

## **Co-operation with the Mediterranean Partner Countries**

**Priorities  
Experiences  
Recommendations**

IST-2005-045370

The Mediterranean Information Society



**Framework Programme 6**  
**Information Society Technologies**

**Co-operation with the Mediterranean Partner Countries**  
**Priorities, Experiences, and Recommendations**

Report 1, Version 2.0, June 2009

Project MED-IST

The partners of this project are:

Planet S.A., Greece (coordinator) • IT Consult GmbH, Germany • Ministry of Communications & Information Technologies, Egypt • Ministère de l'Industrie, du Commerce et des Nouvelles Technologies, Morocco • Euro Maghreb Consulting, Algeria • Centre National de l'Informatique, Tunisia • Royal Scientific Society, Jordan • Palestine Academy of Science & Technology, Palestine • National Council for Scientific Research, Lebanon

The research leading to these results has received funding from the European Community's Sixth Framework Programme (FP6) under grant agreement IST-2005-045370



SIXTH FRAMEWORK  
PROGRAMME

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# Executive Summary

Within the International Cooperation scheme of the FP7 Programme the Mediterranean Partner Countries play an important role.

The Mediterranean Partnership was initiated at the Barcelona Conference in 1995 where the Foreign Ministers of all EU and all South Mediterranean Countries met and agreed to establish a comprehensive partnership among the participants - the Euro-Mediterranean partnership. Its emphasis is on strengthened political dialogue on a regular basis, the development of economic and financial co-operation and greater emphasis on the social, cultural and human dimension.

However, interest in the Mediterranean Partnership diminished over the years until it was revived recently through a new initiative, the Mediterranean Union, with 43 members from Europe and the Mediterranean Partner Countries and its new headquarters to be based in Barcelona.

Within this context of the EU-Med Partnership, the Framework Programme for Research and Development has funded Support Projects in the ICT sector to prepare the ground for a closer cooperation in R&D in the ICT field between the two regions.

One of these projects is MED-IST, the Mediterranean Information Society project, funded by the 6<sup>th</sup> Framework Programme for Research & Technological Development (FP6). Its overall objective is to bring the MPC closer to FP7 ICT and one of its specific objectives is to obtain a clearer picture of the ICT R&D landscape in the MPC, which has made significant advances over the recent years, but often unnoticed by the European research and IT community. Even more important for future collaboration in joint R&D activities is to identify the ICT priorities that the MPC have defined, either explicitly in national policies and strategies or implicitly by their leading research institutes and also major IT industries.

This report summarises the findings of MED-IST in the MPC<sup>1</sup> (Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine and Tunisia), highlighting the existing ICT capacities and the future priorities for each country.

During the discussions at the consultation sessions three FP7 ICT Challenges were identified as the most relevant ones across the region:

- Challenge 1: Pervasive and Trusted Network and Service Infrastructures
- Challenge 4: Digital Libraries and Content
- Challenge 5: Towards sustainable and personalised healthcare

These are presented in this report on a regional perspective, highlighting the importance of each of the Objectives.

The many consultation sessions across the region highlighted a number of problems in understanding FP7 aims and objectives, defining priorities or in distinguishing between research and applications. A number of these were of a general nature and identifiable across the region and since some lessons can be learnt from them, we included an analysis in chapter 2 of this report.

Finally, based on the findings of the MED-IST consultation process, a number of recommendations were made to develop a targeted European Strategy for the improvement of the cooperation with the MPCs in FP7. These are summarised in the last chapter of this report.

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<sup>1</sup> MPC is the term used by the EC within the Framework Programme and stands for Mediterranean Partner Countries. Apart from the countries mentioned they also include Syria and Libya.

# Contents

<b>PART 1: ICT R&amp;D PRIORITIES IN THE MPC - THE COUNTRY PERSPECTIVES</b> .....	<b>1</b>
1.1 INTRODUCTION .....	1
1.2 THE VIEW ACROSS THE REGION .....	4
1.2.1 <i>Identified Research and Development Priorities: Summary</i> .....	4
1.2.2 <i>Identified Research and Development Priorities: The 'Challenges' View</i> .....	5
1.2.3 <i>Identified Research and Development Priorities: The view of the countries</i> .....	6
1.2.4 <i>What the ICT Professionals and the wider research community say: the MPC Directory</i> ..	8
1.3 PRIORITIES SUITABLE FOR EU-MPC RESEARCH AND DEVELOPMENT COLLABORATION	10
<b>PART 2: STRENGTHS AND WEAKNESSES</b> .....	<b>11</b>
2.1 INTRODUCTION .....	11
2.2 THE THREE CHALLENGES .....	11
2.2.1 <i>Challenge 1: Pervasive and Trusted Network and Service Infrastructures</i> .....	11
2.2.2 <i>Challenge 4: Digital Libraries and Content</i> .....	11
2.2.3 <i>Challenge 5: Towards sustainable and personalised healthcare</i> .....	12
2.2.4 <i>Analysis of the general Strengths and Weaknesses in the region</i> .....	12
<b>PART 3: EXPERIENCES</b> .....	<b>14</b>
3.1 CATEGORISATION OF PROBLEM AREAS .....	14
3.1.1 <i>The ICT Challenges and Objectives</i> .....	14
3.1.2 <i>Defining current research capabilities of the country</i> .....	15
3.1.3 <i>The basis for the future Priorities</i> .....	15
3.1.4 <i>Understanding the difference between Research and Application</i> .....	15
3.1.5 <i>Identifying research topics currently not covered by FP7</i> .....	15
3.2 CONCLUSIONS.....	16
<b>PART 4: RECOMMENDATIONS</b> .....	<b>17</b>
4.1 INTRODUCTION .....	17
4.1.1 <i>External Recommendations</i> .....	17
4.1.2 <i>Internal Recommendations</i> .....	18
4.2 A DETAILED VIEW .....	18
4.2.1 <i>Human resources, education, training</i> .....	18
4.2.2 <i>RTD Funding</i> .....	19
4.2.3 <i>ICT Policies</i> .....	19
4.2.4 <i>Co-operation</i> .....	20
4.2.5 <i>Academia - Industry Co-operation</i> .....	20
4.2.6 <i>Infrastructure</i> .....	21
4.2.7 <i>Access to data and information</i> .....	21
4.2.8 <i>Others</i> .....	21
4.3 CONCLUSIONS.....	22
<b>ANNEX: THE MED-IST CONSULTATION QUESTIONS</b> .....	<b>24</b>

# Part 1: ICT R&D Priorities in the MPC - the Country Perspectives

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## 1.1 Introduction

During 2007 and 2008 MED-IST had organised a series of 'consultation meetings' in the MPCs involved in the project to establish an overview of the current ICT capacities in each country and the ICT priorities for research and development for the future. On the basis of a scoping questionnaire (see Annex) and extensive discussions more than 250 ICT experts and stakeholders presented their views.

The results described in this chapter are mainly based on the questions 1 (The Current ICT research landscape) and 5 (Defining the ICT Research Priorities over the Next Five Years). The purpose of the first question was to get a qualitative overview of the current 'capabilities' in each country, based on the knowledge of the experts.

Concerning the question on research priorities, we wanted to identify the importance of an identified priority for a country and at the same time find out how feasibly it would be to implement. Instead of asking directly 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, High):

- Research & 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:

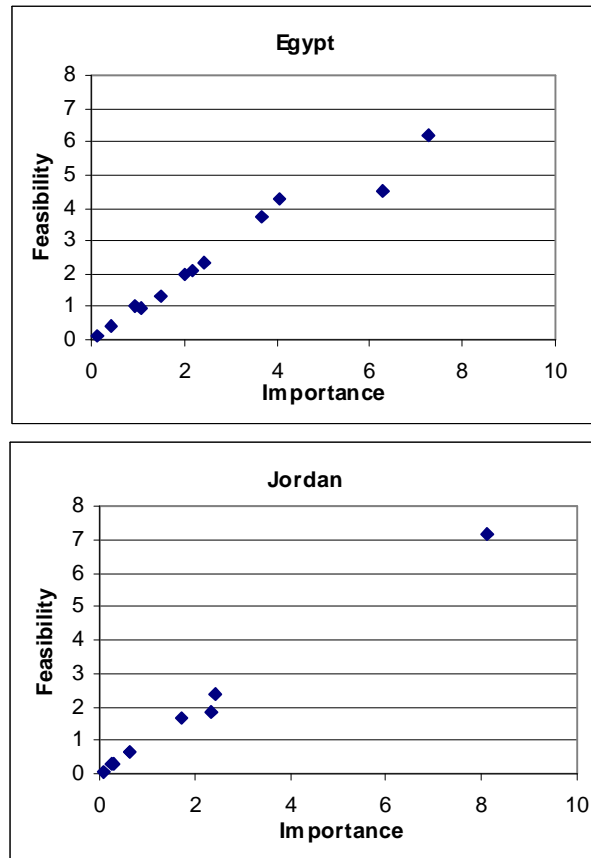
- Potential Benefits =  $\text{SQRT}(\text{Economic Impact} \times \text{Social Impact})$ , (1)
- Importance =  $\text{SQRT}(\text{Potential Benefits} \times \text{Research \& Technological Opportunities})$ , (2)
- Feasibility =  $\text{SQRT}(\text{Research \& Technology Potential} \times \text{Application Potential})$  (3)

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 FP7 ICT Objec-

tives) were grouped into the corresponding Challenges.

The main reason for only using 'importance' and not 'feasibility' is that the scores for the two dimensions were almost identical. Whenever a topic was seen to have high benefits (economic and social impact, leading to a high 'importance' value) it was also considered to have high 'Research & Technology Potential' and 'Application Potential', leading to an equally high 'feasibility' value.

The two following charts are just given as typical examples, where each marker represents an identified priority. Whenever a priority received a high importance value it was also considered as feasible.



As explained above, the experts at each consultation meeting nominated up to ten priorities (in terms of the ICT Objectives as defined in the workprogramme) for which the 'importance' was computed using formula (2). These absolute values were then put on a relative scale, giving the percentage of importance for each of the selected objectives. In the next step the Objectives were grouped into the corresponding Challenges. The problem in this step was that the number of Objectives per Challenges is varying quite substantially, from 1 in Challenge 2 to 7 in Challenge 1. There were two options for dealing with this situation:

1. Summing up the importance values for all Objectives in each Challenge, which gives more weight for those that have many Objectives and where several Objectives were identified as priorities.
2. Taking the average of the importance values given to the Objectives within each Challenge, which reduces the weight of those Challenges that have many objectives.

We decided to go for the first method, which gives a preference to those Challenges that have many and detailed Objectives on the ground that these are seen as the more important ones in the ICT Workprogramme than those with just a few.

As an example we can demonstrate these two methods for Tunisia. Looking only at Challenge 1 (Pervasive and Trusted Network and Service Infrastructures) and Challenge 5 (Towards sustainable and personalised healthcare), the identified Objectives in percentage of all selected priorities are:

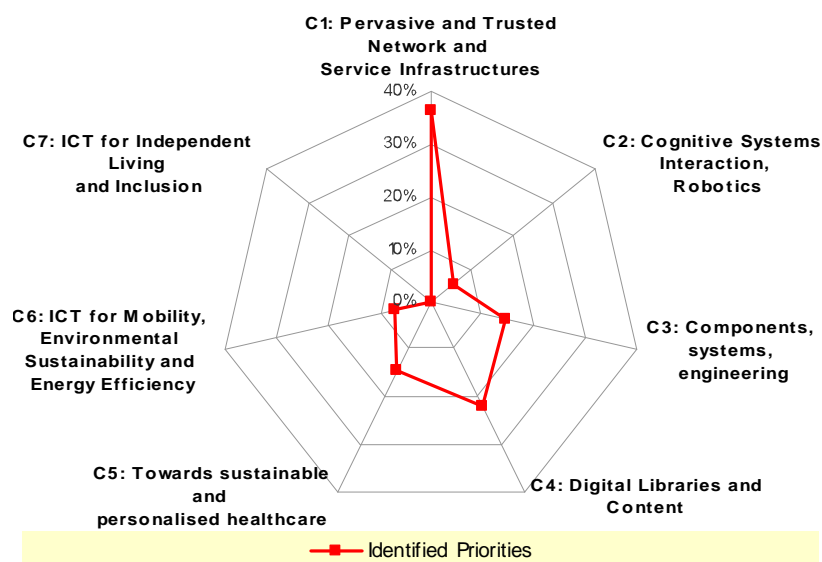
Objective 1.1: The Network of the Future	34.5%
Objective 1.2: Service and Software Architectures, Infrastructures and Engineering	9.3%
Objective 1.3: ICT in support of the networked enterprise	0.7%
Objective 1.4: Secure, dependable and trusted Infrastructures	3.2%
Objective 1.5: Networked Media	
Objective 1.6: New Paradigms and Experimental Facilities	
Objective 1.7: Critical Infrastructure Protection	
Objective 5.1: Personal Health Systems for Monitoring and Point-of-Care diagnostics	27.7%
Objective 5.2: Advanced ICT for Risk Assessment and Patient Safety	
Objective 5.3: Virtual Physiological Human	

Combining these Objectives to the two Challenges, the two methods give the following results:

	1. <u>Sum</u> of Objectives	2. <u>Average</u> of Objectives
CH 1	47.7%	11.9%
CH 5	27.7%	27.7%

It is clear that the 1<sup>st</sup> method much better reflects the weight that the experts had put on Challenge 1 than the 2<sup>nd</sup> method.

In the following we will use 'spider charts' for the graphical presentation of the priorities, as shown in the example below. The scale is relative and varies depending on the distribution of the 'importance' of each challenge per country, with the total of all challenges always being 100%.



## 1.2 The View across the Region

This section provides an overview of 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 FP7 interests declared by the members of the MPC Directory, representing a much wider group of ICT related researchers and developers across the region.

The summaries and comparisons were made on the 'Challenges' level only, i.e.:

- Challenge 1: Pervasive and Trusted Network and Service Infrastructures
- Challenge 2: Cognitive Systems, Interaction, Robotics
- Challenge 3: Components, systems, engineering
- Challenge 4: Digital Libraries and Content
- Challenge 5: Towards sustainable and personalised healthcare
- Challenge 6: ICT for Mobility, Environmental Sustainability and Energy Efficiency
- Challenge 7: ICT for Independent Living and Inclusion

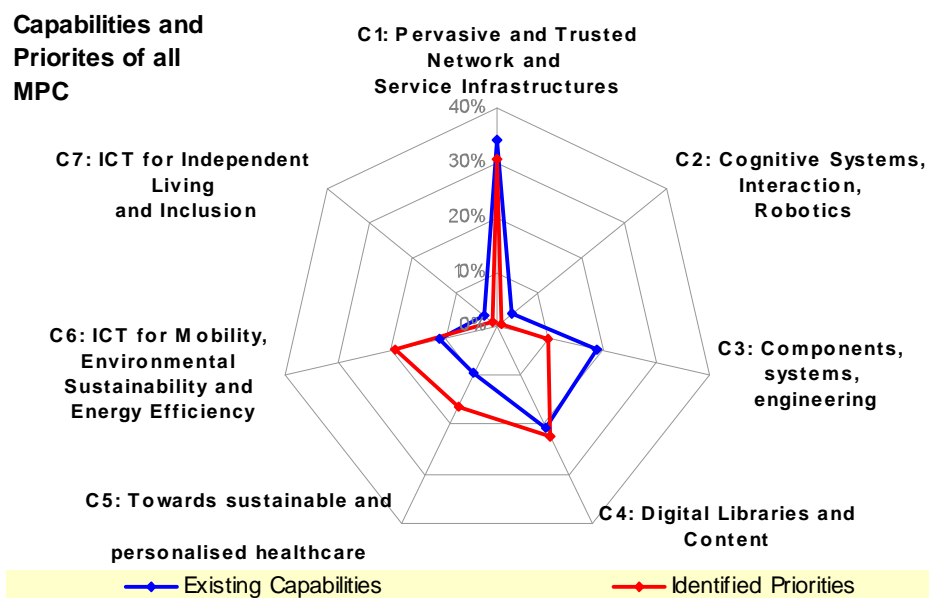
The countries that participated in the consultation process to establish a Scientific Research Agenda were Morocco, Algeria, Tunisia, Egypt, Jordan, Palestine and Lebanon.

### 1.2.1 Identified Research and Development Priorities: Summary

The identification 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.

The following graph shows the summary of identified Research and Development Priorities for all countries:



Globally, there is a clear preference for Challenge 1 both in terms of the countries' existing capabilities and future priorities, followed by Challenges 4, 6, 5 and to a lesser degree C3. Challenges 2 and 7 do not play a major role when looking at the entire region.

### 1.2.2 Identified Research and Development Priorities: The 'Challenges' View

However, there are quite distinct local differences concerning both the future priorities and the existing capabilities.

In **Egypt** and **Jordan** Challenge 1, 'Pervasive and Trusted Networks', 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, 'Digital Libraries and Content', where both countries (and **Lebanon**) have already developed a good Research and Development infrastructure.

All other countries see Pervasive and Trusted Networks as an important Research and Development topic for their communities.

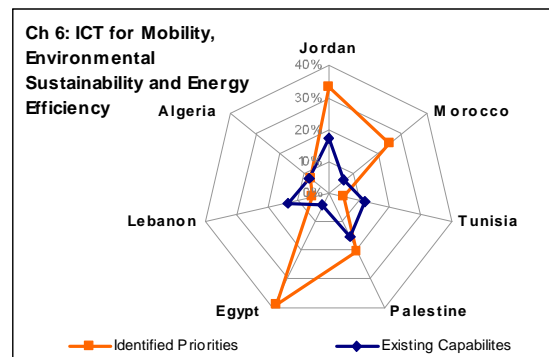
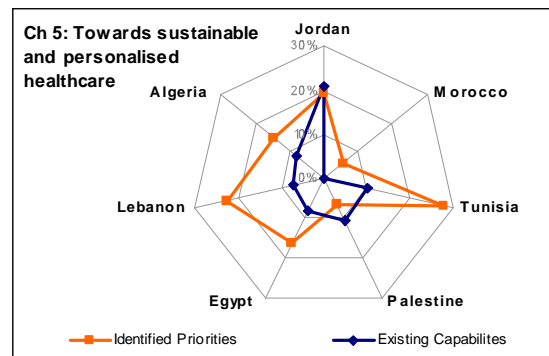
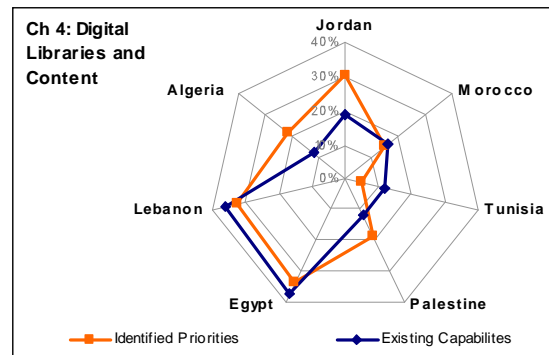
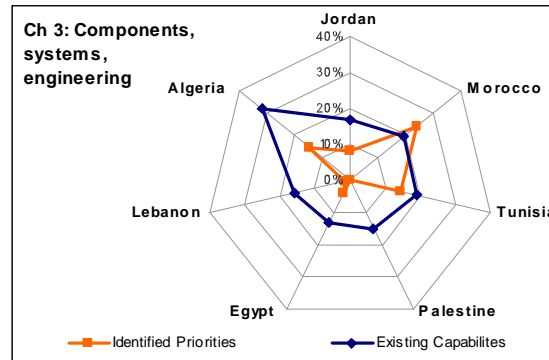
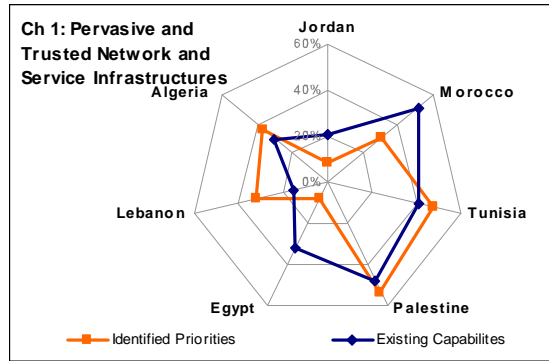
**Morocco** and **Tunisia** have put a strong focus on Challenge 3, 'Components, Systems, and Engineering', while this is rated fairly low in most of the region.

Challenge 5, 'Towards Sustainable and Personalised Healthcare', is generally seen as a major priority, except for **Palestine** and **Morocco**.

As shown in the previous section, Challenges 2 (Cognitive Systems, Interaction, Robotics) and 7 (ICT for Independent Living and Inclusion) do not play a significant role in the MPC. Only very few countries have shown in interest in these (Algeria in Challenge 2 and Lebanon and Palestine in Challenge 7).

We also observe 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), **Lebanon** (Challenge 5) or **Algeria** (Challenge 3).

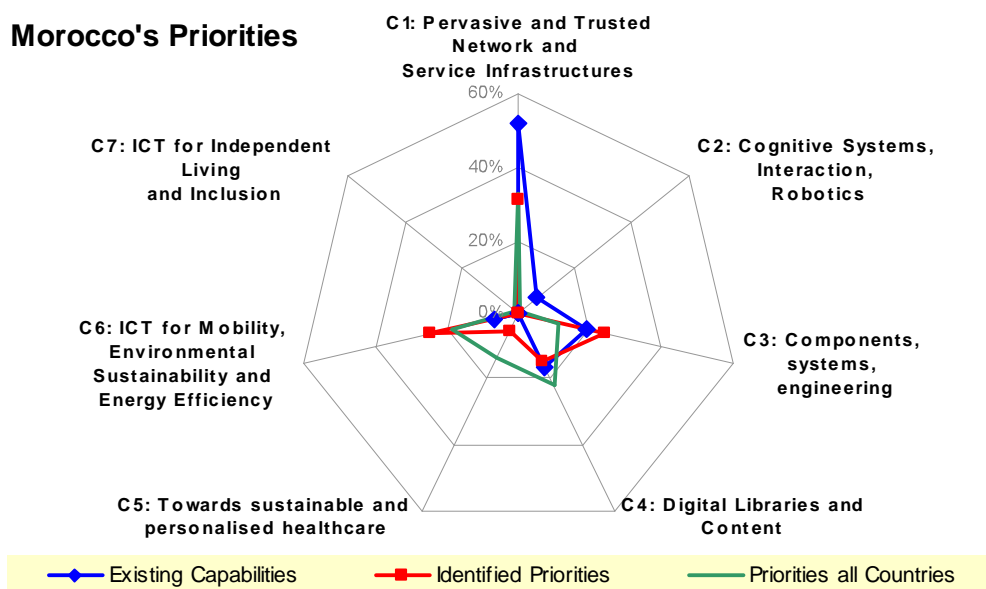


### 1.2.3 Identified Research and Development Priorities: The view of the countries

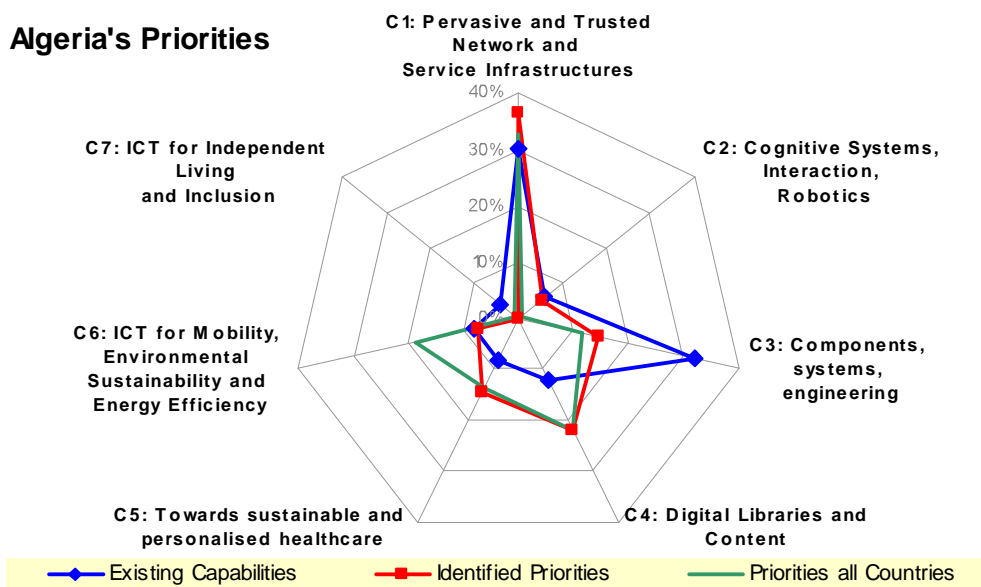
The following charts present the views of each country in terms of the importance of the FP7 ITC Challenges for their identified future R&D Priorities, along with their existing capabilities in each Challenge.

In order to better compare each country with the entire region, the summarised priorities of all countries are also given.

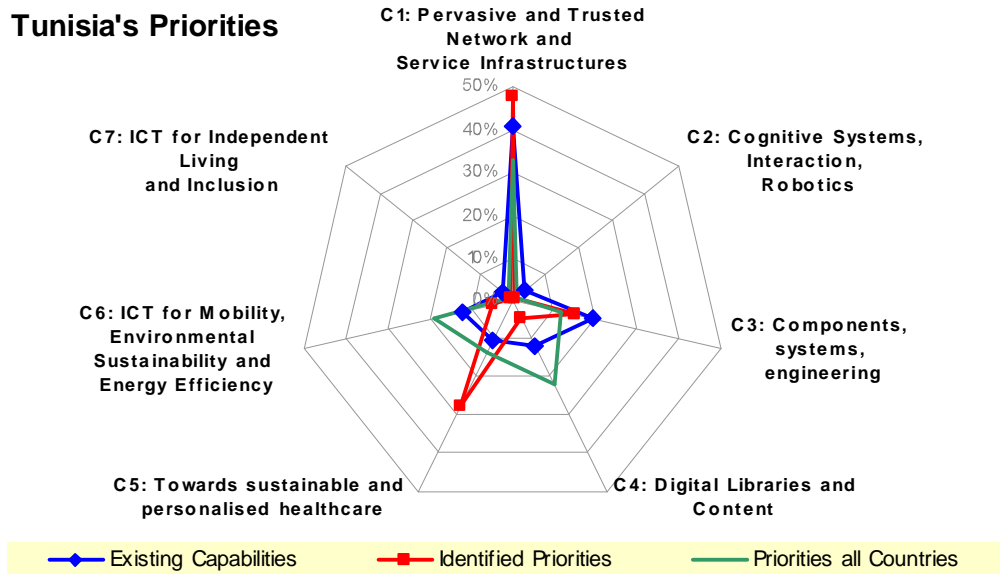
#### Morocco's Priorities



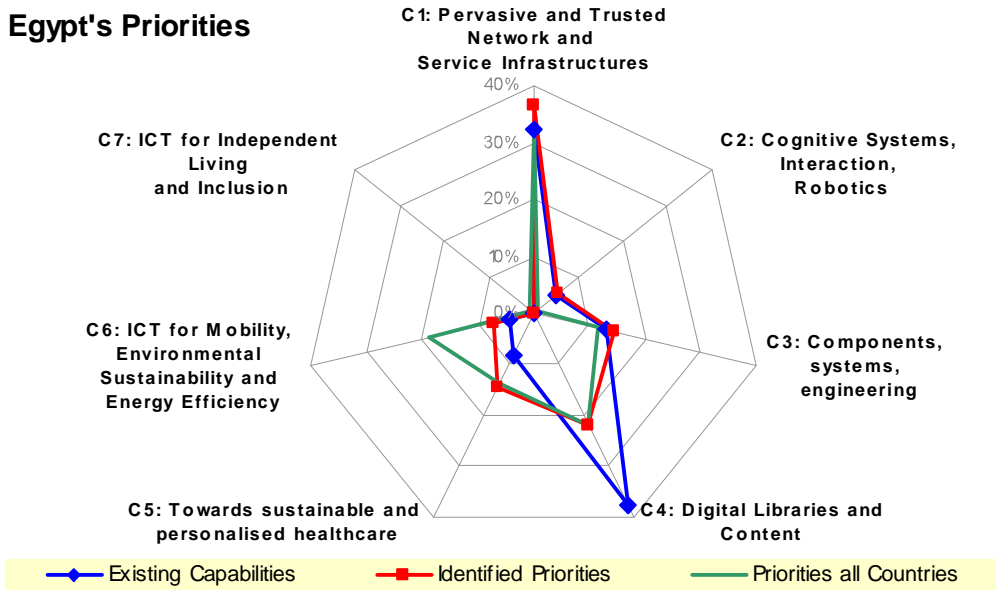
#### Algeria's Priorities



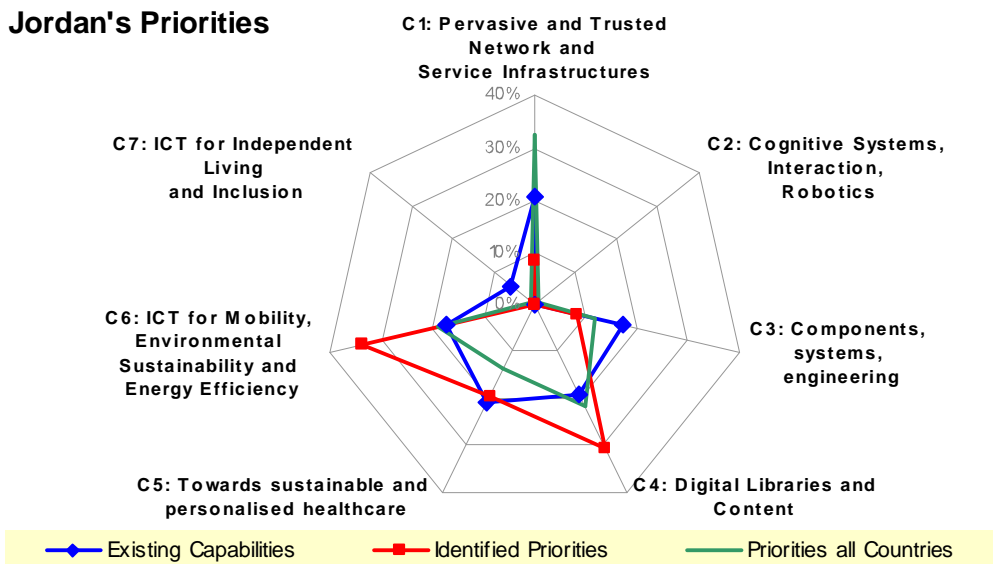
## Tunisia's Priorities



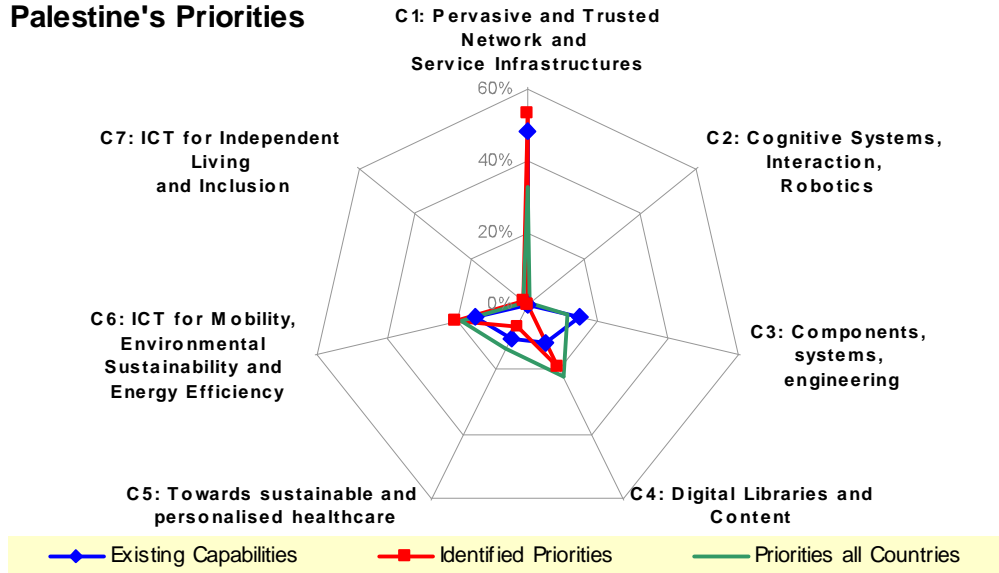
## Egypt's Priorities



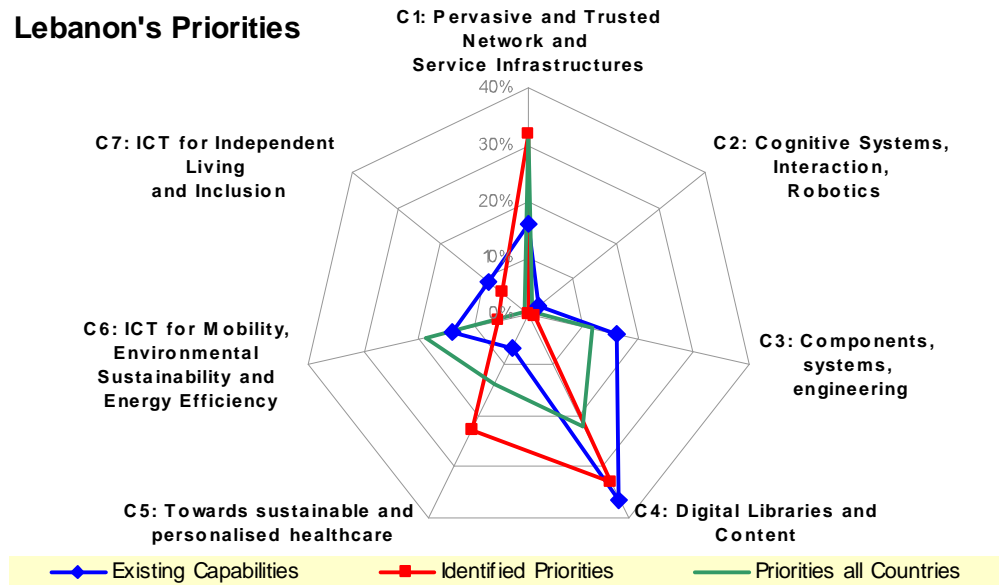
## Jordan's Priorities



## Palestine's Priorities



## Lebanon's Priorities

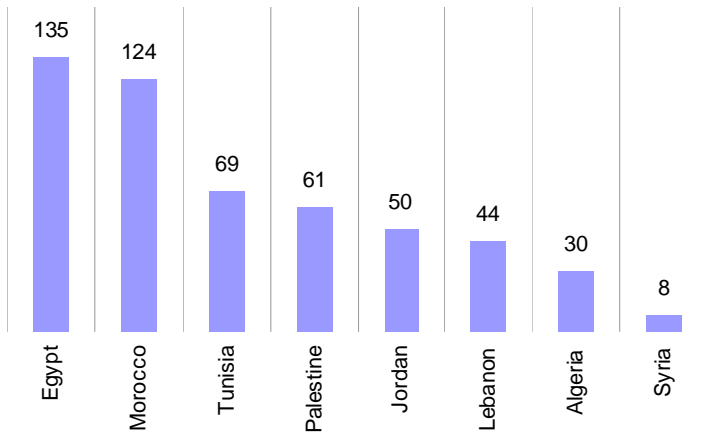


### 1.2.4 What the ICT Professionals and the wider research community say: the MPC Directory

The MPC Directory of ICT professionals is built up by registrations of interested persons from academia, industry and public organisations. Members of this directory are asked to declare their interest in terms of the FP7 ICT Challenges and Objectives.

The following comparison is based on the status of the MPC Directory in June 2009, where more than 300 out of over 500 members have declared their FP7 interest.

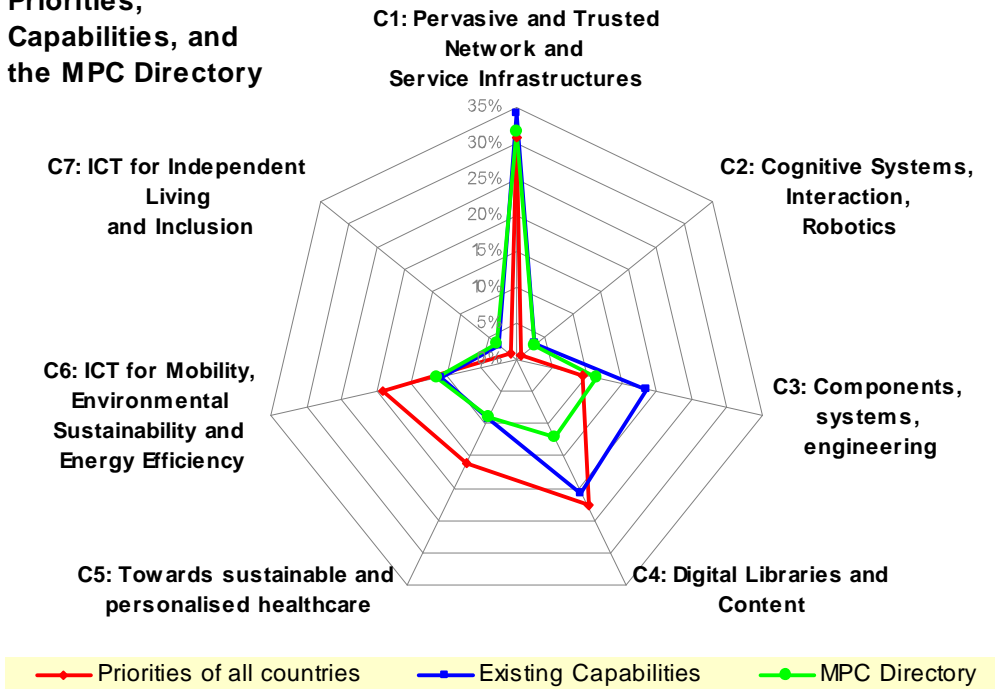
Total registered members from the MPC



Total number: 521

The figure below shows a good match between the Existing Capabilities as identified by the ICT experts at the consultation meetings and what the members of the MPC Directory have stated as their interest. In comparison to the Priorities identified by the experts, 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.

**Priorities, Capabilities, and the MPC Directory**



### 1.3 Priorities suitable for EU-MPC Research and Development Collaboration

Following the examination of all the above information and its analysis the following priorities could be proposed as reflecting the overall capacity and importance for the MPC

FP7 ICT Challenge (2007-2008)	Potential for EU-MPC Research and Development collaboration in the period 2008-2013 (High / Medium / Low)
<b>Challenge 1:</b> Pervasive and Trusted Network and Service Infrastructures	<b>HIGH potential</b> <ul style="list-style-type: none"> <li>• 1.1. The Network of the Future</li> <li>• 1.2. Service and Software Architectures, Infrastructures and Engineering</li> <li>• 1.4. Secure, dependable and trusted infrastructures</li> </ul>
<b>Challenge 2:</b> Cognitive Systems, Interaction, Robotics	<b>Low collaboration potential.</b> no relevant priorities identified
<b>Challenge 3:</b> Components, Systems, Engineering	<b>HIGH potential</b> <ul style="list-style-type: none"> <li>• 3.3. Embedded systems design</li> </ul> <b>Medium potential</b> <ul style="list-style-type: none"> <li>• 3.1. Next generation nanoelectronics components and electronics integration</li> </ul>
<b>Challenge 4:</b> Digital Libraries and Content	<b>HIGH potential</b> <ul style="list-style-type: none"> <li>• 4.1. Digital libraries and technology-enhanced learning (E-learning – digital content – semantic tech. - Virtual classrooms – e-publishing – exchange knowledge – curriculum development - archiving – search – text mining - Multimedia presentation – compression – video streaming)</li> </ul>
<b>Challenge 5:</b> Towards sustainable and personalised healthcare	<b>HIGH potential</b> <ul style="list-style-type: none"> <li>• 5.1. Personal health systems for monitoring and point-of-care diagnostics</li> </ul>
<b>Challenge 6:</b> ICT for Mobility, Environmental Sustainability and Energy Efficiency	<b>HIGH potential</b> <ul style="list-style-type: none"> <li>• 6.3. ICT for Environmental Management and Energy Efficiency</li> </ul> <b>Medium potential</b> <ul style="list-style-type: none"> <li>• 6.1. ICT for the intelligent vehicles and mobility services</li> </ul>
<b>Challenge 7:</b> ICT for Independent Living and Inclusion	<b>Low collaboration potential</b> no relevant priorities identified so far

## Part 2: Strengths and Weaknesses

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### 2.1 Introduction

Following this first round of consultation meetings that focused on the ICT R&D priorities across all Challenges, we wanted to get a more detailed view on the most important ones and at the same time better understand the strengths and weaknesses of the countries - specifically for these challenges but also more generally in terms of the existing R&D environment. For that purpose we organized three Thematic Workshops on one selected Challenge, in which ICT R&D experts from all MPC participated. Based on the analysis of the previously held consultation meetings, the three most important Challenges selected for the Thematic Workshops were:

- Challenge 1: Pervasive and Trusted Network and Service Infrastructures
- Challenge 4: Digital Libraries and Content
- Challenge 5: Towards sustainable and personalised healthcare

### 2.2 The three Challenges

#### *2.2.1 Challenge 1: Pervasive and Trusted Network and Service Infrastructures*

The experts confirmed that this Challenge is the most important one for all MPC (with the exception of Jordan), in terms of current research activities in the ICT domain and as an R&D priority for the future. They also confirmed the results from the consultation workshops that put a particular preference on FP7 ICT objectives '1.1: The Network of the Future' and '1.2: Service and Software Architectures, Infrastructures and Engineering' but also stated clearly that the other five objectives in this Challenge are more important than our analysis may suggest.

#### *2.2.2 Challenge 4: Digital Libraries and Content*

Documentation appears to be still the most important issue in the MPC, but more from a service point of view rather than as an academic research topic. There are indeed many digital documentation centres in the MPC, for example in Tunisia a digital library networks links all libraries in the country, Morocco has a Digital Documentation Centre as well as Egypt that has the most famous one: the CULTNAT.

Digital Preservation is currently not an active research theme in the MPC, but as a topic it is under discussion in the following countries: Jordan, Morocco, and Egypt.

There is a high interest throughout the region concerning Intelligent Information Management, however the current research capacity is underdeveloped, hence this is a topic to be developed in the future.

E-learning has a long tradition in all MPC, both in terms of research as well as applications. Practi-

cally all research related to Challenge 4 in the MPC is focusing on e-learning. However, the more specific subject of Technology-enhanced learning as it is defined in the workprogramme has not yet found its way into the R&D activities. The interest in these fields, such as adaptive and intuitive systems for learning, revolutionary learning appliances (including toys) and advanced cognitive tutors, or interdisciplinary networks is high but the R&D capacity in the region needs to be improved to address them in sufficient depth.

### ***2.2.3 Challenge 5: Towards sustainable and personalised healthcare***

The Objective 5.1 "Personal Health Systems for Monitoring and Point-of-Care diagnostics" is the most important one and neither "Patent Safety" nor the "Virtual Physiological Human" currently play a significant role as R&D topics in any of the MPC.

Overall, in the MPC the penetration of ICT in the health sector is in its early stages but receiving quite a bit of attention. Some countries like Morocco and Jordan are more advanced than others. Nationwide Electronic Health Records (EHR), which are essential to improving health quality and managing health care delivery, whether in a large health system, hospital, or primary care clinic, are under development in most countries. In Palestine the first system was introduced in 2003, in Morocco a prototype is being tested, in Jordan a pilot phase is running with a system based on the open source system VistA, and Lebanon has concrete plans for introducing one.

However, the private sector of IT for health system is not very well developed in the region, possibly with the exception of Jordan, where some private companies in this sector exist.

Another observation made was in some areas the MPC show a surprisingly fast development. A good example is the introduction of nationwide EHRs which appears to be faster than in some EU countries, for example in Germany, where the discussions started in 2004 but still no legislative framework exists that would allow the introduction of an EHR.

### ***2.2.4 Analysis of the general Strengths and Weaknesses in the region***

To get a better view of the countries' strengths and weaknesses, a qualitative survey was made amongst the experts on the following criteria:

- Research outcome in terms of academic publications
- Existing Infrastructure in the sector
- Human resources in general terms, i.e. availability of graduates as potential candidates for research in this field but not specialised researchers
- Governmental Support in terms of legislation
- Governmental Support in terms of supporting funds
- Private Sector/Industry
- Existing International Cooperation
- Awareness of EU Initiatives

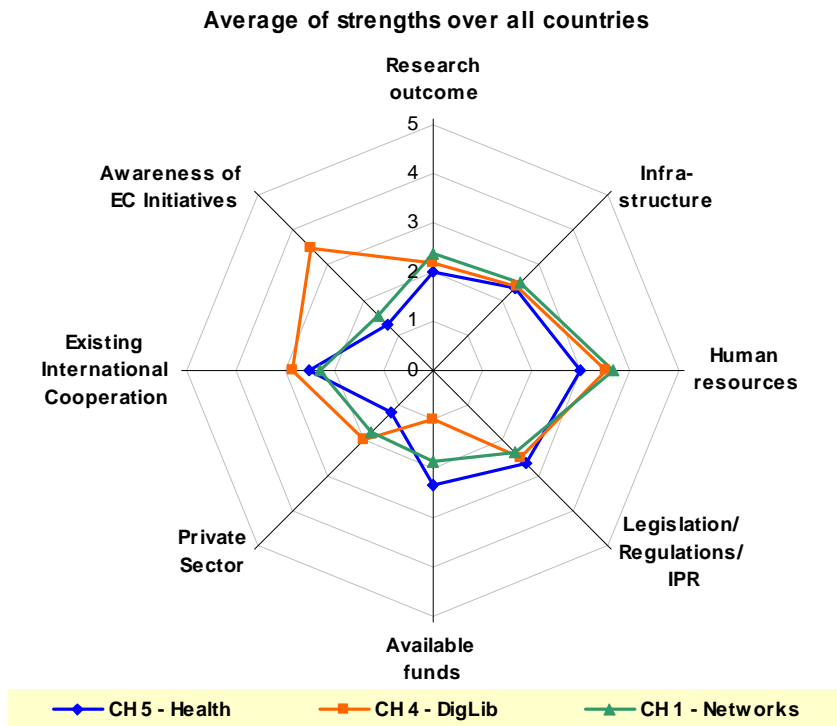
What this summary shows is that 'Human Resources' are clearly the strong point of the MPC. But it must be clear that this is just a 'potential' that needs to be further developed. Well educated graduates will only contribute to a country's strength if they are given the opportunity to actively engage in research and development either in universities or research laboratories.

Taking this situation into account, the relatively high figure given by all experts from the region for the 'Research Outcome' is overestimated on an absolute scale. However on a relative scale it does give a good indication of importance and role that the three selected challenges play in the region.

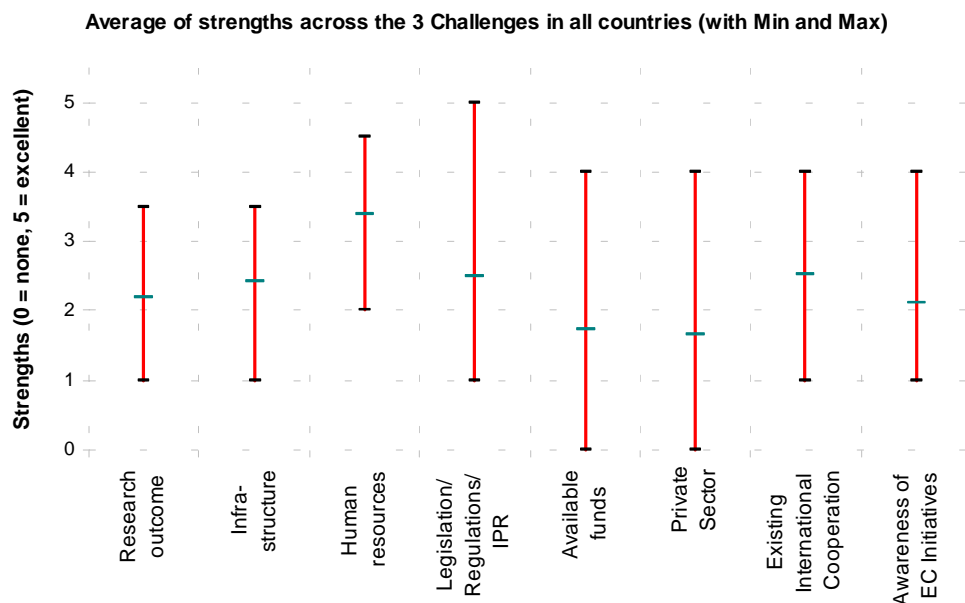
One of the more critical issues is the generally low level cooperation, within a country, the region, and on international level. It is surprising to see that international cooperation is much more popular than national cooperation or even cross-regional one, while co-operation within a country is hardly practiced. At the same time all experts at the events complained about this situation and were in favour of strong national and cross-regional cooperation, but no framework for such cooperation exists, nor are there any tangible incentives. So here is a clear recommendation for policies in the MPC to make national, regional and international cooperation one of the top priorities.

Finally, the conclusion concerning EU FP7 policies for MPC cooperation is that it should focus on specific topic areas, based on the 3 Challenges analysed in these workshops, taking into account the specific needs of the region that are of mutual interest for European R&D.

The following two diagrams show a graphical view of the Strengths that came out of the three Thematic Workshops. The first shows the average strengths in the three selected Challenges and show clearly that the strongest point in all categories is the availability of human resources, while one of the weakest the private sector. Also somewhat surprising was the low level of awareness of EC initiatives that mainly referred to the Framework Programme (current and previous). Since there have been a number of joint activities with the EU in the domain of Digital Libraries, the awareness was significantly higher in this area.



It is also interesting to note the variation of strengths across the region. The next diagram shows the average values and the maximum and minimum values collected.



## Part 3: Experiences

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Because the consultation process turned out to be more difficult than expected with a number of problems encountered that are very similar across the region, it was thought to be worthwhile to describe these problems in more detail, also drawing some conclusion to avoid them in future discussions.

### 3.1 Categorisation of Problem Areas

During the consultation meetings and the analysis of the questionnaires the various issues were classified according to their relation to the FP7 ICT rationale /approach and to the National policies and strategies. This examination resulted to the following categories of issues:

1. Understanding the FP7 ICT Objectives
2. Defining current research capabilities of the country
3. The basis for the future Priorities
4. Understanding the difference between Research and Application
5. Identifying research topics currently not covered by FP7

#### 3.1.1 *The ICT Challenges and Objectives*

Maybe not surprising, understanding the ICT Challenges and detailed Objectives turned out to be a major problem. The temptation to read just the names of the objectives and interpret them according to their own experience and knowledge was quite a common phenomenon with the stakeholders. Hardly anybody had read the whole workprogramme before the meetings.

Quite frequently the stakeholders complained that the given FP7 ICT objectives are not covering all R&D topics in ICT. Firstly, we tried to explain that they are not meant to cover everything, but only those topics that are of high relevance for Europe (and that they were not just selected by some EC officials but emerged through a long consultation process across the R&D community in Europe). Since the overall idea of the MED-IST project is to bring the MPC research community closer to Europe under the FP7 Programme, it is obvious that we focus on the research topics defined there. Secondly, we explained that not all objectives are of relevance for the MPC and that the stakeholders should ignore those they thought not applicable.

### ***3.1.2 Defining current research capabilities of the country***

Although in principle a straightforward question, a variety of problems appeared when answering Question 1 (the general fields of activity are currently being carried out in the country) and Question 2 (selecting the strong ones of them).

1. In some countries for each objective a short explanation was given on how it could be applied in the country, based on the country's need but not on its existing R&D capacity, as was asked.
2. A mistake that the project made was to allow the nomination of "Other areas" than ICT Objective in Question 1, which occasionally lead to the introduction of new topics, not dealt with by FP7. It was removed at a later stage, to avoid such complications.

### ***3.1.3 The basis for the future Priorities***

Identifying concrete priorities for future R&D in a country is not an easy task and at the beginning it was not sufficiently clear on which basis such priorities should be defined. When asking a researcher to define the future priorities, the answer will surely be based on his research interest, which may reflect his current work but could also be new topic he wants to indulge in - and we had several cases like that. Other stakeholders tended to define priorities on the envisaged needs for their country, in socio-economic or scientific perspectives. However, what we needed were priorities based on existing capacities and experience, again to make it easier for the countries to participate in FP7 projects. When this was explained during the consultation meetings, people understood that to find a role in a consortium is based primarily on what a partner can bring in and less on what he would like to do in future.

In some countries new topic areas appeared for the future priorities which made it difficult to harmonise answers across the region, apart from the fact that those new area were outside the FP7 ICT theme.

### ***3.1.4 Understanding the difference between Research and Application***

Quite long discussions took place on the subject of research and application, where the boundary concerning ICT often is not very clear cut. This was in particular the case for Challenge 6, 'ICT for Mobility, Environmental Sustainability and Energy Efficiency', and Challenge 5, 'Towards sustainable and personalised healthcare'. The first was often seen as a general area for environmental applications, the latter as Health in general. The arguments brought forward were that in all environmental or health application one needs ICT and hence these were good topics for the ICT Theme. As a general guideline, we explained that if the main focus of research is on IT, it is most likely a suitable topic for the ICT Programme, but if IT is only a tool (necessary or essential) other programmes in FP7 are likely to be more suitable.

For example, the priorities mentioned as "Fault location in water network, Improvement of maintenance data, Remote sensing" are not ICT R&D topics but can be found under Theme 6 Environment, Sub-activity 6.3.1 "Priority will be given to miniaturised sensing systems and wireless network technology for the deployment of essentially self-sustaining wireless sensor networks aimed at spatial and temporal water quality assessment".

Likewise, drug and AIDS related topics that were mentioned would fall under "FP7 Theme 1 Health, HIV/AIDS Drug Discovery and Preclinical Development".

### ***3.1.5 Identifying research topics currently not covered by FP7***

As mentioned above, FP7 ICT does not cover all possible ICT research topics, so a number of countries suggested during the discussion topic areas that should be included in future, in particular those that are represented in the country's research community or the private industry.

The first problem encountered in this respect was that a number of topics mentioned were not really research topics but application areas.

Examples are

- Development of a national security database
- Health care database system and e-medical records
- ICT management
- Reverse engineering
- Time series forecasting

The other problem was that many topic areas have been research topics in the past, but are not longer considered as research fields. They have reached a maturity level, at least in Europe, that would hardly justify further public funding.

Examples are:

- Pattern recognition and Image understanding
- Data Mining
- High Performance Computing

### **3.2 Conclusions**

More time and effort needs to be spent on explaining and understanding the FP7 ICT workprogramme: not on a procedural level (which is done in the Mentoring Workshops run by the project), but on the technical and content level. Workprogrammes are never easy to understand, they are complex and require very good background knowledge, but given sufficient time all relevant stakeholders can understand them. A quick glance - which we experienced quite often - is certainly not enough and can produce misleading interpretations quite easily.

The scientific level of the workprogramme and that of the expected proposals is very high and adapted to European standards. The conclusion drawn by a number of stakeholders was that this is not a workprogramme where the MPC research community can respond to easily. With some exceptions, the general level of scientific research in the MPC is not yet on the European level and it will take some time (and effort) to raise it accordingly. Hence the clear recommendation was made to "Launch a Euro Mediterranean program, more adapted to our environment and the development of the area" and to "Identify and choose research areas appropriate to the Mediterranean region".

The past INCO Programme that in its early years also covered IT was more adapted to the MPC capacities, and the same was true for the EUMEDIS Programme.

We would need at least some MPC specific R&D calls in the ICT Theme in the near future to better engage the research community in the region. There is a clear risk that researchers as well as private industry lose interest in FP7, if the threshold of participation is too high.

## Part 4: Recommendations

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The findings of the numerous consultation sessions and other workshops brought forward valuable insights on how the MPCs understand FP7, on their own priorities and on the way they develop their National Strategy for the Information Society.

Out of these we have - together with the stakeholders in the region - formulated recommendations which should help both sides to establish policies that maximize the EU-MPC cooperation and would allow the build-up of a sustainable research capacity in the MPC.

### 4.1 Introduction

This section summarises the recommendations for improvements of ICT Research and Development, provided by the stakeholders in the MPC countries, where the consultation process was implemented.

Two different sections of the Scoping Questionnaire referred to such recommendations, one was specific to the selected Research and Development Topics ("Q3 – What ideas do you have about changes that should be done to improve the effectiveness and impact of the current ICT research environment in your country?") and one more general with respect to the future ICT Research and Development ("Q7 – Please add any further comments and suggestions on the future of ICT research in your country").

The spectrum of answers is of course very wide, but there are a number of commonalities that are worth to be highlighted.

We have grouped the answers into two categories, one with recommendations directed to the own country and the other one referring to external collaboration, mainly with Europe.

#### 4.1.1 External Recommendations

The second category of recommendations refers to 'external' ones, mainly to foster international cooperation. The most detailed recommendations were given by **Tunisia, Morocco** and **Jordan**, which can also be seen as an indicator of a relatively mature awareness of European collaboration possibilities.

The following is a list of the most important recommendations given. They address **strategic issues**

concerning more specific EU-MPC programmes targeting the needs of the region with some institutional support, as well as **procedural** ones, for example improved information about EU Programmes. Mobility of researchers and exchange programmes are also seen as an important issue for helping the countries to improve their research level and gain international reputation.

- Launch a Euro Mediterranean program, more adapted to our environment and the development of the area
- Identify and choose Research and Development areas appropriate to the Mediterranean region
- Undertake federated Research and Development actions with European teams and create Euro-Med Networks
- Within the EU-MPC framework, create a Euro-Mediterranean office to foster and develop linkages between research and industry from both European and Mediterranean regions.
- Simplify the procedures of the European Commission and support the participation of the Mediterranean teams in European calls for proposals.
- Provide timely information for the participation in calls for proposals, conferences, seminars, etc.
- Enhance regional collaboration with Europe; Exchange of researchers with EU countries; Improve the University strategies regarding international conferences by allowing more frequent visits and increased financial support to such activities;

Although these answers are not representative for the entire region, they can be seen as a justification of the objectives of MED-IST and for future activities, in particular to create sustainable networks between the two regions.

#### **4.1.2 Internal Recommendations**

In the first category, called 'Internal Recommendations' in the following text, we grouped the most prominent recommendations into several categories (as indicated in the table below).

It should be noted that we are not working with strictly quantifiable data here, and the allocation of some recommendations to a specific category was not always straightforward. For example, the recommendation to strengthen human resources is closely linked to implementing the right governmental policies (Palestine) or to the demand of closer cooperation between academia and industry (Jordan: Increase awareness at the local industries about the value of Research and Development done by Academia).

The overall results of the analysis of question 3 and Question 7 with respect to '**Internal Recommendations**' are in a ranked order:

<b>Rank</b>	<b>Category</b>
1	Human resources, education, training
2	Lack of RTD Funding
3	ICT Policies
4	Academia - Industry Co-operation
5	Infrastructure
6	Cooperation
7	Access to data and information

## **4.2 A Detailed View**

The recommendations given in the first category deserve some more detailed analysis in particular as they can be seen as a good indicator of the current situation in the MPC countries.

### **4.2.1 Human resources, education, training**

Recommendation in this category referred mainly to the education system in general. Working at universities for teaching and research needs to become more attractive, through higher salaries, less

students per class, higher selection criteria for students, higher evaluation standards for academic research and a proper monitoring system. An important aspect mentioned is the need to create more fulltime research positions ("*Currently the most important part of ICT researchers are mainly involved in is teaching*"). Staff and faculty members should have more time for engaging in Research and Development activities ("*Reduce the load of any faculty member who is actively engaged in research from 12 teaching hours to 3 - 6*").

Specifically with respect to ICT, one needs to attract more students as "*Computer Science research will be the most attractive of future young researchers*". Also, the focus must be more on practice than on theory to make students more attractive to industry.

More training is necessary for fresh students in order to "*create a critical mass of information Technology Professional*", and to ensure a "*general level of IT literacy within the workforce*".

An additional recommendation is to encourage staff/faculty members to publish their work and attend international conferences by sponsoring such activities.

#### **4.2.2 RTD Funding**

Closely linked to the education issue is the one of RTD Funding. Not surprisingly, everybody stressed the importance of increased funding. Without additional funding, research will have little chance to prosper in the region. One comment from Morocco sheds light on the current situation, most likely not only in that country:

*"Granting financial autonomy to universities and research laboratories concerning the management of research means. Find and Offer scholarships for young researchers (Companies could be implied in project definition and financing. When a student receives this scholarship he has to sign a contract in order to work on the project. Currently, students do not have subvention and they leave their researches as soon as they get a job.)"*

*"When a financed project is started, the project manager does not know when he will receive the money. It happened that subvention comes after the end of project or he receive only a part of it because of delays. "*

Governmental policies are seen as crucial, as for example in Palestine:

*"Government should influence foreign funds to have ICT as a national priority issues. Adoption of new financial and managerial policies on governmental levels and university administration level for the R&D strategies to support the scientific research."*

Likewise, Jordan recommends "*The government should enhance the research share from the national income*" create "*more funding agencies*" and also "*encourage venture capital*".

#### **4.2.3 ICT Policies**

Support of ICT Policies is one of the objectives of MED-IST and, indeed, the recommendations given fully support this objective. ICT Policies should promote ICT in the widest sense, from direct financial support to general awareness of the importance of R&D in the countries.

One comment from Morocco gives an excellent summary:

*"The government should put a clear policy of R&D innovation encouragement and incitement. It should involve, attract and mobilise researchers, create prizes to reward projects, and activities of people, institutions or NGOs that develop the best convenient and ingenious use of the ICT."*

*Promote innovative thinking and creation process in education.*

*Popularise research and sensitize the general public about research importance.*

*Promote and enhance creative thinking, lifelong learning, and social responsibility.*

*There is a need for stronger and closer collaboration and co-ordination between decision and policy makers and academic researchers and university professors in order to establish a national research strategy at the national level, and leave room of innovation.*

*ICT research could only be effective with added value if it is considered as a priority in a national strategy. Elaborate a contractual framework based on deliverables and milestones and focus on/promote research that:*

- *Contributes to the development of the country (education, health, environment, etc...),*
- *Leads to intellectual property, products, and services,*
- *Generates external/International funding. "*

Having possibly some doubts if governments alone can formulate a proper ICT Policy, Palestine suggest that

*"A body should be created that will include private companies, the government, education institutes and research organizations. This body should be able to monitor and help ICT research in Palestine. The body also needs to create a top strategy plan of what our country needs."*

Although Jordan is one of the MPCs that has formally adopted a strategy for ICT<sup>2</sup> this is not seen as specific enough:

*"We must have clear well defined integrated objectives.*

*We must set the priorities for developing ICT in Jordan.*

*Projects must be integrated to achieve well defined goal strategies from schools to universities, to the industries and government. "*

#### **4.2.4 Co-operation**

Co-operation appears to be a weak point in general, be it co-operation among universities within a country, co-operation with other entities such as industry (see below), co-operation among different disciplines, or co-operation on international level.

Those who remember the situation in Europe in the 80ies, when the first collaborative funding programme was launched, will recall similar problems. While co-operation among universities had an old tradition at least in some disciplines, for industries this was something unusual and met quite a bit of resistance. Combining competition and collaboration was a new and difficult concept, but the European culture has changed in that respect over the past decades. The MPC are still in the early stages of that process, but many have realised that co-operation is essential for a successful scientific and economic development.

Such development clearly starts with the need to "*raise team-spirit*" (Lebanon) to creating "*multidisciplinary teams*" as suggested by Morocco:

*"Build multidisciplinary teams to solve applied problems: ICT research centres must gather not only ICT specialists but also researchers and experts in linguistics, mechanics, minerals, geology, chemistry, genomics, medicine, etc."*

Concrete recommendations came from Palestine who suggested to:

*"Encourage the scientific research culture in our universities, research centres and ministries by organizing periodic workshops, meetings and conferences on the most relevant areas of the ICT, and give the ICT staff the opportunity to meet and keep in contact for mutual cooperation in their researches."*

Similarly, Tunisia recommended:

*"Networking of research teams and the creation of poles of competences."*

#### **4.2.5 Academia - Industry Co-operation**

A specific form of co-operation is that between academia and industry, which - speaking in broad terms - does not exist in the region. Jordan has made a good first step in their new ICT Strategy by creating 'innovation funds for promoting academic-industry partnerships'. Apart from the innovation funds, tax credits or exemptions were proposed for private industry that engages actively in ICT research. But it looks like effects of these measures or proposals are not yet visible, since the recommendations from Jordan were:

*"More partnerships and joint efforts between academic institutions and private sector companies, in order to conduct such researches which could be utilized positively by those companies;*

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<sup>2</sup> Research & Development Strategy for Information and Communication Technology, 2008

*A political decision to force industry to collaborate with academia;*

*Encourage the partnership between the public and the private sectors for both of them to be the drivers of the research evaluation in Jordan;*

*Establish research cooperation at a national level to supervise & manage research activities in Jordan;*

*Provide incentives that increase ties with universities;*

*Change the regulations for promotions in universities to focus on practical co-operation between industry and academia;"*

The situation in other countries is similar, Morocco suggests to:

*"Create bridges and establish collaborations between Universities/Researchers;*

*Create network between Moroccan skilled researchers and poles of excellence;.*

*Organize regular meetings between ICT researchers to debate and exchange ideas and opportunities."*

Also from Morocco came a clear statement that responsibilities for a good research environment are not only on the public side:

*"The Moroccan companies have to contribute/invest to the research development."*

Egypt has been very active in the recent past in promoting ICT in the country, through newly created centres of excellence, a new university or export promotion at international fairs. Through their agency ITIDA they have also created an 'Information Technology Academia Collaboration (ITAC)' programme to help industry in product development or student graduation projects, where IT companies provide proposed subjects for graduation projects, based on market needs, and ITIDA supports these projects with a grant. Still, it was suggested to:

*"Enhance the model of ITAC of ITIDA to involve more researchers and industrial based organizations"*

#### **4.2.6 Infrastructure**

A clear consensus came out across the region that the research infrastructure is insufficient. Palestine recommends to *"Improve research capacities in terms of (a) research facilities/labs, (b) equipment, (c) resources, and (d) highly motivated and skilled researchers."*, Morocco to *"Provide Labs with ICT technical and infrastructural support, and appropriate equipments"*, Tunisia and Lebanon a general *"Improvement of the R&D infrastructure"* and Egypt to *"Develop the ICT R&D infrastructure"*.

#### **4.2.7 Access to data and information**

Access to scientific data appears to be a problem in a number of countries. This refers among others to scientific publications (despite the internet) as for example mentioned by Egypt:

*"The country suffers severe delay in receiving scientific periodicals from specialized institutions"*

A *"database of current research"* was seen as very helpful in Lebanon and Palestine, while the latter also suggested that

*"Government should encourage building proper databases to facilitate researches."*

Similarly, Tunisia saw the *"availability of bibliographical resources"* as an important improvement for the future.

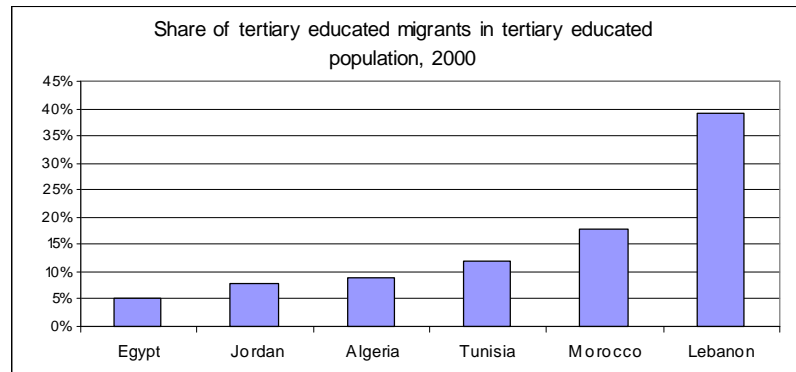
#### **4.2.8 Others**

A number of recommendations did not fit into the above categories, and some of them were addressing quite general issues, often reflecting more the current situation in the countries rather than recommending concrete steps for the future. Nevertheless, some of these statements are important to better understand the situation in the region and also to take into account for policy recommendations.

## Brain Drain

Many countries suffer under a strong brain drain, in particular those that have a well developed and recognised education system but only a small private ICT sector. Lebanon is hit very hard by this problem, it's IT industry is very small and up to now there are very limited research facilities in the country. Only recently the American University of Beirut (AUB) started with the first PhD programme but still the vast majority of graduates find it difficult to get a suitable job in the country. Once graduates leave the country, they rarely come back. In other countries in the region the situation is not as bad as in Lebanon, but also Morocco mentions the brain drain as a problem. In Tunisia graduates frequently go to France for their PhD but at least some come back to continue research work in local research centres.

One overview picture may suffice to characterise the situation:<sup>3</sup>



## 4.3 Conclusions

With respect to the purpose of this report "Co-operation with the Mediterranean Partner Countries: Priorities, Experiences, Recommendations" the question is what the EU could do to help turning these recommendations into reality.

Looking at the '**External Recommendations**' that were directed to the collaboration with Europe, the answers are quite clear:

1. Continue support activities in the MPC to create awareness about the FP7 opportunities and provide specific information about the procedures, open calls, etc.
2. Help creating Euro-Med Networks to bring the research communities from the two regions closer together.
3. Put more focus on mobility and exchange opportunities offered by the People Programme of FP7, possibly by integrating awareness activities for those into the specific ICT activities. A closer coordination between these programmes with the EC could also help.
4. Consider the launch of a specific Euro-Mediterranean Programme, possibly along the lines of EUMEDIS but with a stronger focus on sustainability.

Simplifying the procedures of the EC is not only a wish by potential MPC partners, but expressed throughout Europe as well and we understand that the EC is constantly working on this issue.

Responding to the "**Internal Recommendations**" is clearly more difficult, a number of these do not directly concern the ICT theme in FP7 but go clearly beyond that scope. Nevertheless - and also in the light of the new Mediterranean Union - a policy recommendation should be wide enough to allow room for more far-reaching policies and support, not only focusing on ICT but also targeting collaborative research - within the countries, across the region and internationally.

It is clear that the ICT theme in FP7 cannot support the development or improvement of the ICT Research and Development infrastructure in the MPC, however a successful and mutually beneficial participation of MPC organisations in the ICT Programme does indeed require an up-to-date infrastructure. In other words, if Europe is really interested in closer links with the MPC in terms of

<sup>3</sup> Brain Drain in Middle East & North Africa – The Patterns under the Surface, Çağlar Özden, UN/POP/EGM/2006/10 11May 2006

ICT Research and Development, it must also support the development of the necessary infrastructure.

Even more difficult but possibly also more important is the improvement of the education and academic Research and Development environment with appropriate Research and Development funds. In the long run it is of course the responsibility of the countries to invest the proper share of their GDP in education, R&D and technological development, but until the countries are in a position to do that, external support is necessary. Hence, the recommendation for an EU policy towards the region is to put more emphasis (and money) into higher education and Research and Development, possibly by adapting the 'European Neighbourhood and Partnership Instrument' accordingly.

# Annex: The MED-IST Consultation Questions

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## II.1 Personal Background

Please indicate the type of organization or section of the public you come from by ticking one of the following:

- Government - involved in ICT research policy
- Government - other
- ICT Research Policy Advisory Group
- Academic / Higher Education Research Organisation
- Industrial Research Organisation
- Other Business / Industry
- Citizen and society groups
- Other, please specify:

## II.2 The Current ICT research landscape

*The questions of this section aim at a clear picture of the present-day ICT research capabilities in your country in relation to the FP7 ICT research areas. For this reason, the ICT area taxonomy used here and throughout this questionnaire is based on the FP7 ICT Taxonomy as shown in Table 1 earlier.*

**Q1**– Please indicate in which of the following ICT areas research activities are currently being carried out in your country, where the term “currently” is used to cover the last five-year period. Please add and describe any additional ICT research areas and directions in the “**Other**” rows provided at the end of this table

ICT Area		Keywords	Key Activities
Pervasive & Trusted Network & Service Infrastructures	The Network of the Future	<ul style="list-style-type: none"> <li>Fixed / mobile convergence, technologies and system architectures for the Future Internet</li> <li>Interoperable, scalable, flexible and secure network environments</li> </ul>	
	Service and Software Architectures, Infrastructures and Engineering	<ul style="list-style-type: none"> <li>Service architectures, platforms, technologies, and tools for the context-aware, personalised, and dynamic composition of services</li> <li>Reliable systems with dependable QoS</li> <li>Virtualisation tools, system software, middleware &amp; network-centric operating systems</li> </ul>	
	ICT in support of the networked enterprise	<ul style="list-style-type: none"> <li>Integrated solutions for inter-enterprise interoperability</li> <li>Support for massively distributed network devices, <i>inc.</i> RFID-based systems</li> </ul>	
	Secure, dependable and trusted infrastructures	<ul style="list-style-type: none"> <li>Flexible, scalable and context-aware secure and resilient architectures / technologies</li> <li>Security in dynamic reconfigurable service architectures</li> </ul>	

ICT for Independent Living	ICT and ageing	<ul style="list-style-type: none"> <li>Systemic solutions for independent living and active ageing: tracking technologies and sensors, human activity recognition, virtual community technologies, etc</li> <li>Open systems reference architectures, standards and platforms for smart workplaces &amp; independent living</li> <li>Plug-and-play sensors, devices, subsystems and care services</li> </ul>	
	Accessible and inclusive ICT	<ul style="list-style-type: none"> <li>Self-adaptive ICT-enabled assistive systems based on non-invasive Brain-to-Computer interaction</li> <li>Immersive environments, user interfaces adaptable to people with special needs, etc</li> </ul>	

**Q2** – Please rank on a 1-3 scale (1 being the highest) the strongest three (in terms of research capacity in your country) of the above research areas. Also, please identify the specific research capacity strengths for each area, and explain why you think so. Some examples of research areas strength include research performance, quality of human resources, relevant R&D infrastructure, etc. These may reflect, in turn, research output (e.g. number of publications) or participation in international research projects, research staff qualifications (e.g. number of researches holding a PhD), etc

ICT Research Area	Key Strength(s)	Explanation
#1 —		
#2 —		
#3 —		

**Q3** – What ideas do you have about changes that should be done to improve the effectiveness and impact of the current ICT research environment in your country ?

.....

### II.3 Future ICT Research Drivers

*The main focus here is to identify key future research drivers, along with their implications for future ICT research directions. In this sense, the term “driver” represents any developments, challenges, and threats with particularly high momentum and potential impact on the economy, industry, and/or the society. Some examples include trends in the national social and economic environment, globalisation, technological developments (e.g. open standards), demographic and environmental trends, etc*

**Q4** – In your opinion, what are the three most important issues ( threats or challenges) that that will be faced by your country over the next five years, and how could these be addressed through future ICT research?

Future Research Driver (please provide brief description)	Implication(s) for Future ICT Research

### II.4 Defining the ICT Research Priorities over the Next Five Years

*This section seeks nominations for the ICT research areas where you think there are significant opportunities for the ICT research sector to excel and contribute to the national economy.*

**Q5** – Based on your answers above and the ICT area classification system used in **Q1**, please identify the top three ICT research priorities for your country over the next five years. Please justify your nominations based on your estimate of **(A)** the impact that research in the select areas could have on critical areas such as the national economy and national welfare; and **(B)** the ability of the country to deliver the necessary R&D skills and facilities, and its capacity to capture the benefits of such an impact.

In the table below, the terms used refer to

- Research & Technological Opportunities — the ability of the proposed research area to produce new technologies, the probability of creation of new applications, possibility of synergies with other research directions, probability of involvement in international co-operation, etc
- Economic Impact — the importance of this research area for GDP and market growth, impact on productivity, importance for export, etc;
- Social Impact — the importance of the research area for human health, quality of life, influence on the creation of job opportunities, etc
- Research & Technological Potential — the production potential of R&D in the proposed area, as captured by parameters such as current presence of critical mass of effort in the country, the country’s ability to deliver necessary skills and facilities, etc
- Application Potential — the potential of the relevant application sector in terms of its overall competitiveness, the support it can offer to administration or state policy, the sector’s influence on the creation and growth potential of small- and medium-sized enterprises (SMEs), etc

ICT Research Priority	Justification			
	Importance in Terms of	High	Moderate	Limited – None
Priority #1 —	Research & Technological Opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Economic Impact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Social Impact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Research & Technology Potential	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Application Potential	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>Other justification, please explain</i>			
Priority #2 —	Research & Technological Opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Economic Impact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Social Impact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Research & Technology Potential	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Application Potential	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>Other justification, please explain</i>			
Priority #3 —	Research & Technological Opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Economic Impact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Social Impact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Research & Technology Potential	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Application Potential	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>Other justification, please explain</i>			

**Q6** – For each ICT research priority identified above, please propose up to 3 finer-level, more specialised research sub-areas suitable for further research activities in your country (for example, a research sub-area in the priority area “Personal health systems for monitoring and point-of-care diagnostics” could be “remote diagnostic health services). Please explain the reason(s) for your suggestions.

ICT Research Priority	Suggested Research	Justification

## II.5 Additional Comments

**Q7** – Please add any further comments and suggestions on the future of ICT research in your country.

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