D priorities that leading research institutes in the Arab region see for the future. We present our findings and analysis with the aim to support bringing researchers from both EU and Arab researchers together through an ICT Research Network and in identifying research policies in the Arab region and developing policy recommendations for enhanced EU-Mediterranean R&D collaboration in the field of ICT.

Keywords: *Information Systems. ICT Research. ICT Priorities in MENA region.*

1. INTRODUCTION

There is a common agreement on the importance of Information and Communication Technologies (ICTs) as an essential tool for growth and advancement of development. ICT now is widely considered by developing countries as the motor of growth, the driver of efficiency and effectiveness and the tool to enhance human development. Recognizing the potential of ICTs, infrastructure initiatives and development of various ICT strategies are being increasingly promoted and encouraged. If we look specifically at the south Mediterranean region (or what is widely known as Mediterranean Partner Countries or MPC and in this study it include Jordan, Lebanon, Syria, Palestine, Egypt, Tunisia, Algeria and Morocco), the region has been witnessing a booming ICT sector in recent years. ICT contribution to GDP in most countries in the region has increased significantly over the past few years and is expected to continue to increase. There have been many examples to support this. In Tunisia for example, the contribution of the ICT sector in Tunisia amounted to 10% of the national GDP in 2009 and it was estimated to contribute around 13% in 2011 [1]. We can find a similar pattern in the case of Jordan where the total revenues from ICT products and services has significantly increased since 2000 [2]. Most Arab countries in the Mediterranean region have been witnessing comparable development in the ICT sector. Certainly the political instability in what is widely known as the Arab spring has affected the growth and it will be interesting research to study its impact on the ICT sector.

In order to strengthen the ICT sector and exploit its potentials, ICT research is absolutely essential to focus on innovative ICT solutions to respond to real national and regional needs. There have been several efforts in the MPC to strengthen the role played by ICT through research and development (R&D). But as of today, there are no long-term

research policies in the full sense – only plans or agendas such as the MCIT activities in Egypt [3], the Lebanese STIP [4], the Jordanian R&D Strategy for ICT [5], or the Syrian national ICT Strategy [6].

Both research co-operation with Europe and the topic of ICT has become an integral part of the planned 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. Subsequently and to benefit from this agreement, there is pressing need for the MPC to focus their own research agendas towards a closer co-operation with Europe and to learn more about the concrete Framework opportunities and procedures, in particular in the field of ICT.

In this paper we look into enhancing the EU-MPC cooperation in ICT research and bringing MPC and EU research communities in the field of ICT closer together through the development of sustainable research networks. We report on our investigation to obtain a clearer picture of the ICT R&D landscape in the region, which has made significant advances over the recent years, but often unnoticed by the European research and ICT community. Even more important for future collaboration in joint R&D activities, to identify the ICT R&D priorities that leading research institutes in the MPC see for the future. We look closely at the current status and attempt to understand strategic ICT priorities in the MPC and link it to priorities define by the Framework Programme. This will be a key effort to enable MPC research community to actively participate in the current and future ICT Framework

Programs. We also look at efforts and recommendation to support Policy Dialogue Exchange.

2. RESEARCH QUESTIONS AND OBJECTIVES

The main research questions that motivated our work is (1) what are the tools and mechanisms to bring the Mediterranean Partner Countries closer to the European Framework Programmes in the field of ICT and (2) how to establish a sustainable network of ICT research organisations between Europe and the MPC, reinforcing the Research Cooperation between these two regions on a wider scale, not only limited to Framework Programme co-operation.

Our stated research questions are in line with the vision of the Barcelona agreement [7] which aims at the promotion of mechanisms to foster transfer of technology; the increase of participation in joint research projects; and the encouragement of regional co-operation and integration.

Specific objectives we opted for to approach our research questions include (i) establishing a research agenda for the MPC that establish research priorities together with the national bodies of the MPC that defines the strategic approach to a closer co-operation with the European Framework Programme; (ii) promoting the thematic priority of ICT in Framework Programme 7 on a wide basis to the research community and IT industry in the MPC; (iii) identifying promising research organisations and relevant private industry in the MPC that are suitable for participation in future ICT research activities, and defining criteria for their selection; (iv) facilitating the development of networks between research organisations and companies in the MPC and the EU in order to exchange ideas and pursue joint research collaboration; and (v) establishing a sustainable and independent ICT research network to provide links between MPC and EU researchers and their organisations and facilitate the development of networks between organisations in the MPC region and the EU.

Figure 1 depicts how the main objectives were linked to provide a detailed and systematic approach to establishing the EU-Mediterranean ICT research network. As shown in the figure, the first set of activities aimed at gaining understanding of the ICT environment in the MPC region and to promote awareness and inform the Research Communities in the countries on the European Programmes. A focus was put on developing Scientific Research Agendas (SRAs) in each of the MPCs by identifying the ICT priorities of each country with respect to the FP7 ICT Challenges and Objectives (FP7 2009). A series of Mentoring workshops that explain the ICT element of FP7 and their objectives, the rules and regulations of the FP7, and provide hands-on training on proposal writing aimed at preparing the countries for participation in the framework programmes. Most importantly, the first phase was designed to provide unique insights into the way the ICT research environment functions in each investigated country, the problems it encounters for further development, and insights to possible approaches appropriate to the Region.

The second phase was aiming at establishing an EU-MPC ICT Research Network. This is important to provide the link to the European ICT research community. In parallel, it aimed to support a Policy Dialogue with a Pan-MPC focus, based not only on the results achieved in the first phase but also taking into account the Arab Strategy for Information Society and Communications Technology.

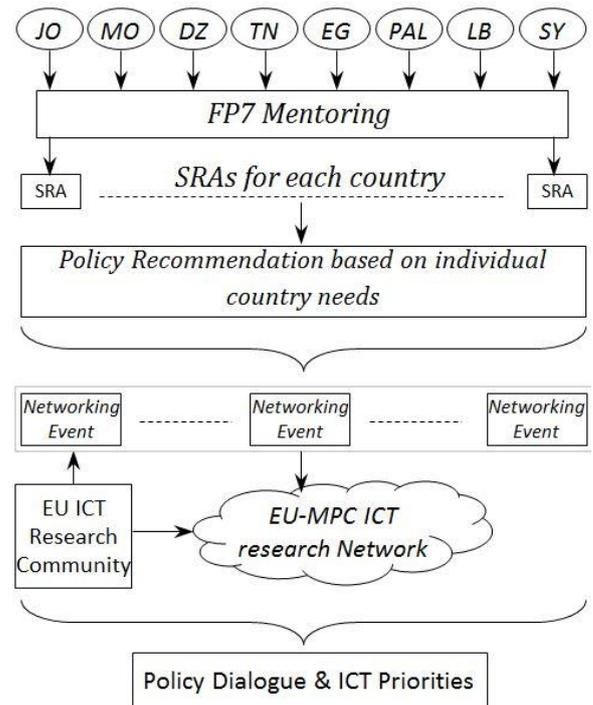


Figure 1. Main objectives and activities to enhance EU-MPC cooperation

3. METHODOLOGY

It's very important to understand and clearly identify current capacities in MPC in the field of ICT and attempt to identify priorities in this field that reflect national interest and competencies. The knowledge obtained is then used to support the challenging task of creating a sustainable network to reinforce research cooperation between the MPC region and the EU.

Figure 2 summarises the major elements of the methodology we opted for to realise our objectives. One major source for the development of our consultation methodology has been the available literature on research priority setting, SRA development and allied national or thematic forecasting and foresight exercises and case studies [8,9,10]. The general way research prioritisation has been approached in the studied examples tends to vary with the scope of the related exercises and/or the size and status of the countries involved, with larger countries and European Technology Platforms primarily focusing on the identification of emerging technologies of strategic relevance for the related country or research field. In contrast, smaller and developing countries tend to perform

research priority exercises aiming at the development or refocusing of technological specialization strategies, and the matching of their national potentials with economic opportunities and societal needs.

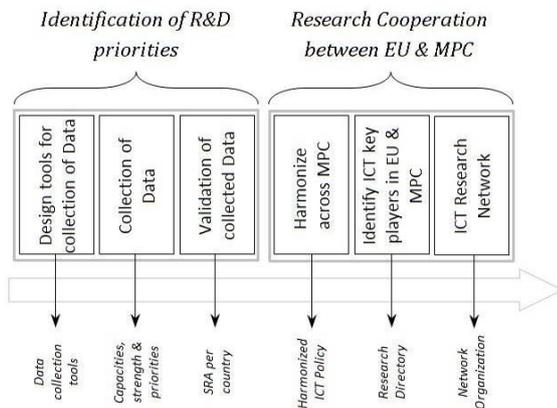


Figure 2. Methodology used and outcome from each process

The corresponding methods and tools employed vary accordingly, and usually comprise a combination of tools such as Delphi and issues surveys, critical key technologies, SWOT analysis, foresight exercises, technology road-mapping, and scenario development exercises [15]. We opted for a two-phase consultation process that was designed around the deployment of a scoping survey followed by the organisation of a consultation workshop [11]. The specific analytical tools used within this context have been selected following an analysis of other SRA and research prioritisation exercises, and was grounded on a blend of trend and SWOT analyses and the CSIRO importance-feasibility prioritisation framework [12]. Key reasons for this choice include: (1) the simplicity and ease of use; (2) flexibility to accommodate any differences in the level of analysis performed in each country as a result of prior ICT research priority-setting work; (3) compatibility with time constraints and overall two-staged consultation concept; and (4) their provision of a systematic, consistent and transparent basis for the formation, analysis and evaluation of research priorities and research themes.

The entire process was split into three phases as shown in Figure 3. The identification of research priorities and direct stakeholders facilitate the development of networks at different levels: (i) the cross-regional networking events; (ii) the focused distribution of the EU-MPC Research Directory in the EU (via EU members states' National Contact Points (NCPs), CORDIS, and directly to key EU research organisations) and dissemination of information on the MPC organisations through participation in major EU dissemination events; (iii) providing targeted EU contacts (Commission, key EU research organisations, and personal contacts from the extensive networks of the EU-MPC partners).

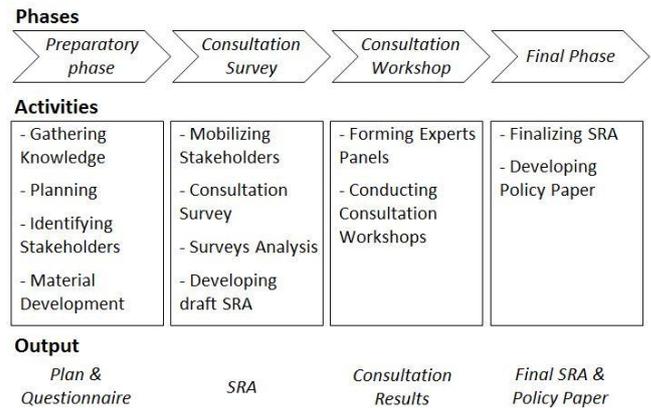


Figure 3. Overview of the Consultation Process

Networking events were the most important element to achieve this objective by bringing researchers from EU and different MPC together to discuss and develop concrete research activities and projects. They were designed to be the platform for the policy exchange, where current policy developments were presented and discussed among the participants and the relevant stakeholders of the countries addressed.

4. THE MPC DIRECTORY

One of the tangible and necessary outcomes was the MPC Directory. On this front, The MAP-IT Project [13] has also built up a database of researchers in the MPC, primarily from private industry. Most of all these data entries covered names, addresses and affiliation, some provide details of the ICT interest of the members (in terms of selected framework programme objectives), but most of them lack detailed information about their on-going and past research activities, their institutions or their experience in collaborative research work. Hence in the proposed database all these available data has been screened, updated and completed to provide a better basis for the ICT Research Network.

Based on the discussions with experts from the different MPCs, the criteria for identifying researchers and research organisations for the Directory were refined. While previously the focus of the directory was on individuals, emphasis was now put on a clear description of research organisations such as size, R&D topic areas, and main focus in terms of FP7 Challenges. An on-line questionnaire was modified accordingly.

In that same context of enhancing the research capabilities of the researchers as well as the overall networking effect in addition to the Directory the project carried out two important tasks: (1) Identifying and mobilising the Diaspora and (2) analysing the experience and the performance of MPC researchers from their participation in proposals/projects.

Figure 4 shows the current status of the MPC directory in terms of number of registration and their distribution country-wise. The number of registrations in the directory



had significantly increased, mainly due to the Networking Events and the Final Conference. The total increase was 968 since the start of the project, from the MPCs by 738 and from other countries by 230 (Figure 5).

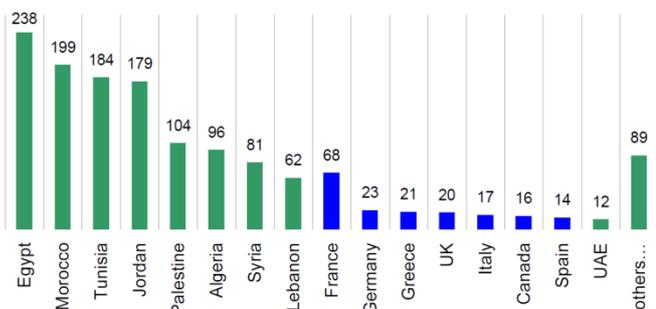


Figure 4. Population in the MPC directory as of February 2012

Not only the numbers of registrations had increased considerably, but also the quantity and quality of the information provided. Around 400 organisations have provided important information (such as description of the relevant departments, or research topics of the department or university). Also the number of CVs provided by researchers and the declaration of their specific research focus has been quite significant at the end of our investigation. Research focus declared were almost 64.80% (922 Members) and CVs given were almost 38.70% (551 Members).

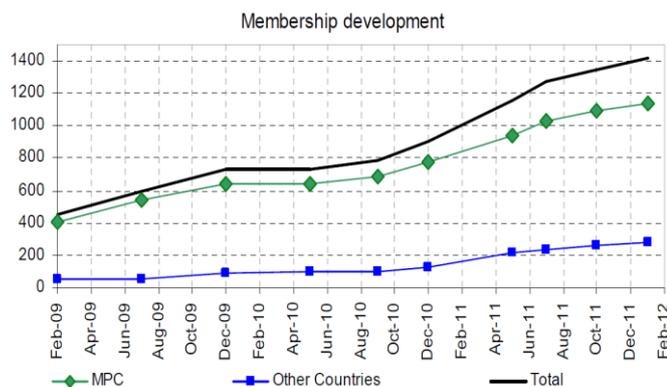


Figure 5. Membership development of MPC directory

5. ICT PRIORITIES IDENTIFICATION: THE MPC PERSPECTIVES

We have implemented an open consultation process involving more than 250 ICT stakeholders in the participating MPC including ICT experts, research actors, policy makers, ICT company representatives, NGO and civil society representatives.

Through a scoping questionnaire and extensive group discussions we established an overview of the ICT capacities in each country and also the ICT priorities for the future. The results described in this section are mainly based on the questions (1) The Current ICT research landscape and (2) Defining the ICT research priorities over the next five years. While the first question is straightforward, the latter needs

some explanation. We wanted to identify the importance of an identified R&D priority in a country and at the same time to find out how feasibly it would be to implement.

Instead of explicitly asking about the priorities and their importance, we used five criteria that were then clustered into the two target parameters – “importance” and “feasibility”.

Each nominated ICT Research and Development Priority had to be rated by the following five criteria, each expressed on a scale from 1 to 3: Limited/None, Moderate or High:

- Research and Development & Technological Opportunities
- Economic Impact
- Social Impact
- Research & Technology Potential
- Application Potential

From the results the two parameters: Importance and Feasibility were computed using the formulas:

$$Potential\ Benefits = \sqrt{Economic\ Impact * Social\ Impact}$$

$$Importance = \sqrt{Potential\ Benefits * Research\ and\ Tecnological\ Opportunities}$$

$$Feasibility = \sqrt{Research\ and\ Technological\ opportunities * Application\ Potential}$$

For the comparison in the following analysis only the importance parameter was used and the results for the individual Research and Development priorities (corresponding to the framework programme ICT objectives) were grouped into the corresponding Challenges. Figure 6 shows an example of importance-feasibility analysis for Egypt.

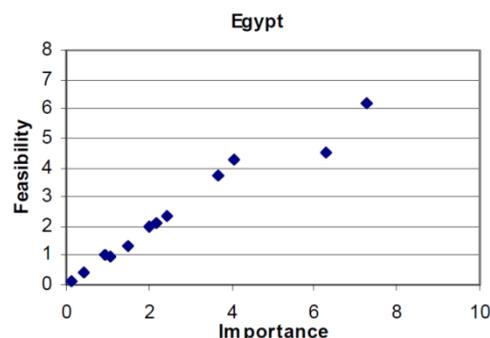


Figure 6. Importance-Feasibility for ICT R&D priorities in Egypt

We focus our analysis on the importance of the identified priorities of each country as well as a summary across the region. It also compares the survey results of existing Research and Development capabilities with the identified priorities for the future.

It finally compares these priorities that were nominated by a selected group of high level stakeholders, with the research



interests declared by the members of the MPC Directory, representing a much wider group of ICT related researchers and/or developers across the region. The summaries and comparisons were made on the framework programmes challenges level only, i.e. [14]:

- **Challenge1:** Pervasive and Trusted Network and Service Infrastructures
- **Challenge2:** Cognitive Systems, Interaction, Robotics
- **Challenge3:** Components, systems, engineering
- **Challenge4:** Digital Libraries and Content
- **Challenge5:** Towards sustainable and personalized healthcare
- **Challenge6:** ICT for Mobility, Environmental Sustainability and Energy Efficiency
- **Challenge7:** ICT for Independent Living and Inclusion

The countries that participated in the consultation process to establish a Scientific Research Agenda were Morocco, Algeria, Tunisia, Egypt, Jordan, Palestine and Lebanon.

The nomination of priorities for future R&D in the MPC should be based on two criteria:

1. The R&D capabilities of the countries as the most important one, since these existing capabilities will qualify organisations as promising partners in collaborative EU projects.
2. The expected needs of the countries play a role when defining priorities for the future, but should do this to a much lesser extent than their capabilities. It is not the role or task of FP7 to support building up entirely new Research and Development directions in the country, this falls under the responsibility of the countries themselves or under specific aid programmes.

In most countries this principle was well respected, in many cases the Priorities reflect a needed strengthening of certain areas, which is within the scope of an FP7 R&D project.

There are quite distinct local differences concerning the future research priorities (as we can see in Figure 7). In Egypt and Jordan the network issues are not seen as an important priority for future Research and Development but instead Challenge 6 (with a strong focus on Environment Energy and Mobility) and Challenge 4, where both countries have already developed a good Research and Development infrastructure.

All other countries consider pervasive and trusted networks as an important research and development topic for their communities. Tunisia has put a strong focus on Challenge 3, Components, systems, and engineering, while this is rated fairly low in most of the region. We also observed some discrepancies concerning the above mentioned relationship between Priorities and Capabilities. For example in Egypt, where the existing capabilities relating to Challenge 6 are rated very low, but at the same time this Challenge has the highest priority for the future. Similar cases can be observed in Morocco (also Challenge 6) and Lebanon (Challenge 5).

Figure 8 shows the summary of nominated Research and Development priorities for all investigated MPC countries. There is a clear preference for Challenge 1, followed by Challenges 4, 5 and 6. Challenges 2, 3 and 7 do not play a major role when looking at the entire region.

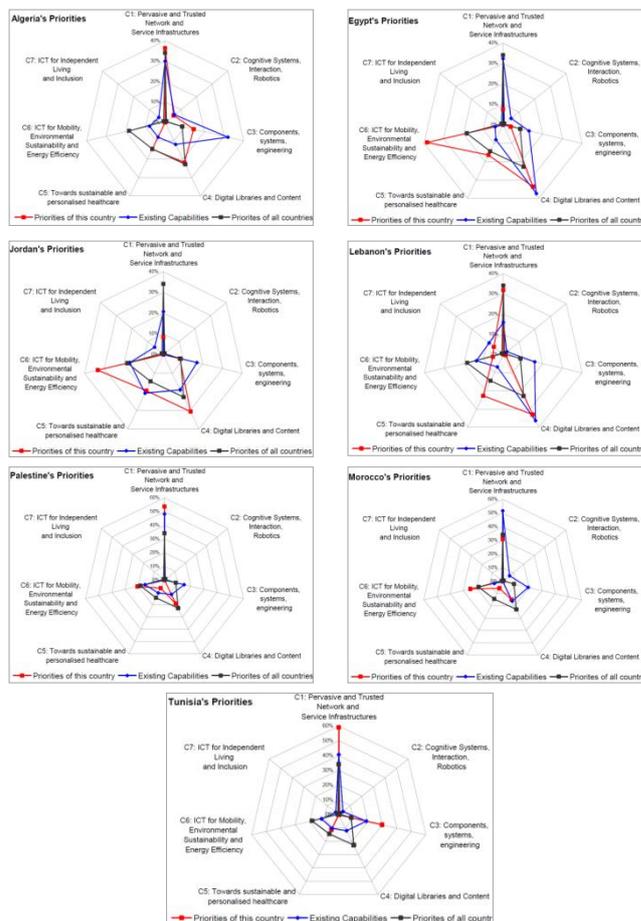


Figure 7. Capabilities and Priorities of individual MPC Countries.

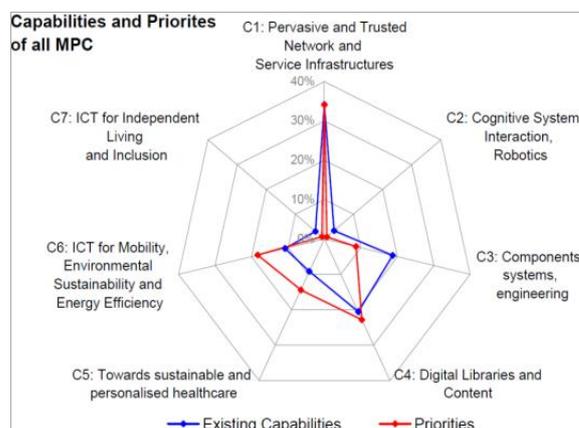


Figure 8. Capabilities and Priorities of MPC countries combined

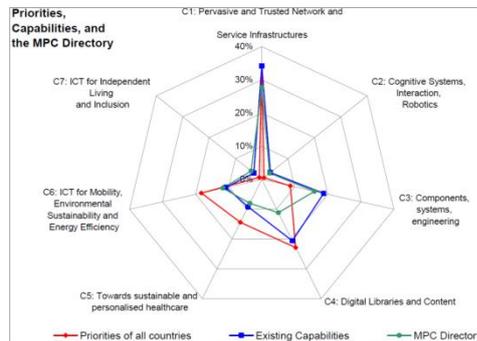


Figure 9. Priorities, Capabilities and the MPC directory

Figure 9 shows a good match between the Existing Capabilities as identified by the selected stakeholders at the consultation meetings and what the members of the directory have stated as their interest.

In comparison to the Priorities identified by the stakeholders, the general interest appears to be more balanced across the main MPC Challenges and also refers to challenges 2 and 7, but to a significantly lesser extent to challenge 4.

Following examination and analysis of collected information the following priorities (Table 1) could be proposed as reflecting the overall capacity and importance for the MPC.

Table 1 Potential For EU-MPC R&D Collaboration In The Period 2008-2013

FP7 Challenges and Objectives	Potentials
Challenge 1: Pervasive and Trusted Network and Service Infrastructures - Objective 1.1 The Network of the Future - Objective 1.2 Service and Software architectures, Infrastructures and Engineering - Objective 1.4 Secure, dependable and trusted infrastructures	High
Challenge 3: Components, Systems, Engineering - Objective 3.3 Embedded systems design	High
Challenge 4: Digital Libraries and Content - Objective 4.1 Digital libraries and technology-enhanced learning	High
Challenge 5: Towards sustainable and personalised Healthcare - Objective 5.1 Personal health systems for monitoring and point-of-care diagnostics	High
Challenge 6: ICT for Mobility, Environmental Sustainability and Energy Efficiency - Objective 6.3: ICT for Environmental Management and Energy Efficiency	High
Challenge 3: Components, Systems, Engineering - Objective 3.1 Next generation Nano-	Medium

electronics components and electronics integration	
Challenge 6: ICT for Mobility, Environmental Sustainability and Energy Efficiency - Objective 6.1 ICT for the intelligent vehicles and mobility services	Medium
Challenge 2: Cognitive Systems, Interaction, Robotics	Low
Challenge 7: ICT for Independent Living and Inclusion	Low

6. ANALYSIS OF THE ICT R&D POLICY ENVIRONMENT IN THE MPC

The identification of national policies and strategies on Research & Development in the field of Information and Communication Technologies in the MPC is not a straightforward task [16]. With the exception of Jordan [5], the remaining MPC countries do not have a dedicated national R&D policy for ICT. It should be noted though that the nonexistence 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. The types of documents that partners were asked to identify included:

- National R&D strategy / policy / programme for ICT;
- R&D strategy / policy for ICT (from other sources such as working papers of universities, IT association, proposals etc.);
- National strategy for ICT (i.e. promoting overall ICT sector development, information society etc.)
- Overall R&D strategy / policy addressing various sectors, sometimes including ICT, e.g. issued by Ministry of Research.

Based on the above typology, a total of thirteen most relevant documents were identified in the participating 8 MPC countries. Table 2 presents the title and scope of the strategies/policies that were analysed.

The analysis of the above strategies and policies reveals that the majority of documents focus on the development of the ICT sector in the country.

We examined through our analysis to what extent the strategies/policies address a more extensive set of parameters. These include:

- Promotion of scientific research (e.g. through national funding programmes, creation of research agencies...)
- Key thematic ICT R&D objectives explicitly mentioned (supply or demand-driven – e.g. Nano-technologies, language processing, eGovernment, eHealth)



- Promotion of the ICT business sector (e.g. export promotion, FDI)
- ICT Sector restructuring / reform
- Development of the ICT infrastructures (e.g. broadband networks)
- Promotion of the education in the field of ICT
- Promotion of the use of ICT for sustainable development (and in rural areas)
- Improving the institutional/policy/legislative environment (e.g. new legislation, cluster initiatives etc...)
- Strengthening partnerships between private sector and academia
- Strengthening international R&D co-operation with other countries

The relevance of the above parameters for the reviewed strategies and policies was attributed by project partners. Specifically, those partners were asked the following question “in the document (i.e. strategy/policy), how would you evaluate the importance of the following aspects?” The following scores were provided: 0=not relevant /or not addressed, 1: slightly relevant, 2: somewhat relevant, 3: very relevant, 4: extremely relevant).

As revealed from Figure 10, the main orientation of the strategies/policies is the development of the ICT business sector and the promotion of education in the field of ICT.

The promotion of scientific research (at a high level) is quite relevant in most strategies/policies however specific thematic ICT R&D objectives are only moderately addressed. The “weakest point” of all documents is the lack of specific measures/incentives supporting international R&D collaboration in the field of ICT.

Table 2 Analysed strategies in the MPC countries

Country	Document	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 R&D in ICT
Lebanon	Science, Technology & Innovation Policy for Lebanon	Promotion of scientific research in various fields including ICT
Morocco	eMorocco 2010 Strategy	ICT sector development
	Morocco 2025 Research Strategies	ICT Morocco sector development Research perspectives for 2025 for various fields (not only ICT)
Palestinian	Palestinian National Strategy	Palestine ICT

Authority	of Telecommunications and Information Technology 2005-2008	sector development
	A Word from the Ministry of Education and Higher Education (2009)	Overview of the Science, Engineering, Technology, and Innovations (SETI) system and recommendations of policies
Syria	National ICT Strategy for Socio-Economic Development in Syria	ICT sector development
	Tenth Syrian Five-Year Plan 2006-2010	Planning for various sectors. Includes a plan for Sciences, Technology, R&D that contains qualitative and quantitative objectives of R&D in Syria
	National Profile of the Information Society in the Syrian Arab Republic Scientific Research and Technology	Current status of information society
Tunisia	Innovation in Tunisia	Promotion of scientific research across fields
	Tunisia ICT Strategy	ICT sector development

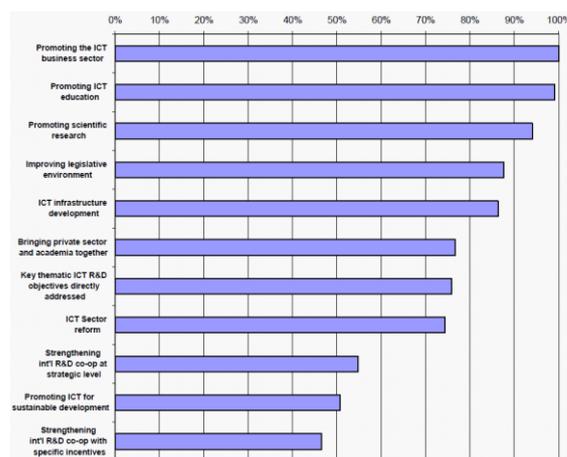


Figure 10. Importance of various parameters attributed to MPC policies/ strategies

6.1. Policies to foster and guide research and development

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 is an excellent example for moving from national policies to a joint European one. The programme 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.

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, we have initiated an open dialogue among MPC policy makers and have developed harmonized policy recommendations for enhanced EU-MPC R&D co-operation in the field of ICT.

With respect to EU-MPC collaboration in the field of ICT, 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*”. In the Cairo declaration, Ministers agreed to undertake the following key measures to build the EU-MPC 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 EU-MPC 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 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. 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 cooperation 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”.

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 Euro-med 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) 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 [980787987]. MIRA is an INCONET 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.

6.2. Country-Level Recommendations

The recommendations in this section target national policy actors in the MPC with a view to further support R&D activities in the field of ICT, which is considered to be a pre-requisite for enhanced EU-MPC R&D collaboration. The recommendations are grouped along four dimensions that are suggested to be taken into consideration in the formation of national R&D policies for ICT:

Institutional issues:

The main issue throughout most MPCs is the lack of a clear vision and strategy for ICT research and development. Secondary issues deal with lack of funding, bureaucratic governance, lack of incentives for SMEs to engage in R&D and lack of support for researchers and PhD students. It is therefore necessary for each MPC to decide whether ICT is a priority sector and then to elaborate an ICT research



strategy based on a vision shared by major key players. The strategy must go beyond research to take into account innovation. Innovation concerns all players and most importantly SMEs. It is also important to outline the possible impacts of Research, Development and Innovation on the creation of start-ups, new jobs and the attraction of foreign companies etc. The future national ICT Research, Development and Innovation (RDI) strategies should define prioritized objectives with regard to two main directions: Technology oriented RDI to feed the ICT sector; and innovative application oriented RDI as a vector for the development of a country's priority sectors (e.g. agriculture, health, transport, tourism).

MPC RDI strategies should also define adequate Governance and Financial mechanisms. A specific funding mechanism with very flexible and non-bureaucratic management procedures is a key to success.

Education and Human Resources Issues

A major component of future national RDI strategies is the development of qualified human resources at all levels. Several issues / key barriers have been pointed out:

- Heterogeneous quality of training and lack of conformity with international standards.
- Heterogeneous adequacy of training with local and international job demands.
- Lack of strong doctoral programs.
- Lack of high level teaching staff.
- Lack of incentives for full time researchers and PHD students.
- Lack of cooperation between university and the ICT business sector in research and innovation.

Major recommendations related to research related to education and HR development are:

- Create centres of excellence, independent or within universities, based on recognized international standards (critical mass of researchers and rich environment) and capable of participating on equal footing in international cooperative projects such as FP7 projects.
- Create and/or strengthen ICT doctoral programs in cooperation with recognized centres of excellence.
- Finance PhD students and Postdoctoral students.
- Launch joint RDI programs with the key players from the ICT business sector and application sectors.
- Promote international cooperation providing easy mechanisms for mobility and collaborative projects.

ICT Business Sector Issues

A major issue pointed out is the weakness of the ICT sector and its lack of interest for research and development. As a consequence there is practically no cooperation between academic research teams and the business sector. Both actors seem to largely ignore each other within the region. At the same time however, all over the region many incubators and

technology parks have been created in the recent past, and their number is still increasing. Many of the start-up companies in the incubators will one day make it into the main stream market, but it is also important to identify the current key players in the private sector that can drive RDI. Incentives to attract them for joint business-research RDI projects are vital. A good example is the Queen Rania Center for Entrepreneurship (QRCE) in Jordan that is running several programmes trying to build an entrepreneur-friendly environment that would serve entrepreneurs in Jordan and the region. Key recommendations related to the ICT business sector are:

- Identify key business players that can drive RDI.
- Promote networking of key business players and academic research teams.
- Devise financing mechanisms and incentives to promote joint academia-business RDI projects based on cost-sharing.
- Promote entrepreneurship and the development of ICT incubators to enable the creation of start-ups.
- Promote the creation of more technology parks with very attractive conditions and infrastructures to attract foreign ICT actors.
- Promote IPR awareness.

4 Infrastructure Issues

A major issue is the lack of Broadband Internet Connectivity in particular within the university environment. Other key infrastructural issues are the lack of wireless connectivity and accessibility to Internet for students and researchers and the high cost of telecom broadband services such as 3G, 3G+. As regards researchers and SMEs they further suffer from the lack of access to advanced ICT platforms to develop their research or new applications. Recommendations with regards to infrastructure are to:

- Promote broadband connectivity and access to Internet with affordable costs
- Promote the launch of advanced ICT platforms to serve the needs of researchers and SMEs. Typical platforms could be:
 - Mobile Services development platform
 - Cloud computing platform
 - Sensor Networks Platform (e.g. for environment, agriculture etc.) for surveillance and monitoring
 - Advanced Networking platforms with various technologies (LTE, WIMAX, Fibre etc.).

6.3. Intra-regional recommendations

The main issue is the lack of clear vision and strategy for ICT research at a regional level. Whereas the Arab countries have developed, under the umbrella of the Arab league, a regional strategy for the development of the

Information society and created formal coordination mechanisms such as the council of ministers in charge of ICT and more recently the Arab ICT organization (AICTO) whose headquarter is located in Tunis, they have not as yet elaborated a common framework for research in ICT. As a result there are no regional research projects, except for a few bilateral initiatives that have been launched in recent years. Recommendations include:

- Advocate the elaboration of an ICT research vision and strategy at regional level. The council of ICT ministers and AICTO could be in charge of leading this task. Best practices from Europe could be used.
- Advocate the launch of regional or sub-regional RDI projects to demonstrate the impact of such endeavours. Projects should be related to common priority areas. AICTO could be the leader organization to launch and manage such programs.
- Advocate the dedication of a certain percentage of funds allocated to research in ICT for regional projects.
- Promote the networking of researchers and business actors within the region.

6.4. EU-MPC Recommendations

A dedicated regional policy or strategy for Research and Development in the field of Information and Communication Technologies does not exist until now, whether it is in an intra-MPC regional or an EU-MPC bi-regional context. However, a fundamental policy on the European side exists: the opening of the European Research Programme for the Mediterranean Partner Countries, virtually without any restrictions. It is not a dedicated or thematically focused policy; it opens the doors to EU-MPC Co-operation but leaves the initiative to exploit the opportunities it offers to the MPCs.

As highlighted also in the document “Investing in our Future: Building Together our Information Society” which can be considered the most comprehensive effort of the Mediterranean countries in this area, two of the key obstacles faced by Mediterranean Partner Countries in this area are: (a) a lack of a clear strategy for ICT research and development in the region and (b) a lack of sustainable funding mechanisms and investments. Main recognized obstacles:

- There is no regional interlocutor to deal with the EU.
- MPCs do not have a common strategy to work with the EU.
- EU Framework Programmes are not oriented towards MPC needs.
- MPC teams do not have critical mass and expertise to be attractive to EU partners.
- Lack of willingness or awareness of EU teams to involve MPC teams in FP projects. Note however, that EU teams strive to attract researchers from MPCs to their labs or in joint bilateral projects.
- Researchers’ mobility constraints due to visas and other local bureaucratic procedures

Recommendations:

- Create an institutional mechanism to develop EU-MPC research cooperation. AICTO (or an ad-hoc NGO) could be playing a major role.
- EU to assist MPC to develop an EU-MPC ICT strategy (joint endeavour).
- Launch special calls on areas of common interest (e.g. ICTs and environment, ICTs and health, Cultural Heritage and Digital Content) where the involvement of MPC would be considered mandatory. This will help build up ties between EU and MPC teams and give some exposure of MPC teams to FP projects.
- Launch a special program to upgrade MPC research units or laboratories, with the aim of creating players able to compete for the FP calls. The capacity building can be done through partnerships with well-known EU research institutions and should deal with scientific as well organizational and managerial components.
- Launch a program to support the creation by major EU research institutes of research centres or antennas in the MPC to help foster relations between EU and MPC and tackle research problems of mutual interest.

7. CONCLUSION

To conclude, it is necessary to emphasize those results. The elaboration of a Vision for the ICT in the Region which took into account the initiative of the Arab League and AICTO to develop an “Arab Strategy for Scientific and Technical Research and Innovation” This document is made available to AICTO and other relevant regional organisations with a view to enhancing the R&D collaboration between the Arab world and Europe.

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 cooperation 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 cooperation with Europe as well as the ICT priorities has become an integral part of the on-going development of research policies in all MPC. There is pressing need for the MPC to focus their own research strategies towards a closer cooperation 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, we had initiated an open dialogue among MPC policy makers and had developed harmonised policy recommendations for enhanced EU-MPC R&D cooperation in the field of ICT.

The activities focused on the geographic region of the Mediterranean Partner Countries (MPC), in the context of the Euro-Mediterranean Partnership agreement, in an effort to:

- Satisfy the need for enhanced scientific and research cooperation with the EU, which is strongly promoted by the European Commission, and;
- Enhance the participation of the MPC countries in the European Research Programmes.

The impact of our work with regards to the above statements can be clearly seen in three main areas:

- a) The Mobilisation of the MPC research community which was realised through the registration of the researchers and their main interest and experience in the MPC Directory. The number of entries shows not only a great interest but also significant capacities of researchers and research organisations. At the same time we started to identify the MPC ICT Diaspora in Europe and mobilise their multiplier function for the development of the research cooperation with Europe;
- b) Fostering the collaboration across the MPC through the establishment of a network of researchers who communicate with each other and are well aware of the opportunities offered by the European and bilateral Programmes; and
- c) The understanding for the need to develop an ICT Vision for the region which should become a basis for discussion by the National Authorities. The first developed vision has already attracted interest by international organizations (AICTO, the ICT organisation of the Arab League and the UN).

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