Deliverable 9

Simplified Report

MALTA – ICT RTD TECHNOLOGICAL AUDIT

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ADSL	Asymmetric Digital Subscriber Line
AVC	Avicenna Virtual Campus
B2A	Business to Administration
B2B	Business to Business
B2C	Business to Consumer
Benchmarking	A management tool that can be used to measure performance of different organisations and identify good practices.
BERD	Business Expenditure on Research and Development
CAGR	Compound Annual Growth Rate
CEDEFOP	Centre Européen pour le Développement de la Formation Professionnelle; European Centre for the Development of Vocational Training
CERME	Congress of the European Society for Research in Mathematics Education
CFL	Centre for Flexible Learning
CIP	Competitiveness and Innovation Framework Programme
CKC	Community Knowledge Centres
CMS	Content Management System
COL	Commonwealth of Learning
CCs	Candidate Countries
CoE	Centres of Excellence are public or private research and technology development organisations that have had substantial knowledge input into important (European/International) innovations that contribute to domestic value added, welfare and quality of life
DFSAE	Department for Further Studies and Adult Education
Dtie	Department of Technology in Education
DTMP	Differentiated teaching module – primary: preparing trainee teachers to respond to pupil diversity
EDEN	European Distance Learning and Elearning Network
EEA	European Economic Area
e-ID	Electronic Identification Card
ERDF	European Regional Development Fund
ESF	European Social Fund
ETC	Employment Training Corporation
eTEN	Trans-European Telecommunications Networks
EU	European Union
EU-10	The new member states joining the European Union on 1, May, 2004, except for Cyprus and Malta
EU-15	The member states of the European Union before 1 May, 2004
EU-25	The member states of the European Union before 1 January, 2007
EU-8	The new member states joining the European Union on 1, May, 2004, except for Cyprus and Malta
EU-RA	European Research Associates
EUROCALL	European Association for Computer-Assisted Language Learning
EUMEDIS	Euro-Mediterranean Information Society
FES	Foundation for Educational Services
FTZ	Fondazzjoni Temi Zammit
FDI	Foreign Direct Investment
FP	Framework Programme (for Research and Development)
GDP	Gross Domestic Product
GERD	Gross domestic expenditure on R&D. GERD can also be broken down by four sources of funding namely business enterprise, government, other national sources, abroad.
GOVERD	Government intramural expenditure on R&D
GVA	Gross Value Added
HERD	Higher education expenditure on R&D (HERD);

IDA	Interchange of Data between Administrations
Innovation	The successful production, assimilation and exploitation of novelty in the economic and social spheres" (*EC* 2003).
IP	Intellectual Property
IPR	Intellectual Property Rights
IS	Information Society
ISCED	International System of Classification of Education
ISDN	Integrated Services Digital Network
ISP	Internet service provider
IT	Information Technology
ITC	Information Technology and Communication
LEONIE	Learning in Europe: Observatory on National and International Evolution
LieDM	Development of Distance Education Network in Lithuania
LMS	Learning Management System
MCAST	Malta Council of Arts, Science and Technology
MCESD	Malta Council for Economic and Social Development
MQC	Malta Qualifications Council
MCA	Malta Communications Authority
MCAST	Malta College of Arts, Science and Technology
MIS	Management Information System
MIT	Massachusetts Institute of Technology
MITI	Ministry for Investment, Industry and Information Technology
MST	Maths, science and technology
NACE	Nomenclature of economic activities
NGO	Non Governmental Organization
NMS	New Member States, see EU-10.
NRI	Networked Readiness Index
NSO	National Statistics Office
NSRF	National Strategic Reference Framework
NUPEX	NUclear Physics Experience
NCPE	National Commission for the Promotion of Equality
NCSD	National Commission for Sustainable Development
NGOs	Non Governmental Organisations
Non-VET	Non Vocational Education and Training
NRDP	National Rural Development Plan
NRP	National Reform Programme
NSP	National Strategic Plan
NSRF	National Strategic Reference Framework
NSSD	National Strategy for Sustainable Development
ODL	Open and Distance Learning
OECD	Organisation for Economic Cooperation and Development
OER	Open Educational Resources
OTS	Off-the-shelf
OP I	Operational Programme I
OP II	Operational Programme II
OPM	Office of the Prime Minister
PPCD	Planning and Priorities Co-ordination Division
PPS	Purchasing Power Standard
PC	Personal Computer
PC	Personal Computer
PGCE	Postgraduate Certificate in Education

PIAP	Public Internet Access Points
PISA	Programme for International Student Assessment
PNPRD	Private non-profit expenditure on R&D
PPP	Public Private Partnership
PPS	Purchasing Power Standard
PBS	Public Broadcasting Services
R&D	Research and Development
R&I	Research and Innovation
ROI	Return on Investment
RPI	Retail Price Index
RTD	Research and Technological Development
RTDi	Research and Technological Development and Innovation
RTDi organisations	Organisations that generate, utilise and diffuse knowledge, providing R&D and technology services to companies and the public sector
SCI-O	Science Online
SEEQUEL	Sustainable environment for the evaluation of quality in elearning
SME	Small and Medium Sized Enterprises
SD	Sustainable Development
SMEs	Small and Medium Sized Enterprises
SPD	Single Programming Document
SWOT	Strengths, Weakness, Opportunities and Threats
TAS	Technician Apprenticeship Scheme
UoM	University of Malta
UK	United Kingdom
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UOE	Joint statistics of UNESCO Institute for Statistics, OECD, Eurostat
VET	Vocational and Education Training
VOIP	Voice over Internet Protocol
VUSSC	Virtual University for Small States of the Commonwealth

Executive Summary

As highlighted by the Lisbon Strategy, knowledge accumulated through investment in R&D, innovation and education is a key driver of long-term growth. One of the main goals of the EU's Lisbon agenda is to achieve a higher level of R&D spending. Two sub-targets for R&D spending were clearly defined in 2002: EU R&D intensity (R&D expenditure divided by GDP) was to increase from about 1.8% in the late 1990s to 3% by 2010; and two-thirds of this spending was to be funded by the business sector, the rest being funded by governments. In this regard, it is to be noted that the objective was intended to be achieved at the level of the EU, and this did not necessarily imply that it would have to apply in a similar way to each individual country. In fact, Malta's target was set at 0.75% of the GDP. Especially, in the case of small countries like Malta whose individual performance does not impinge materially on the achievement of targets at the level of the EU, deviations from such a target would be acceptable. On the other hand, the individual country would have to ensure that any such deviations would not put it at a competitive disadvantage in the EU Single Market and within the global markets.

Study Objective

The EU is not delivering on its Lisbon agenda commitment to increase its R&D-to-GDP ratio to 3% by 2010. The objective of this technical audit in the area of research and development on information society technologies in Malta is to identify a number of elements in the local scenario that will enable the release of the hidden potential for the construction of an all-inclusive and geographically balanced European Research Area (ERA).

"The ICT sector is easily the leading sector in the EU economy in both labour productivity (almost twice the whole economy average) and R&D expenditure; although its weight in the EU economy is lower than the weight of other sectors. The ICT sector is therefore the sector contributing most to the development of the EU knowledge economy."[1]

Malta's economic situation with special reference to R&D activity

Tertiary education in Malta is offered mainly by the University of Malta, which provides services for 97% of the total tertiary level student population[2]. ***The share of science and technology (S&T) graduates is 3.4%, well below the EU average of 12.9%[3]. Therefore, although the latest data[4] available by field of study shows a substantial influx of graduates into the country's economy in all areas, including those of S&T, this is not sufficient when compared to the EU average.***

S&T graduates represented 3.9% of the total labour force in 2006 compared to 4.8% of the EU27 average[5].

The economic strategies compiled by the Maltese government with direct relevance to ICT, aim for the vision of Malta as an ICT hub by becoming an ICT-driven economy and an ICT driver in the Euro-med region[6].

Chart 1 confirms that the ICT sector is indeed more important in some economies than in others, especially for countries like Malta. According to this data, most of the differences between member states are due to differences

[1] Quoted from EUR 23832 EN – 2009 The 2009 report on R&D in ICT in the European Union http://ftp.jrc.es/EURdoc/JRC49951.pdf
[2] NCHE Further and Higher Education Statistics 2008
[3] Source: EIS, 2007
[4] Source: University of Malta statistics as quoted in Malta in Figures 2008, National Statistics Office
[5] Eurostat Release No. 34/2008 EU27 R&D spending stable at 1.84% GDP in 2006, 10th March 2008
[6] Smart Island Strategy https://mitc.gov.mt/page.aspx?pageid=263

in ICT manufacturing, rather than ICT services, although ICT services also tend to be larger where ICT manufacturing is significant.

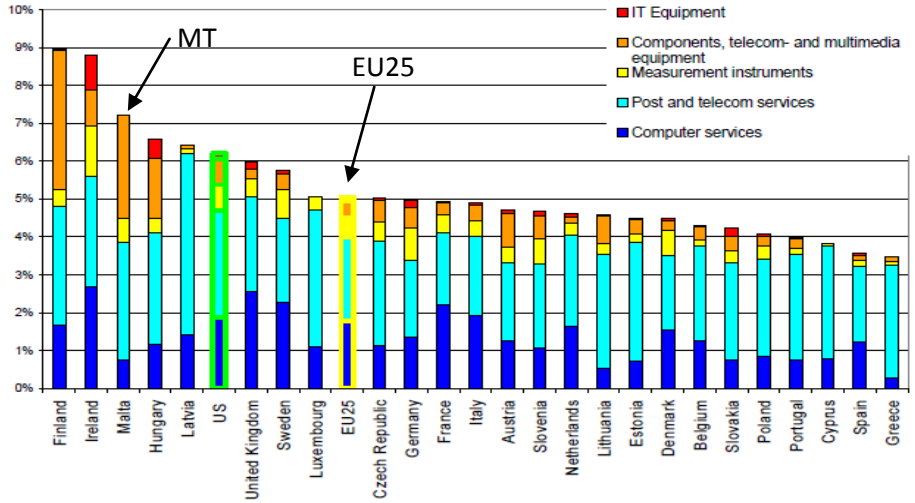

Chart 1 – Weight of the ICT sector in the economy – EU25 and US (2008) [7]

Very little data is available offering a breakdown in R&D spending by the private sector. However public expenditure on R&D as at 2009 was €11.9M, an increase of 4% over the previous year[8], the vast majority of which went to the higher education sector, mainly to the University of Malta.

In 2006, Gross Domestic Expenditure on R&D (GERD) as a percentage of GDP stood at 0.61% in Malta, which is well below the EU27 average of 1.85%.[9]

The latest figures[10] indicate that the Maltese business sector tripled its R&D expenditure in ICT between 2004 and 2005. ICT R&D expenditure relative to GDP remains lower than average, but one third (compared to 11% in the previous year) of all R&D spending goes to the ICT sector.

Review and analysis of local strategy papers related to ICT R&D

The main policy maker in ICT Research in Malta is the government in liaison with national bodies, stakeholders and organisations. Policies are formulated at Ministerial level through the Office of the Prime Minster, the Ministry of Education and Culture, the Ministry of Resources and Rural Affairs and the Ministry of Finance, Economy and Investment through collaboration and discussion with the national bodies that lie within their responsibility.

However, there is a lack of communication links between the various Ministries and the working groups lying within their responsibility.

Apart from the Intra-Governmental Committee on R&I that links the Ministries to the Cabinet of Ministers, the Malta Industrial Policy Strategy calls for an Inter-Ministerial Working Group stewarded by the Office of the Prime Minister to be set up to examine issues, which include social security taxation, the legal status of researchers, conditions of acceptance of third-country researchers so as to eliminate the barriers to researcher mobility. However we are not aware of such a Working Group having been set up.

[7] "Policy Brief: R&D Business Investment in the EU ICT Sector"; Sven Lindmark, Geomina Turlea, Martin Ulbrich
[8] National Statistics Office, 2009 Data: http://www.nso.gov.mt/statdoc/document_file.aspx?id=2793
[9] http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsc00001&plugin=1
[10] Europe's Digital Competitiveness Report; Volume 2: i2010 — ICT Country Profiles; http://ec.europa.eu/information_society/eeurope/i2010/docs/annual_report/2009/sec_2009_1060_vol_2.pdf

The task of improving Maltese participation within FP7-ICT Theme calls is a task that could very well be taken up by such a working group where the various ministries together with representatives from the operational national bodies will have the opportunity to tackle the obstacles that are hindering Malta's complete participation and implement actions to overcome them.

Also, there seems to be a lack of a driver or champion which pushes forward the specific needs of ICT R&D activities in a consistent manner in the national agenda in Malta. This in part reflects the insufficient resources and lacking technical capabilities in a number of institutions which could be tasked with such a mission.

The two main strategies defining Malta's performance in ICT R&D are **The National Strategic Plan for Research and Innovation 2007-2010** and **The Smart Island – National ICT Strategy for Malta 2008-2010**. These strategies have been reviewed and discussed through the technical desk review of local strategy papers together with other papers including the MITA Strategic Plan 2009 – 2012, Malta's National e-Learning Strategy 2008-2010, Malta's E-Health and E-Government Visions and Strategies, Industry Strategy for Malta 2007-2010, National Strategic Reference Framework 2007-2013, Malta National Reform Program 2008-2010, Quality Assurance Framework for Further and Higher Education in Malta and the National Broadband Strategy.

The desk review of the major studies and strategy papers published in the field of ICT R&D indicates that there are a number of strategic policy initiatives which could actually be conducive to ICT R&D in Malta. On the other hand, a unified approach towards actually developing ICT R&D as a key economic driver in Malta, which is consistent and coherent and which would be conducive to the implementation of measures and initiatives in this regard, is at this stage lacking. Various recommendations and suggested actions to improve this situation are detailed in Section 3 of this report.

Review of published works from local ICT R&D players

A number academic institutions, governmental bodies, commercial entities and individual researchers are involved in ICT R&D activity in Malta.

- **Public Bodies**

  Public expenditure on R&D in 2009 amounted to €11.9M.[11] The vast majority of this expenditure is utilised to fund the University of Malta (UoM) which falls under the Government's direct expenditure. According to official data[12], in 2009, a total of 954 employees were engaged in research work. However, the number of researchers with a PhD in the natural sciences and engineering lag behind.[13]

  Government R&D is carried out mainly by the UoM plus a number of public institutes, including MITA.[14]

- **Academic Institutions**

  The bulk of the research activity in academia takes place at the UoM which aims to maintain and confirm its place as a research-intensive institution.

  R&D activity in the ICT field is carried out within the Faculty of ICT in the areas of Artificial Intelligence, Communications & Computer Engineering, Computer Information Systems and Computer Science, and at the Faculty of Engineering in the areas of Electronic Systems Engineering, Industrial & Manufacturing Engineering, Systems and Control Engineering and Microelectronics & Nanoelectronics.

[11] National Statistics Office, 2009 Data: http://www.nso.gov.mt/statdoc/document_file.aspx?id=2793
[12] National Statistics Office, 2009 Data: http://www.nso.gov.mt/statdoc/document_file.aspx?id=2793
[13] European Commission (2008) 'ERAWATCH Research Report for Malta', European Commission
[14] "The gender challenge in research funding - assessing the European national scenes Malta"; Debbie Millard and Louise Ackers (May 2008); http://ec.europa.eu/research/science-society/document_library/pdf_06/malta-research-funding_en.pdf

- **Commercial Entities**

  The desk review process for reviewing ICT R&D published works, has also identified a number of commercial entities that are active in the field. Whereas, in a number of cases the authors could find reference and highlights of the R&D activity being pursued, although limited in detail, in the majority of cases it was observed that many organisations do not showcase their research efforts online. This is usually due to the sensitive nature of the research which is intended to lead to commercialisation.

For a country of its size, Malta shows very good promise in ICT R&D as shown by the substantial amount of ICT R&D projects that have been undertaken or are in progress. A substantial amount of R&D projects are also being undertaken within the private sector, however it seems that most of these efforts remain isolated and fragmented, and not aimed at establishing critical mass but rather competitive advantage.

The reality is that until Malta starts dedicating more substantial funding for research and research grants, while encouraging more PhD students, it will be difficult for research institutes to be able to amass the necessary critical mass for the establishment of Centres of Excellence to the same level as those found in the old Member States and other developed countries.

However the potential is certainly there especially in niche ICT areas like e-government, artificial intelligence, semantics and digitisation to name a few. The establishment of various ICT R&D schemes offered by the MCST and Malta Enterprise in the form of competitive R&D investment seem to be reaping results, especially in establishing working links between industry, academia and the public sector but certainly more can be done.

Analysis of Malta's participation in FP6-IST and FP7-ICT

The Sixth Framework Programme contributed circa €10M to Maltese entities during 2002-2006, and was particularly successful in receiving funding from the 'Information society technologies' (over €2.6M); 'Sustainable development, global change and ecosystems' (over €1M); 'Aeronautics and space' (over €1M) and 'Horizontal research activities involving SMEs' (over €900k) priority areas. In FP6 IST (Information Society Technologies) Thematic priority. A total of 126 Maltese organisations participated in 111 FP6 projects, which amounts to 1.1% of the total projects submitted, with the total funding received in FP6-IST being slightly over €2.6M.

When comparing Malta's participation in FP6-IST to EU25, EU15 & EU12, in all three cases Malta places last. The indications are that this is most probably due to the size of the country. In fact, most small member states score in the same manner. The eight countries with lowest number of participation in retained projects are all smaller member states. Therefore, it seems fair to argue that there is a clear link between the country size and its capacity to participate in FP.

In FP7-ICT, Maltese partners participated in a total of 40 proposals and Maltese organisations received funding for 6 projects, with the total funding requested for successful projects in FP7-ICT estimated at circa €1.5M. This results in the highest per capita participation in the accession states.[15]

Within the EU27, Malta stands in third place from last with regards to the amount of approved projects within FP7-ICT while within the EU15 and EU12 Malta stands in last place

In all the comparison scenarios, it has to be noted that the least performing eight countries in the list are in fact the smallest of the EU Member States, both in terms of population and geographical size.

[15] http://www.independent.com.mt/news.asp?newsitemid=97630

In conclusion it can be noted that following the same observations being made in both FP6-IST and FP7-ICT, strengthens the argument that the size of the Member State has an obvious impact on the country's participation capacity in FP. Following this argument, it can be stated that Malta, being the smallest Member State, and in fact a micro state, might find more difficulties to participate in FP than the other countries.

A number of recommended actions that are aimed at improving participation of local ICT R&D stakeholders within FP program calls are detailed in Section 5.3. These address the areas of National Funding, S&T Graduates, ICT Infrastructure, Venture Capital and Business Incubation, SME & Academia, R&D and Entrepreneurship Culture, National Support Structures, Political Support and Policy, International Promotion of Local Organisations and Local Clustering.

On an EU level, recommendations are also detailed in Section 5.3 addressing issues of Smallness of local private R&D players, Opportunities for highly focused R&D projects, Simplification of application process within FP calls and Improved Payment Terms

Review and analysis of Malta's ICT infrastructure

E-infrastructures are defined as next generation transnational ICT research and education infrastructures that provide researchers with a controlled, secure, seamless, easy and economical access to shared science and engineering resources, through a fully integrated and advanced information and communication infrastructure. With regards to the existing and planned physical and educational ICT research infrastructures in Malta, and any relevant support schemes it can be observed that:

- **Physical Infrastructure**

  With the Maltese Government having prioritised IT in its agenda for more than two decades, Malta has progressed in leaps and bounds from its infancy stage to a fully fledged leader in all aspects of the ICT spectrum, both according to local and international standards. Section 6.1 of this report gives an overview of the local broadband infrastructure, the UoM IT Services Centre, IPV6, Super Computer Cluster, SmartCity Malta, Living Labs, ICT Cluster of Excellence, GIS Alliance, BPO, business incubation centres, Malta National Laboratory and i-Gaming infrastructures.

  In general it can be said that Malta has created a reliable physical ICT infrastructural set-up which forms the core of ICT research infrastructure available.

- **Academic Infrastructure**

  The academic infrastructure which enables the release of potential from the physical infrastructures available in the country is mainly provided by the UoM and MCAST whose source of funding is through the Ministry for Education, Culture, Youth & Sports. Collaborative entities in this area include the MCST which is the principal agency on S&T policy, the NCHE which is a consultative and advisory body to government on the higher and further education sectors and ME through co-financing of a number of research projects.

  Unfortunately an important factor impeding the establishment of Centres of Excellence is the lack of researchers and PhD students /graduates. It is foreseen that the new Faculty of ICT which is currently under construction will adequately provide the ICT infrastructure and drive for both the current ICT faculty to grow and conduct R&D; and to support more PhD students who wish to continue their ICT studies locally.

Section 6.3 of this report details a number of suggested actions aimed at exploiting the full potential of ICT collaboration and research.

Centres of Excellence for ICT R&D in Malta

The following lists detail the Maltese organisations / individuals who are active in ICT R&D and that have been classified into Centres of Excellence, National Centres of Excellence and Potential Centres of Excellence according to the classification criteria described in Section 1.4.

Centres of ICT R&D Excellence

	Organisation	Website	Objective Number of ICT RTD fields of excellence (in accordance with FP7 – ICT Themes ICT-2009)
PUBLIC BODIES	Faculty of ICT	www.um.edu.mt/ict	1.1/1.2/1.3/1.4/1.5/1.6/2.1/2.2 3.1/3.2/3.3/3.4/3.5/3.6/3.7/3.8/3.9 4.1/4.2/4.3/5.1/5.2/5.3/5.4 6.1/6.2/6.3/6.4/6.5/7.1/7.2/7.3 8.0/8.1/8.2/8.3/8.4/8.5/8.7/8.8/8.9/8.10
	Faculty of Education	www.um.edu.mt/educ	4.1/6.1
	Faculty of Engineering	www.um.edu.mt/eng	2.1/2.2/3.4/5.1/5.2/5.3/5.4 6.1/6.2/6.3/6.4/6.5/7.1/8.3/8.4/8.5/8.6/8.8
	Heritage Malta	www.heritagemalta.org/	1.2/1.5/4.1/4.2/4.3/6.4/7.3
	MITA (Malta Information Technology Agency)	www.mita.gov.mt/	1.2/1.3/1.4/1.6/4.1/4.2/4.3/5.1/7.3
INDUVIDUAL RESEARCHERS	**University of Malta**		
	Prof Juanito Camilleri UoM Rector	www.um.edu.mt/about/uom/administration	1.1/1.2/1.3/1.4/1.5/1.6/2.1/2.2 3.1/3.2/3.3/3.4/3.5/3.6/3.7/3.8/3.9 4.1/4.2/4.3/5.1/5.2/5.3/5.4 6.1/6.2/6.3/6.4/6.5/7.1/7.2/7.3 8.0/8.1/8.2/8.3/8.4/8.5/8.6/8.7/8.8/8.9/8.10
	Faculty of ICT, UoM		
	Dr Ernest Cachia Faculty Dean	www.um.edu.mt/ict/cs/staff/Dr.ErnestCachia	1.1/1.2/1.3/1.4/1.5/1.6/2.1/2.2 3.1/3.2/3.3/3.4/3.5/3.6/3.7/3.8/3.9 4.1/4.2/4.3/5.1/5.2/5.3/5.4 6.1/6.2/6.3/6.4/6.5/7.1/7.2/7.3 8.0/8.1/8.2/8.3/8.4/8.5/8.7/8.8/8.9/8.10
	Dr Gordon J. Pace Department of Computer Science	www.um.edu.mt/ict/cs/staff/Dr.GordonPace	1.1/1.4/3.2/3.4/3.6/4.2/6.4/8.0/8.2/8.3/8.4/8.8/8.9/8.10
	Dr Adrian Francalanza Department of Computer Science	www.um.edu.mt/ict/cs/staff/Dr.AdrianFrancalanza	2.2/3.6/4.3/7.2/8.1/
	Dr Kevin Vella Department of Computer Science	www.um.edu.mt/ict/cs/staff/Dr.KevinVella	1.2/1.3/1.6/2.1/3.1/3.5/3.6/4.1/4.3/5.1/5.2/5.4/6.1/6.2/6.3/6.5/7.1/7.3/
	Christian Colombo Department of Computer Science	www.christiancolombo.com/	3.4/3.5/3.6
	Dr Vitězslav Nezval Department of Computer Information Systems	www.um.edu.mt/ict/cis/staff/vn	1.1/1.2/1.3/1.4/1.5/1.6/2.2/5.2/7.2/8.8
	Professor Albert Leone Ganado Department of Computer Information Systems	www.um.edu.mt/ict/cis/staff/alg	1.1/1.5/1.6/2.2/5.2/
	Mr Mike Rosner Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/staff/Mr.MikeRosner	1.1/1.2/1.3/1.4/1.5/1.6/2.2/3.5/3.6/4.1/4.3/5.2/7.2/8.4/8.5/8.8
	Dr John Abela Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/staff/Dr.JohnAbela	3.6/8.4/8.5/8.8
	Dr Matthew Montebello Department of Intelligent Computer Systems	staff.um.edu.mt/mmon1/	1.1/1.2/1.4/1.5/3.5/8.4/8.5/8.8
	Dr Chris Staff Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/staff/Dr.ChrisStaff	1.2/4.1/4.3/7.2/
	Dr Alexiei Dingli Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/staff/Dr.AlexieiDingli	1.1/1.2/1.3/1.5/1.6/2.2/5.2/8.4/8.5/8.8
	Prof Ing Paul Micallef Department of Communications & Computer Engineering Faculty of ICT	www.um.edu.mt/ict/cce/staff/paulmicallef	1.2/1.3/1.5/1.6/2.2/3.4/3.5/3.6/4.1/4.3/5.3/8.1/8.4/8.8

	Dr Ing Victor Buttigieg Department of Communications & Computer Engineering	www.um.edu.mt/ict/cce/staff/victorbuttigieg	1.2/1.3/2.2/3.4/3.6/8.1/8.4/
	Dr Ing Carl J. Debono Department of Communications & Computer Engineering	www.um.edu.mt/ict/cce/staff/carldebono	1.6/3.5/5.3/
	Dr Adrian Muscat Department of Communications & Computer Engineering	staff.um.edu.mt/amus1/	3.4/3.5/3.6
	Dr Ing Saviour Zammit Department of Communications & Computer Engineering	www.um.edu.mt/ict/cce/staff/saviourzammit	1.5/4.1/4.3/
	Mr Reuben Farrugia Department of Communications & Computer Engineering	www.um.edu.mt/ict/cce/staff/reubenfarrugia	4.1/4.3/8.8/
	Prof Joseph Micallef Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/staff/joseph	1.4/2.2/3.1/3.2/3.3/3.4/3.7/3.8/3.9/5.1/5.2/5.3/5.4/7.2/8.2/8.4/8.7/8.8
	Ing Ivan Grech Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/staff/ivan	3.1/3.2/3.3/3.4/3.7/3.8/3.9/5.1/
	Dr Edward Gatt Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/staff/edward	2.2/5.2/5.3/5.4/7.2/8.2/8.4/8.7/8.8
	Mr Owen Casha Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/staff/owen	1.4
	Faculty of Engineering, UoM		
	Prof Cyril Spiteri Staines Dept of Industrial Electrical Power Conversion	www.eng.um.edu.mt/~cjspit/	3.4/6.1/6.2/6.3/6.4/6.5/8.4/
	Prof Ing Simon Fabri Department of Systems & Control Engineering	www.eng.um.edu.mt/~sgfabr/	2.1/2.2/3.4/5.1/5.2/5.3/5.4/7.1/8.3/8.4/8.5/8.6/8.8
	Prof Ing Kenneth Camilleri Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/staff/kennethcamilleri	2.1/2.2/3.4/5.1/5.2/5.3/5.4/7.1/8.3/8.4/8.5/8.6/8.8
	Faculty of Education, UoM		
	Dr Suzanne Gatt	www.educ.um.edu.mt	4.1/6.1
	Malta Council for Science and Technology		
	Dr Nicholas Sammut Chairman	www.mcst.gov.mt/page.aspx?id=51	5.1/5.2/5.3/5.4/6.3/7.1/7.2/7.3
	Dr Brian Warrington CEO & FP7 National Coordinator	www.mcst.gov.mt/page.aspx?id=51	5.1/5.2/5.3/5.4/6.3/7.1/7.2/7.3
	IPv6 Task Force Malta		
	Ing Clara Delia Chairperson	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6
	Mr. Dave Mifsud Computer Services Centre, University of Malta	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6/4.1/4.2/4.3
	Mr. Robert Sultana Malta Internet Foundation & UoM	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6
	Ing Francis Farrugia Malta Standards Authority	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6
	Mr Kenneth Ciangura GO mobile	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6
	Ing. Conrad Chircop	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6

	Air Malta plc		
	Ing. Arthur Pace Maltacom plc	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6
	Dr. Ing. Saviour Zammit Techinvest Ltd	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.5/4.1/4.3/
	Ing. Mark Ebejer Vodafone Malta Ltd	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6
	Ing. Mark Pace Balzan Engineer Melita Cable plc	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6

National Centres of ICT R&D Excellence

	Organisation	**Website**	**Objective Number of ICT RTD fields of excellence (in accordance with FP7 – ICT Themes ICT-2009)**
PUBLIC BODIES	Diplo Foundation	www.diplomacy.edu	1.2/1.6/4.3/7.3/8.10
	Euro-Mediterranean Initiative for Technology and Innovation (EuroMedITI)	www.euromediti.com	1.1/1.3/1.4/1.6/3.4/3.5/3.6/4.1/8.0/8.4/8.5/8.8/8.9
	International Ocean Institute Malta Operational Centre (IOI MOC)	www.capemalta.net/ioimoc	
	Malta College of Arts, Science & Technology (MCAST)	www.mcast.edu.mt	2.1/3.4
	The Commonwealth Network of IT for Development (COMNETIT)	www.comnet-it.org	1.3/7.3/8.9

Centres of ICT R&D Competence (Potential Centres of Excellence)

	Organisation	**Website**	**Objective Number of ICT RTD fields of excellence (in accordance with FP7 – ICT Themes ICT-2009)**
PUBLIC BODIES	Fondazzjoni Temi Zammit (FTZ)	www.ftz.org.mt	1.1/1.6/4.2/6.1/6.5/7.3/8.0/8.9/8.10
	Foundation for Information Technology Accessibility (FITA)	www.knpd.org/mittsfita	2.2/4.1/4.2/6.2/7.1/7.2/7.3
	Living Lab EuroMediti	www.euromediti.com	1.1/1.3/1.4/1.6/3.4/3.5/3.6/4.1/8.0/8.4/8.5/8.8/8.9
	Malta Council for Culture and the Arts – The Caravaggio Foundation	www.maltaculture.com	4.1
	Malta Communications Authority (MCA)	www.mca.org.mt	1.1/1.2/1.3/1.4/1.5/1.6
	Malta Resources Authority	www.mra.org.mt	6.3/6.4/6.5
	Maltese Association of Gerontology & Geriatrics	www.um.edu.mt/eurgeront/magg	7.1/7.2
	MEPA	www.mepa.org.mt	1.2/1.5/4.1/4.2/4.3/6.1/6.3/6.4/7.2/7.3
	Superintendence of Cultural Heritage	www.culturalheritage.gov.mt	4.1
	The Department of Technology in Education	www.education.gov.mt	4.2
	UoM IT Services Centre	www.um.edu.mt/itservices	1.1/1.2/1.3/1.4/1.5/1.6
PRIVATE ORGANISATIONS	Abertax Quality Ltd	www.abertax.com	5.1/2.1//6.2
	Across Limits	www.acrosslimits.com	4.1/4.2/4.3/5.1/5.2/7.1/7.2
	AIS - Advanced Industrial Systems Ltd	www.ais.com.mt	3.4/3.5/3.6
	All Secure International	www.asiops.com	1.2/1.4
	Allied Newspapers Ltd	www.progresspress.com.mt	1.2
	Ascent Software Ltd	www.ascent.com.mt	1.1/1.2/1.3/1.4/2.1/2.2/4.1/4.2/4.3/5.1/5.2/5.3/5.4/6.1/6.2/6.5/7.1/7.3/8.2/8.4/8.6
	Charonite Ltd	www.charonite.com	1.1/1.2/1.4/1.6/2.2/3.4/3.6/3.9/4.1/4.3/6.2/7.1/7.2/7.3/8.2/8.3
	Computer Domain Ltd	www.computerdomain.net	1.1/1.3/1.6/4.1/4.3
	Computime Ltd	www.computime.com.mt	1.2/1.3/1.4/1.6/2.2/
	Crimsonwing Malta Ltd	www.crimsonwing.com	1.1/1.2/1.3/1.4/1.5/1.6/2.2/4.3/5.2/
	Cyberspace Solutions Ltd	www.cyberspace.com.mt	1.2/1.3/1.5/4.1/4.2/4.3/5.1/5.2/5.3/5.4/6.1/6.2/6.3/6.4/6.5/7.1/7.2/7.3
	Datatrak Holdings plc	www.datatrak.ws	1.2/4.3/6.1/7.2
	Electronic Systems Design Ltd	www.esdl.com.mt	4.3/6.5/7.3

	Engineria	www.engineria.com	2.1/3.5/3.6
	Exigy Ltd	www.exigy.com	1.1/1.2/1.3/1.5/2.2/3.6/4.2/4.3/7.3
	Global IT Solutions	www.adesign.com.mt	1.1/1.2/1.3/1.5/1.6/4.3/5.1/6.1/6.2/7.1/7.2/7.3/8.0/8.7/8.8
	GO plc	www.go.com.mt	1.2/6.1
	HOB Software Malta	www.hobsoft.com	1.1/1.2/1.3/1.4/3.6/4.3/
	ICON	www.icon.com.mt	1.1/1.2/1.5/4.1/7.3
	Information Systems Ltd	www.progressive.com.mt	5.1/5.2
	Integrated Resources Management Co Ltd	www.environmentalmalta.com	3.5/6.4
	Ixaris Systems Ltd	www.ixaris.com	1.2/1.4/4.3/7.3
	Malta Industrial Innovation for SMEs (MIIS)	www.miis.com.mt	2.1/2.2/3.1/3.2/3.4/3.5/3.6/3.9/4.1/4.2/4.3/6.1/6.2/6.3/6.4/6.5/7.1/7.2/7.3/8.0/8.1
	Megabyte Ltd	www.megabyte.net	1.2/1.3/4.1/4.3/5.1
	Methode Electronics Malta Ltd	www.methode-eur.com	1.4/2.1/3.4/3.5/6.1/
	onNeutral	www.onNeutral.com	1.2/1.4/3.6
	Philip Toledo Ltd (PTL)	www.ptl.com.mt	1.2/4.3
	Paragon Ltd	www.paragoneurope.eu	1.3/4.1/6.3/7.1/7.2/7.3
	Prochrony Systems Ltd	www.prochrony.com	1.2/1.3/1.5/2.2/3.4/3.6/4.2/4.3/5.1/5.2/
	Projects in Motion Limited	www.pim.com.mt	1.3/2.1/4.1/4.2/4.3/6.3/6.4/7.2
	RS2 Software plc	www.rs2.com	1.2/1.3/3.6/7.3
	Seasus	www.seasus.com	1.1/1.2/1.3/1.4/1.5/1.6/4.1/4.2/4.3/6.2/7.2/7.3
	Shireburn Software Ltd	www.shireburn.com	1.2/1.3/1.4/4.3/7.3
	St James Hospital	www.stjameshospital.com	5.1/5.2
	Strategyworks Ltd	www.strategyworks.net	1.2/4.3
	STMicroelectronics Malta	www.st.com	3.1/3.2/3.3/3.7/3.8/3.9/8.6/8.7
	Technology (Malta) Ltd	www.technologymalta.eu	1.2/3.2/3.4/3.5/3.6/3.9/5.1/5.2/6.3
	Transactium Ltd	www.transactium.com	1.2/1.3/1.4/3.4/7.2
	World Match Ltd	www.worldmatch.com.mt	1.2/1.5/1.6

Malta's ICT RTD capabilities and competences – Survey Results

A total of over 350 entities were contacted and invited to participate in a DELPHI-based structured survey seeking to identify the competences of local ICT R&D players and to gather their impressions and suggested actions as regards to their participation within FP calls. The survey seeks to gather views about the potential of various IST application areas to contribute to EU goals, the key players within these areas, the particular types of application that are most promising and where EU capabilities were strongest, together with the problems and barriers that are faced, impeding performance to EU required levels.

A full list of the players split by their competences in line with the FP7-ICT Theme Challenges and Objectives can be found in ANNEX V and a full description of the survey methodology is provided in Report 6 pertaining to this technical study.

Chart 2 illustrates the size of the expert base per FP7-ICT Theme Challenge as identified following the execution of the survey. The chart contains a further split between private or public organizations or individuals performing ICT research per Theme Challenge.

In five out of the eight FP7-ICT Theme Challenges, it was seen that the majority of expertise lies with the individual researchers and thus within the Faculties at the UoM where these persons perform their R&D activity.

From an overall perspective, it can be concluded that ICT R&D activity in Malta is well distributed among the various FP7-ICT Theme challenges and objectives.

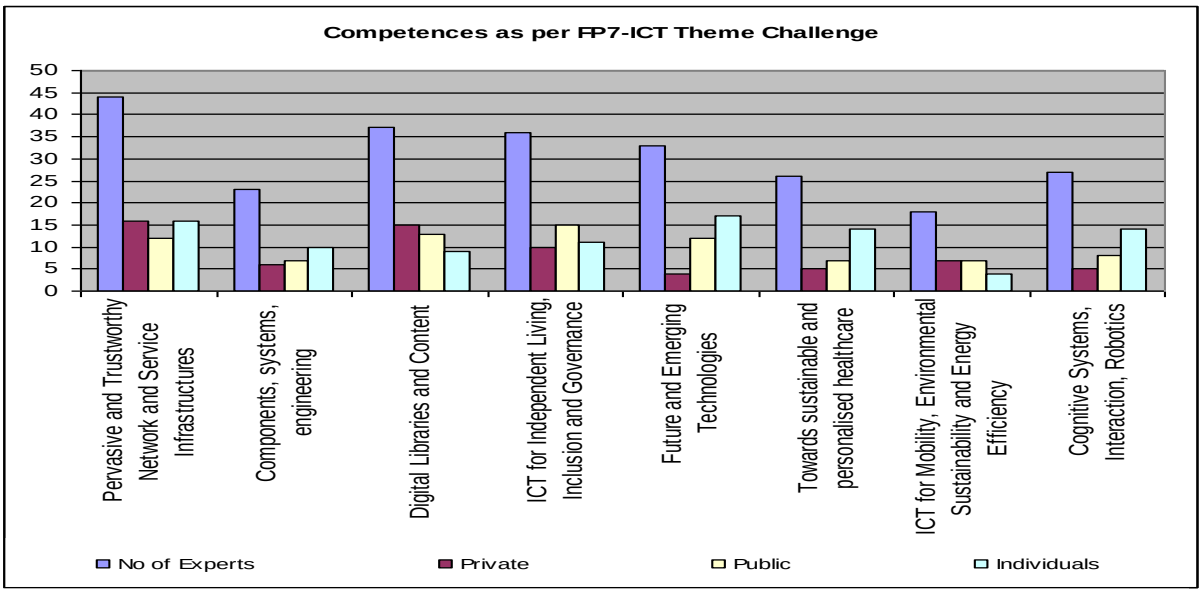

Chart 2 – Split of identified competences among FP7-ICT Theme Challenges

The competence/share matrix detailed in Table 1 shows that for most of the FP7 objectives, Maltese entities qualified as low competence – low share. However, one has to point out that Maltese entities have high competence in a good number of topics - namely internet of services, intelligent information management, ICT for governance and internet of things - even though these exist with a low share. This might explain why these competences have not been put to practice within FP7 as yet. Maltese entities seem to have the highest competence and highest share in digital libraries and technology enhanced learning.

Objective Number	High Competence - Low Share	Entities that claim competence	Entities that actually participated in FP6/FP7 thematic areas		Objective Number	High Competence - High Share
ICT-2009.1.2	Internet of Services, Software and Virtualisation	16	0		ICT-2009.4.1	Digital libraries digital preservation
ICT-2009.4.3	Intelligent Information Management	14	0		ICT-2009.4.2	Technology enhanced learning
ICT-2009.7.3	ICT for Governance and Policy Modelling	11	0			
ICT-2009.1.3	Internet of Things and Enterprise environments	11	0			
ICT-2009.1.1	The Network of the Future	9	0			
ICT-2009.7.2	Accessible & assistive ICT	8	1			
ICT-2009.1.6	Future Internet experimental facility and experimentally driven research	8	0			
ICT-2009.5.1	Personal health systems	7	1			
ICT-2009.1.4	Trustworthy ICT	6	0			
	Low Competence - Low Share					**Low Competence - High Share**
ICT-2009.1.5	Networked Media and 3D Internet	5	0			
ICT-2009.6.4	ICT for env services	4	1			
ICT-2009.7.1	ICT & aging	4	1			
ICT-2009.5.2	ICT for Patient Safety	4	0			
ICT-2009.3.5	Engineering of Networked Monitoring and Control systems	4	0			
ICT-2009.3.6	Computing Systems	4	0			
ICT-2009.2.1	Cognitive systems and robotics	3	1			
ICT-2009.5.3	Virtual Physiological Human	3	0			
ICT-2009.2.2	Language-Based Interaction	3	0			
ICT-2009.6.1	ICT for Safety and Energy Efficiency in Mobility	3	0			
ICT-2009.6.2	ICT for Mobility of the Future	3	0			
ICT-2009.6.3	ICT for Energy Efficiency	3	0			
ICT-2009.6.5	Novel ICT Solutions for Smart Electricity Distribution Networks	3	0			
ICT-2009.8.0	FET-Open: Challenging Current Thinking	3	0			
ICT-2009.8.9	Coordinating Communities, Plans and Actions in FET Proactive Initiatives	3	0			
ICT-2009.8.10	Identifying new research topics, Assessing emerging global S&T trends in ICT for future FET Proactive initiatives	3	0			
ICT-2009.5.4	International Cooperation on Virtual Physiological Human	2	0			
ICT-2009.3.4	Embedded Systems Design	2	0			
ICT-2009.8.4	FET proactive 4: Human-Computer Confluence	2	0			
ICT-2009.8.6	FET proactive 6: Towards Zero-Power ICT	2	0			
ICT-2009.3.1	Nanoelectronics Technology	1	0			
ICT-2009.3.2	Design of Semiconductor Components and Electronic Based Miniaturised Systems	1	0			
ICT-2009.3.3	Flexible, Organic and Large Area Electronics	1	0			
ICT-2009.3.7	Photonics	1	0			
ICT-2009.3.8	Organic Photonics and Other Disruptive Photonics Technologies	1	0			
ICT-2009.3.9	Microsystems and Smart Miniaturised Systems	1	0			

Table 1 – Competence Share Matrix for Malta ICT R&D as per FP7-ICT Theme Objective

Up to the present date, trends for Malta show a modest participation rate in the FP programme. However closer analysis of these undertaken projects, shows clearly that Maltese FP participants are not involved in high end projects that require substantial infrastructure. Consequently, improving the research infrastructures as proposed in the R&I Plan could increase even further Malta's FP participation in R&D Collaborative Projects (IPs and STREPS).

Barriers to FP Participation

The execution of this technical study has identified a number of barriers that are impeding Malta's improved participation within the FP program. The participants to the study's survey have identified the main barriers that they were actually faced with when going through the process of applying for a project to one of the FP calls. These barriers are listed in Table 2.

Barriers faced when applying for FP calls	% of participants
Administrative complexity of running a project	32%
Insufficient financial resources for starting a project	28%
Difficulty to find a reliable and competent partner	17%
Insufficient awareness of the programme	13%
Insufficient understanding of programme conditions	10%

Table 2 - Major barriers to participating in FP program calls (identified by survey participants)

Furthermore, the following are the main barriers that have been identified by the authors through the compilation and execution of the study.

Area	Barrier
Strategic Planning	Lack of a single cohesive strategy document specifically designed to cater for the needs of ICT R&D activity in particular.
	Lack of communication links between the various Ministries and the working groups lying within their responsibility.
	Lack of a driver or champion which pushes forward the specific needs of ICT R&D activities in a consistent manner in the national agenda in Malta.
	Insufficient resources and lacking technical capabilities in a number of national institutions.
	Lack of funds for the MCST to be in a position to deliver its remit in the near future, both in terms of its recurrent budget and staff resources.
	No published timeline / plan of action for the implementation of the MITA Strategic Plan actions.
	Lack of funding for research and research grants.
ICT R&D Activity	Academic staff at the UoM have a heavy lecturing load leaving them little time to dedicate to R&D.
	Lack of national funds for laboratory equipment to be utilised within the UoM Faculties.
	Lack of PhD students and graduates in the area of ICT.
FP Participation	Insufficient funding available for financing submission and participation to FP.
	Insufficient understanding of the FP rules amongst the private sector.
	Difficulty in finding reliable and competent partners for a project submission.
	Problematic communication with project partners.
	Difficulty in keeping within budget throughout the duration of the project.
	Smallness of the organisations is a disadvantage for being accepted in project teams.
	Limited access to high-tech equipment.
	Limited professional contacts.
	SMEs lack researcher human capital.
	Lack of awareness about FP and the opportunities it presents among private and public entities.
	Participation in FP considered time consuming, risky and complicated.

	Fear of excessive bureaucracy and delays from the Commission.
	Expense of submitting a rejected proposal.
	Intellectual property risks.
	Low support from national research infrastructure.
	Complex administration process
	Lack of national funds and venture capital for research.

Table 3 - Major barriers to participating in FP program calls (identified by authors)

SWOT Analysis for Malta's participation in FP

By means of a SWOT analysis, the study aimed to identify the strengths and weaknesses of the local ICT R&D players, and to identify target areas that need to be addressed in order to enable the release of Malta's hidden potential and allow for an increased participation within FP.

STRENGTHS

1. FP-ICT Theme topics are in line with business research interests
2. Flexibility of local organisations
3. Sound national ICT infrastructure
4. Existing areas of expertise
5. University of Malta has a strong potential for FP participation

WEAKNESSES

1. Insufficient funding available for financing submission and participation to FP
2. Insufficient understanding of the FP rules
3. Difficulty in finding reliable and competent partners
4. Problematic communication with project partners
5. Difficulty in keeping within budget throughout the duration of the project
6. Smallness of the organisations is a disadvantage for being accepted in project teams
7. Limited access to high-tech equipment
8. Limited professional contacts
9. SMEs lack researcher human capital

OPPORTUNITIES

1. Increased funding for R&D activity
2. New knowledge of methods and techniques in the respective ICT area
3. Improving an existing product
4. Increased market and contact base

THREATS

1. Lack of awareness about FP and the opportunities it presents among private and public entities
2. Participation in FP considered time consuming, risky and complicated
3. Fear of excessive bureaucracy and delays from the Commission
4. Expense of submitting a rejected proposal.
5. Intellectual property risks
6. Low support from national research infrastructure
7. Lack of national funds and venture capital for research
8. Complex administration process

Although this exercise has highlighted an imbalance between the strengths and opportunities versus the threats and weaknesses involved in Malta's participation within the FP7-ICT Theme projects, with the threats and weaknesses outweighing the strengths and opportunities, the authors still consider participation in FP as beneficial to local organisations and something which we must strive to achieve.

Suggested actions to maximise participation

A number of concrete actions have been suggested throughout the compilation and execution of the study. A summary of all actions suggested at a local level and also at an EU level are provided in Table 4 and Table 5 respectively.

Target Area	Action	Responsible
ICT R&D Strategic Policy Initiatives	▫ To create a unified approach towards actually developing ICT R&D as a key economic driver in Malta, which is consistent and coherent and which would be conducive to the implementation of measures and initiatives. This approach would be the main driver for progress supported by the various strategic policy initiatives that have been reviewed in this study.	OPM, MCST, ME
	▫ Increased political commitment to assist the national bodies and stakeholders in implementing the strategies.	OPM
	▫ Better planning and dissemination on the National Investment Programmes will be necessary to see the tangible shift towards value added R&I and critical mass from industry towards the EU's 3% of GDP target for R&D. Also, a targeted Innovation Policy could certainly provide more support and direction towards R&D in general.	MCST
	▫ Increased R&D performance can only be brought about through increased funding. The target set out by MCST is based on specific targets and performance goals and should be the road plan to be followed by the government for increased funding for R&D-related activity.	OPM, MCST
	▫ To formulate a single cohesive strategy document specifically designed to cater for the needs of ICT R&D activity in particular. This document should set the base for a unified approach for ICT R&D developments, for R&D support facilities offering services to academia and industry, and for support mechanisms for participation in EU funded programmes.	MCST, MITA, ME, Malta Chamber, OPM
	▫ To formulate a national framework of regulations for R&D activity with regards to the execution of the activity per se, the funding allocation for the research activity, scientific collaborations both locally and internationally, industry-academia collaboration, etc.	ME, UoM, MCST, MITA, Malta Chamber, OPM
National Funding	▫ To increase the national funding for R&D activity in line with the MCST recommendation of 0.75% of GDP.	OPM, UoM, MCST
	▫ To target and intensify R&D funds with an increased focus in thematic areas of importance to the national economy.	MCST, UoM
	▫ To create an efficient mechanism for coordination of EU-RF ICT R&D collaboration at the national level.	ME, MCST, MITA
S&T Graduates and PhD Candidates	▫ To formulate a strategy for attracting more students to higher level education in areas specific to the development of Malta's economy.	MCST, NCHE, UoM
	▫ To promote the Malta University Trust Fund among the business community while ensuring that the research being carried out is in fact relevant to the national economy.	MCST, UoM, ME
	▫ To create a forum for collaboration between UoM and the	MCST, NCHE, UoM,

	business community with the aim of identifying future market skill requirements and promotion of applied research.	ME
	▫ To create an external policy promoting Malta as an international destination for higher education and to attract foreign investment into the provision of educational services.	NCHE, Ministry of Education
ICT infrastructure	▫ To increase the national funding for R&D activity in line with the MCST recommendation of 0.75% of GDP.	OPM, UoM, MCST
	▫ To create national supporting frameworks and enabling platforms for efficient ICT R&D infrastructures.	MITA, MCST, UoM
	▫ To expand the Human Capital Base and to create business-academia linkages for cooperation.	MCST, NCHE, Ministry of Education, ME
	▫ To commission a detailed national study on the extent to which RTD infrastructure meets the needs of current researchers.	MITA, ME
Venture Capital and Business Incubation	▫ Government to promote a business and risk-taking culture.	ME, MFSA, Malta Chamber, MCST
	▫ Government bodies as well as private organisations must be the catalysts for the establishment of venture capital culture.	OPM, MFSA and MCST
	▫ Improving the availability of seed money and venture capital.	ME and OPM
	▫ Simplifying and reducing bureaucratic requirements for start-up companies.	ME
	▫ Expanding the network of business incubators and other support services for high-tech companies.	ME and Malta Industrial Parks
	▫ To provide better access of start-up companies to high-quality market information.	ME
	▫ To promote the purchasing of local high-tech products through government procurement.	OPM and MITA
	▫ To promote the export of high-tech products by keeping export taxes low and by promoting high-tech products abroad.	ME, MFIN
SME & Academia R&D and Entrepreneurship Culture	▫ To address the lack of an efficient mechanism for coordination of EU and Regional Funds in ICT R&D at a national level.	MCST, ME
	▫ To campaign for a promotion of the importance of R&D within the private organisations through government incentives or grant schemes that are tailor made to cater for the special circumstances of the SMEs.	ME
	▫ To organise mass-media and educational campaigns encouraging more focus on creativity, entrepreneurship and innovation.	ME, MCST
	▫ To direct R&D activity within the UoM towards applied research spearheaded by the needs of the local economy.	UoM, NCHE
	▫ To address the legal barriers that inhibits public-private partnerships in innovation.	ME, MCST
	▫ To promote research and communication links between public entities and private industry.	ME
National Support	▫ To improve information dissemination from national coordinating	OPM, MCST, ME

Structures	bodies.	
	▫ To sustain a better coordinated mechanism through which professional proposal writing/project management advice related to EU funding programmes can be channelled.	ME, MCST
	▫ To provide better training seminars covering effective proposal writing, financial methodologies and project management for successful participation in FP7 calls.	ME, MCST
	▫ To create a unified and comprehensive strategy document with the involvement of all national bodies in consultation with the UoM and private entities with the aim of improving communication.	OPM, MCST, ME, NCHE, UoM, MCAST, Malta Chamber, MITA
	▫ To improve the use of and dissemination of partner searches including a more timely distribution of simple partner searches emanating from projects like Ideal-IST.	MCST, ME
	▫ To reinforce suitable instruments for SMEs such as 'Take up actions' or exploratory awards.	ME, MCST
Political Support and Policy	▫ To appoint a Parliamentary Secretary for Research, Science and Technology.	OPM
	▫ To increase the national funding for R&D activity in line with the MCST recommendation of 0.75% of GDP.	OPM, UoM, MCST
	▫ To set in place priority setting procedures regulating the direction of R&D activity focusing mainly on areas of economic importance with full consultation with the users of the knowledge and technology.	NCHE, ME, MCST, UoM
	▫ To ensure better integration of SMEs in the policy making process.	Malta Chamber, OPM, MCST, ME
International Promotion of Local Organisations	▫ To increase visibility of Malta's ICT R&D competences in Europe through international promotion and relationship building exercises.	MCST, ME
	▫ To maintain an up-to-date database of key players (both individuals and organisations) in the ICT R&D field.	ME, MCST
Local Clustering	▫ To engage a national body with the task of clustering public and private organisations according to their area of expertise.	OPM
	▫ To promote clustering efforts of local public and private organisations in order to increase participation and accepted project proposals within the FP7-ICT Theme calls.	MCST, ME
	▫ To encourage and offer state-SME join ventures, R&D contracts and cooperative research projects thus incentivising SMEs to improve their research capacity and contributing to the advancement of the economy.	ME, MCST, MITA, UoM
	▫ To pursue a clustering and networking strategy introduced in Malta's Industry Strategy for 2007-2013 which is intended to synergise Maltese industry at a local level as well as at a regional and international level through: Activating Supply Chain Vendors Clusters Initiatives (SCVCI), Activating Indus-try Grouping Clusters Initiatives (IGCI) and Activating Targeted National Clusters Initiatives (TNCI)	ME

Malta's ICT infrastructure	▫ The construction of new factories should not relate solely to the provision of land at favourable rates, but more importantly to the need of upgrading the concept of industrial estates to industrial and science parks, featuring a strategic concentration of activities backed up by shared facilities.	OPM, ME, Malta Industrial Parks
	▫ The grant schemes currently being put into action by ME through the new Malta Enterprise Act should be further enhanced so that they reach a wider range of small businesses that are willing to take up the challenges of innovative research, development and internationalisation. Eligibility should be extended to more sectors and not merely to manufacturers, so that the present discrimination between enterprises qualifying for state aid is furthered rewarded, including those relating to research and innovation.	ME
	▫ Expansion of KBIC remains an important measure, since aggressive support to those start-ups which show promise of innovation, needs to be provided in order to induce growth. The Business Incubation Centre requires dedicated support to ensure that the new budding entrepreneurial firms get the appropriate level of hand-holding in the initial two years of their operation. It is essential for the Centre to be equipped with sufficient managerial talent in this regard.	OPM, KBIC, ME
	▫ Setting up an Entrepreneurship Research Unit to help SMEs access EU Funding and provide better coordination of national SME policies to increase the SME contribution to Community programmes, and ensure that the projects that are supported would have a better economic impact.	ME
	▫ Establishment of a one-stop-shop for business support that tackles the existing barriers for information and communication flow between different government entities.	ME
	▫ Heavier investment towards ICT infrastructure that will contribute to enhance the performance of all SMEs, and upgrade Malta's enterprise profile.	OPM, ME, MCST, UoM, MITA

Table 4 – Suggested actions at a local level

Target Area	Action
Smallness of local private R&D players	▫ To include an obligation whereby project proposals must include team players of smaller size but with high technical potential. This is also in view of the fact that SME participation rates are still very low especially in the new member states.
	▫ To establish an EU-wide system that analyses area, country and country-group specifics thus helping to identify small R&D players that have a potential to contribute to larger projects. This is to be done in collaboration with the local NCPs. Countries would report the needs and opportunities of their R&D scenario, thus creating common collaborations and best practices within the EU FP programmes. This EU in-house system would provide a basic analysis of scientific and technological profiles amongst the countries to support weaker member states and create a common basis for the definition of opportunities.
	▫ To enhance coordination between SME support projects and within the relevant Commission services.
Opportunities for	▫ To include a fair amount of small projects within the approved budgets for FP projects.

highly focused R&D projects	This can be done after an evaluation of the international dimension of the country's R&D players and their specific outcomes such as publications, patents, etc
	▫ Together with the local NCPs, EU officials will recognise those players and specific areas that are highly active in the country and allow openings for these small entities to compete for funding set aside purposely for small scale but highly focused R&D projects
	▫ Increase resources for IST priorities of interest to SMEs
Simplification of application process within FP calls	▫ To have a more simplified and streamlined application process across all calls.
Payment Terms	▫ Improvement in payment timeliness can be achieved through regular internal EU monitoring of dues and simplified associated procedures, improving their cash flow, clarifying the financial rules and access to management, and by exploring how to facilitate subcontracting to SMEs.
	▫ Of benefit to the entity awaiting payment would be to pay interest accordingly with the delay incurred, although this is not the best solution for both parties
	▫ Establishment of an SME ombudsman office to tackle any issues arising in project execution. A code of conduct should be established.

Table 5 – Suggested actions at an EU Level

Conclusions

Although it has been noted that Malta's participation within the FP is somewhat lacking when compared to that of other Member States, this must all be seen in the light of the local R&D scene and the opportunities available for researchers and R&D active organisations. Local incentives for R&D is limited, human resources are scarce, political championing is lacking and support structures in many cases inadequate, but this is primarily due to Malta's size and limited resources.

The areas covered include better strategic R&D planning, increased R&D activity on a local level via clustering and also internationally through FP participation, and improvements to the local ICT Infrastructure. Several actions and recommendations are detailed in the aforementioned section with the intention of improving the local setup with regards to ICT R&D performance enablers that aim for higher standards and involvement of the local ICT R&D performers in international projects. However it important to note that Malta is making significant progress across all of these fronts thanks to the clever and strategic use of Structural Funds available for the 2007-2013 period.

The attainment of an equitable ERA involves an effort from all EU-wide countries that will take time, and results will not be seen overnight. However, addressing the individual actions that have been suggested through this study, and through the other studies undertaken amongst the other countries, will definitely go a long way towards achieving a sound and well-performing ERA, while ensuring Malta increases its uptake of future FP opportunities.

End of Executive Summary

1. Report Background

This report serves to summarise and present the major conclusions and statistics that have been highlighted throughout the Malta ICT RTD Technological Audit project execution. A more detailed summary of all the material dealt with throughout the execution of the project is presented in deliverable 8.

The report goes through the following stages:

- Analysis of Malta's economic situation with special reference to R&D activity
- Review and analysis of local strategy papers related to ICT R&D
- Review of published works from local ICT R&D players
- Analysis of Malta's participation in FP6-IST and FP7-ICT
- Review and analysis of Malta's ICT infrastructure
- DELPHI based survey for analysing Malta's ICT RTD capabilities
- Identification of local ICT R&D competences
- Opportunities and barriers arising with Malta's increased participation in FP
- Suggested actions to maximise participation

1.1. The Lisbon Strategy Targets for R&D

As highlighted by the Lisbon Strategy, knowledge accumulated through investment in R&D, innovation and education is a key driver of long-term growth. One of the main goals of the EU's Lisbon agenda is to achieve a higher level of R&D spending. Two sub-targets for R&D spending were clearly defined in 2002: EU R&D intensity (R&D expenditure divided by GDP) was to increase from about 1.8% in the late 1990s to 3% by 2010; and two-thirds of this spending was to be funded by the business sector, the rest being funded by governments. In this regard, it is to be noted that the objective was intended to be achieved at the level of the EU, and this did not necessarily imply that it would have to apply in a similar way to each individual country. In fact, Malta's target was set at 0.75% of the GDP. Especially, in the case of small countries like Malta whose individual performance does not impinge materially on the achievement of targets at the level of the EU, deviations from such a target would be acceptable. On the other hand, the individual country would have to ensure that any such deviations would not put it at a competitive disadvantage in the EU Single Market and within the global markets.

However, the EU is not delivering on its Lisbon agenda commitment to increase its R&D-to-GDP ratio to 3% by 2010. Europe seems to be unable to reach an objective it has publicly set itself. In 2006 its R&D intensity was still below 2% and was flat-lined for more than two decades.[16] According to Janez Potočnik, European commissioner for science and research, the vast majority of applications for European research funds come from countries, unlike Malta, which were members of the EU before the major expansion of the Union in 2004.[17] Only one in ten requests for funds made under the Seventh Framework Programme (FP7) came from one of the 12 countries that have joined the EU since 2004.

The objective of this technical audit in the area of research and development on information society technologies in Malta is to identify a number of elements in the local scenario that will enable the release of the hidden potential for the construction of an all-inclusive and geographically balanced European Research Area (ERA). "The ICT sector is easily the leading sector in the EU economy in both labour productivity (almost twice the whole economy average)

[16] Bruegel Policy Brief http://www.bruegel.org/uploads/tx_btbbreugel/pbf-02.08_RandD_missing_the_wrong_target.pdf Issue 2008/03

[17] http://www.euractiv.com/en/science/new-eu-members-applying-research-funds/article-182276

and R&D expenditure; although its weight in the EU economy is lower than the weight of other sectors. The ICT sector is therefore the sector contributing most to the development of the EU knowledge economy."[18]

1.2. Defining Research and Experimental Development (R&D)

For the purpose of this study, the authors have followed the definition of R&D as specified in the Frascati Manual 2002 - The Measurement of Scientific and Technological Activities[19]. The manual provides a standard practice for the execution of surveys within the R&D field.

> *Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.*
>
> *The term R&D covers three activities: basic research, applied research and experimental development...*
>
> ***Basic research** is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.*
>
> ***Applied research** is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.*
>
> ***Experimental development** is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.*
>
> *R&D covers both formal R&D in R&D units and informal or occasional R&D in other units.*

This definition was adhered to throughout the desk research and subsequent analysis in order to identify and filter out any ICT R&D activity being performed by the various organisations and entities involved in ICT operations in Malta.

1.3. Desk Based Research Methodology

The methodology utilised in reports 1 to 4 is based on desk and web based research. In all stages of the desk review, reference was also made to supporting documents and other published studies that could be accessed online.

Desk Review Methodology – Studies and Strategy Papers (Report 1)

The starting point for the desk review of the strategy papers and publications related to ICT R&D was the Malta Council for Science and Technology website[20] from which the National Strategic Plan for Research and Innovation 2007-2010 was extracted. Subsequently the review focused on the Malta Government website, specifically through the Ministry for Infrastructure, Transport and Communications[21] (MITC) who are responsible for the Smart Island Strategy 2008-2010. Through the government website and government published documents, the review progressed

[18] Quoted from EUR 23832 EN – 2009 The 2009 report on R&D in ICT in the European Union http://ftp.jrc.es/EURdoc/JRC49951.pdf
[19] Frascati Manual - http://browse.oecdbookshop.org/oecd/pdfs/browseit/9202081E.PDF
[20] http://www.mcst.gov.mt/
[21] https://mitc.gov.mt/

with an analysis of the Vision 2015, e-Learning, e-Government and e-Health strategies, the Industry Strategy for Malta 2007-2010 and the National Broadband Strategy.

Supporting documents include the National Strategic Reference Framework 2007-20013, National Reform Programme 2008-2010 and the Quality Assurance Framework for Further and Higher Education in Malta.

Desk Review Methodology – Published Works (Report 2)

The starting point for identification of the main ICT R&D actors was the list of applicants and beneficiaries of the FP5, 6 & 7 programme calls, the Malta Enterprise 20millionforindustry grant scheme and the Eureka and Eurostar programmes, the MCST RTDI 2004, 2006 & 2008 funding programmes and the National Structural and Cohesion Funds. The list of actors was further populated with entities that have worked on individual projects with the UoM as part of the final year student thesis projects within the Faculty of Engineering and the Faculty of ICT. One-person researchers only exist within the UoM structure and these were identified through a basic web search through the UoM web pages. The list was also further populated with those organisations who have worked together with the government on ICT projects in the past. In all instances, the analysis conducted was pure web based research. The analysis of each organisation / individual is based on pure web research.

While acknowledging that this analysis has been carried out in a comprehensive manner, it might have excluded some key players, either through omission or simply because no concrete material or publications where available on their websites that specifically indicates any ICT R&D activity. It is acknowledged that this is also due to market sensitivities and confidentiality agreements necessary to protect research being undertaken.

Analysis Methodology – FP6-IST & FP7-ICT Participation (Report 3)

This report is based on the raw data that the European Commission has provided in respect of Malta's participation in proposals and in projects under FP6 and FP7. This data is placed in the context of the various work programmes and later updates to the work programmes, and the respective calls and information available.

There might be slight discrepancies between the data obtained from the Commission and other sources; however this report primarily refers to official data as provided by the Commission, if not otherwise mentioned.

Desk Review Methodology – ICT R&D Infrastructures (Report 4)

The review for this report has followed the definition established by the European Strategic Forum on Research Infrastructures (ESFRI22) for research infrastructures; that of "*facilities, resources or services of a unique nature that have been identified by pan-European research communities to conduct top-level activities in all fields".*

This report has been based on available information, track record and/or media coverage of the various infrastructures available in Malta. Additionally, this report reviews and discusses various reports, papers and strategies that attempt to provide a reinforced and coordinated effort to foster world-class ICT infrastructures on the Maltese Islands by the Government of Malta; and also includes the input of key stakeholders including the UoM.

1.4. Methodology for Classification of ICT R&D Organisations

For the purpose of this study, it has been necessary to define the parameters within which the classification of the major ICT players and ICT R&D organisations in Malta has been done. Research and technological development and innovative (RTDI) organisations are defined as those organisations that "*are created to direct the generation and application of scientific and technological knowledge to strategically defined goals*."[23] RTDI organisations are

[22] http://cordis.europa.eu/esfri/
[23] http://www.waitro.org/News/know.pdf

specialist providers of R&D and related technology services to both companies and public-sector clients. They view themselves as knowledge organisations dedicated to developing practical solutions to meet industrial and social needs.[24]

The authors have defined parameters with which to identify the major ICT players and ICT R&D organisations in Malta using a benchmarking methodology to individually classify entities into four categories namely

1. International Centres of Excellence
2. National Centres of Competence
3. Centres of Competence
4. Individual Centres of Excellence

The EU definition[25] of Centres of Excellence in RTD immediately suggests that "*they are an intuitive concept that is not easy to define....*"

> *"The concept of centres of excellence is interpreted and used in many different ways in Europe. A simple definition could be: "A centre of excellence is a structure where RTD is performed of world standard, in terms of measurable scientific production (including training) and/or technological innovation". In any case, it seems possible to list some key features which should be part of the concept:*
>
> - *a "critical mass" of high level scientists and/or technology developers;*
> - *a well-identified structure (mostly based on existing structures) having its own research agenda;*
> - *capable of integrating connected fields and to associate complementary skills;*
> - *capable of maintaining a high rate of exchange of qualified human resources;*
> - *a dynamic role in the surrounding innovation system (adding value to knowledge);*
> - *high levels of international visibility and scientific and/or industrial connectivity;*
> - *a reasonable stability of funding and operating conditions over time (the basis for investing in people and building partnerships);*
> - *sources of finance which are not dependent over time on public funding.*
>
> *Centres of excellence in RTD evolve continuously. Together with a well-educated workforce, they are essential for endogenous economic growth as well as to attract private investment; the argument of proximity to excellent research centres is becoming a major element in decisions by multinational companies to locate production sites. RTD activity itself more and more attempts to capture and make best use of frontier knowledge in multidisciplinary dimensions (global change, food safety, learning, ageing, etc). Although physical concentration of excellent researchers is still a key factor in RTD productivity, advanced ICT tools progressively allow effective interaction in networks."*

However for Malta, and other small island states, the definition of centres of excellence should be broad.[26] It is important to note that the benchmarking methodology being proposed is to set criteria for research organisations linked with competitiveness and value added production capabilities. Institutions that meet the following three criteria are considered excellent, or '**International Centres of Excellence'**:

- there is a critical mass of researcher knowledge needed for competitiveness;
- the results achieved contribute to marketable innovations; and
- the researchers have a rich network of national and/or international relationships with the business sector as well.[27]

The reference to a centre of excellence could embrace a variety of national, regional or international institutions able to provide services at a standard sought by Member States or regions, and a satisfactory rationale for investment in their activity by interested customers. The reality of Malta's ICT R&D players however indicated that many RTDI institutions, while having marketable innovations and good networking, simply cannot fulfil the size

[24] http://www.earto.org/Newsletter/Outsourcing.doc
[25] http://ec.europa.eu/research/era/pdf/centres.pdf
[26] http://portal.unesco.org/science/en/ev.php-URL_ID=6875&URL_DO=DO_TOPIC&URL_SECTION=201.html
[27] "The RECORD Manual Benchmarking Innovative. Research Organisations in European Accession Countries." http://www.zsi.at/attach/record_manual_finalEU.pdf

criteria adequately. Consequently institutions in this predicament or that do not match one of the above three criteria have been defined as RTDI organisations in transition and referred to as "**National Centres of Competence**". Consequently, in this report the benchmark adopted includes also National Centres of Excellence which are defined as organisations or setups that undertake top-level activities in ICT R&D research or that support ICT infrastructures or infrastructural development which need not necessarily be a public institution. Private research laboratories or institutions having a high repute in science that are seeking to provide services for an institutional capacity building programme are also being included under this category.

For many other basic ICT research-oriented institutions we had to conclude that utilisation of research results is missing and/or business relationships are poor, and R&D efforts seem sporadic rather than backed by a concrete R&D strategy and budget. These are being referred to simply as "**Centers of Competence**". Consequently this third category has been included that comprises public or private organisations that are pursuing ICT R&D activities that are of note, and have serious potential as RTDI project partners in FP7 projects. Publications are not considered to be a requisite for this category since most are focused also on the commercialisation of their research and not interested in result dissemination or academic publishing.

When analysing the research efforts ongoing in the country, it is immediately noticeable that much effort is taking place within the UoM. This effort can be directly linked to individual persons who are active in the various fields and who are authorities in their area within the University. Being classified as "**Individual Centres of Excellence",** the competence of these persons is mostly measured in terms of publications and ongoing research projects.

All Maltese classified entities are listed in ANNEX VI.

1.5. DELPHI Survey Methodology

The Delphi method is a systematic, interactive method which relies on a panel of experts. The experts answer questionnaires in two or more rounds. After each round, a facilitator provides an anonymous summary of the experts' forecasts from the previous round as well as the reasons they provided for their judgments. Thus, experts are encouraged to revise their earlier answers in light of the replies of other members of their panel. It is believed that during this process the range of the answers will decrease and the group will converge towards the "correct" answer. Finally, the process is stopped after a pre-defined stop criterion (e.g. number of rounds, achievement of consensus, and stability of results) and the mean or median scores of the final rounds determine the results. [28] This is a summary of the DELPHI technique as developed by the Rand Corporation in the 1950's.

The DELPHI survey utilised in this study was conducted with the aim of gathering views about the potential of various IST application areas to contribute to EU goals, the particular types of application that were most promising, and where EU capabilities were strongest, together with the problems and barriers that are faced impeding performance to EU required levels.

1.6. SWOT Analysis Methodology

The SWOT Analysis is a strategic planning method used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a project, business venture or methodology. It involves specifying an objective and identifying the internal and external factors that are favourable and unfavourable to achieving that objective. The technique is credited to Albert Humphrey, who led a convention at Stanford University in the 1960s and 1970s.

[28] Rowe and Wright (1999): The Delphi technique as a forecasting tool: issues and analysis. International Journal of Forecasting, Volume 15, Issue 4, October 1999

Identification of SWOTs is essential because subsequent steps in the process of planning for achievement of the selected objective may be derived from the SWOTs.[29]

- **S**TRENGTHS: *internal attributes* that are helpful to achieving the objective
- **W**EAKNESSES: *internal attributes* that are harmful to achieving the objective
- **O**PPORTUNITIES: *external conditions* that are helpful to achieving the objective
- **T**HREATS: *external conditions* which could do damage to reaching the objective

The SWOT methodology has been used at several instances throughout this study and most of the SWOTs shall be reproduced in this document since they serve the purpose of presenting all the major winning points and stumbling blocks for various topics of interest.

The main SWOT analysis for the purpose of this study is that which deals with analysing the scenario in which Maltese organisations and researchers perform their R&D activity within the areas of the FP7-ICT Theme. The ultimate objective is that of arriving at an identification of those areas that require consideration with the ultimate aim being that of increasing Malta's participation in ICT R&D activity.

[29] http://en.wikipedia.org/wiki/SWOT_analysis

2. Population & Economic Demographics

Situated at the centre of the Mediterranean Sea, Malta is the smallest member of the European Union (EU) with the highest population density (circa 414,000 inhabitants) and also one of the most densely populated countries in the world with about 1,298 inhabitants per square kilometre[30].

The country's expenditure on education stood at 4.82% of the GDP in 2004 while partial data for 2005 showed a rise in expenditure to 6.76% of the GDP[31]. Tertiary education in Malta is offered mainly by the University of Malta, which provides services for 97% of the total tertiary level student population[32]. ***The share of science and technology (S&T) graduates is 3.4%, well below the EU average of 12.9%[33]. Therefore, although the latest data[34] available by field of study shows a substantial influx of graduates into the country's economy in all areas, including those of S&T, this is not sufficient when compared to the EU average.***

S&T graduates represented 3.9% of the total labour force in 2006 compared to 4.8% of the EU27 average[35].

The economic strategies compiled by the Maltese government with direct relevance to ICT, aim for the vision of Malta as an ICT hub by becoming an ICT-driven economy and an ICT driver in the Euro-med region[36].

It is relevant to note comparable results between 2004 EU Candidate Countries of direct investment inflows over GDP, to the respective degree of openness for the same year. The countries are presented in Chart 3 in decreasing order of the ratio of direct investment inflows over GDP. Malta stood ahead for both indicators where inward FDI over GDP amounted to 17% when the average ratio of FDI over GDP was 4%. In 2000, the Maltese economy was also the most open with a degree of openness of 2.13% when the average value of the degree of openness was .85%.

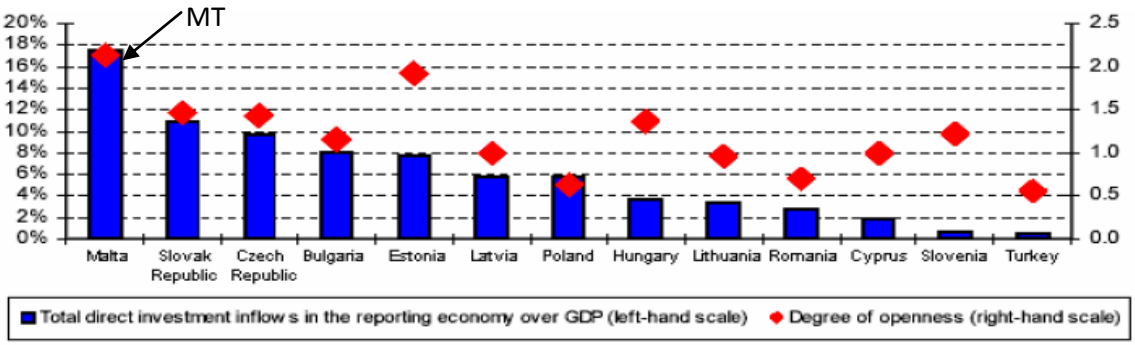

Chart 3 – FDI and Degree of Openness of the Economy[37]

Chart 4 confirms that the ICT sector is indeed more important in some economies than in others, especially for countries like Malta. According to this data, most of the differences between member states are due to differences in ICT manufacturing, rather than ICT services, although ICT services also tend to be larger where ICT manufacturing is significant.

[30] Data extracted from Malta in Figures 2008 published by the National Statistics Office, Malta ISBN 978-99909-73-64-8 / ISSN 1726-1392
[31] Source: eurostat http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdsc510
[32] NCHE Further and Higher Education Statistics 2008
[33] Source: EIS, 2007
[34] Source: University of Malta statistics as quoted in Malta in Figures 2008, National Statistics Office
[35] Eurostat Release No. 34/2008 EU27 R&D spending stable at 1.84% GDP in 2006, 10th March 2008
[36] Smart Island Strategy https://mitc.gov.mt/page.aspx?pageid=263
[37] Source: Eurostat, Statistics in Focus, Theme 2 – 11/2003

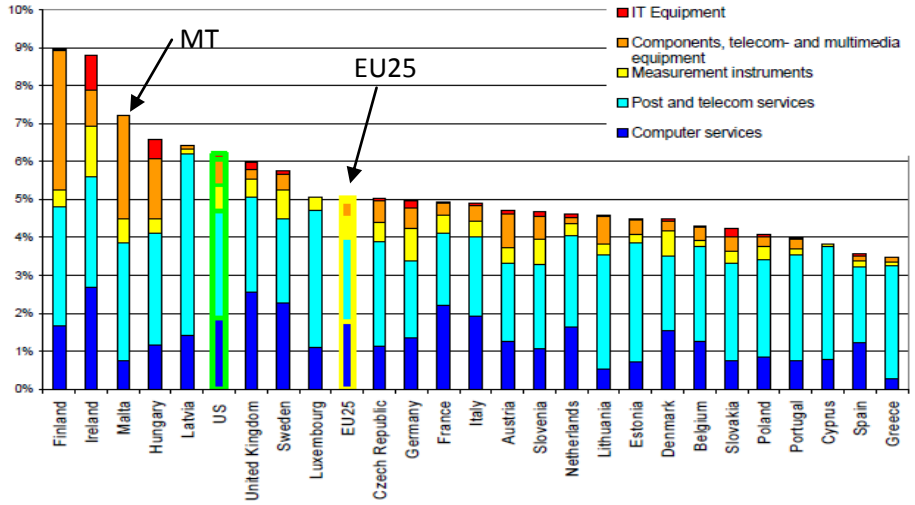

Chart 4 – Weight of the ICT sector in the economy – EU25 and US (2008) [38]

Chart 5 shows the latest available figures for 2005 for patent applications with the European Patent Office (EPO) regardless of whether the patents were granted or not.

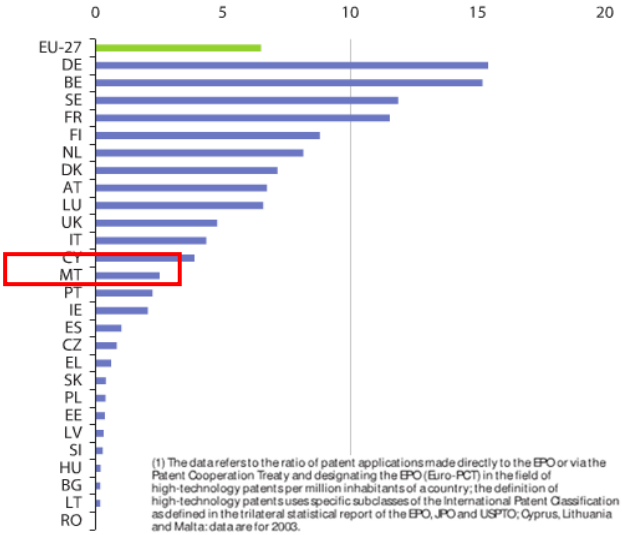

Chart 5 – Number of high technology patent applications in 2005 to the EPO (per million inhabitants)[39]

Malta's performance is lacking when compared to the EU27 average applications per million inhabitants. However, it must be noted that among the EU10, Malta's performance is above the average rate of patent applications[40]***. However, from an overall perspective, the country's output of ICT related patent applications is non-existent.***

An incentive for enterprises was announced in the Budget 2010 government speech whereby a tax exemption on royalties and revenues resulting from patents on inventions shall be given.[41]

Very little data is available offering a breakdown in R&D spending by the private sector. However public expenditure on R&D as at 2009 was €11.9M, an increase of 4% over the previous year[42], the vast majority of which went to the higher education sector, mainly to the University of Malta.

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[38] "Policy Brief: R&D Business Investment in the EU ICT Sector"; Sven Lindmark, Geomina Turlea, Martin Ulbrich

[39] Eurostat http://www.scribd.com/doc/17490089/Eurostat-Key-Figures-on-Europe-2009-Editionksei08001En?classic_ui=1

[40] National Statistics Office, 2004 data http://www.nso.gov.mt/statdoc/document_file.aspx?id=118

[41] http://www.finance.gov.mt/image.aspx?site=MFIN&ref=2010_budget_Budget Speech_en

[42] National Statistics Office, 2009 Data: http://www.nso.gov.mt/statdoc/document_file.aspx?id=2793

In 2006, Gross Domestic Expenditure on R&D (GERD) as a percentage of GDP stood at 0.61% in Malta, which is well below the EU27 average of 1.85%.[43] Chart 6 shows a comparison of this value of Malta's GERD in relation with the EU27 countries.

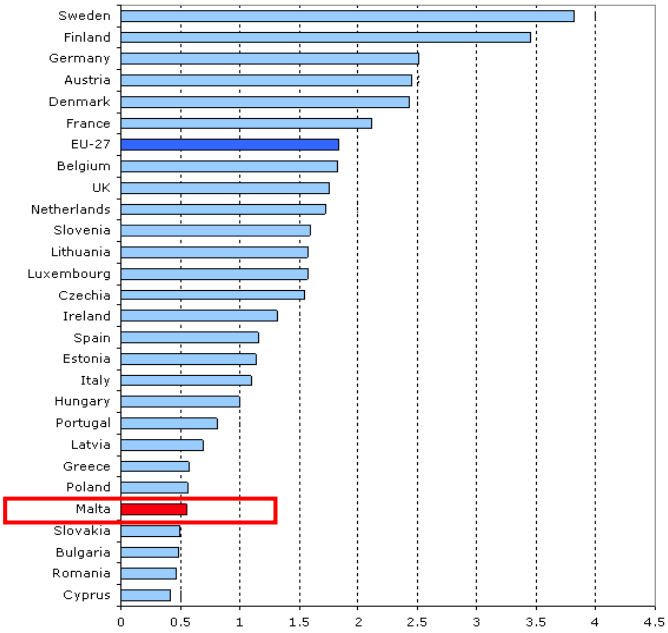

Chart 6 – GERD as a percentage of GDP (R&D intensity), EU-27 and selected countries – 2006[44]

Within the EU, the share of ICT business expenditure on R&D (BERD) is heavily dominated by the largest economies, i.e. Germany, France and the UK. The EU12 group of which Malta is a member contributes to only 2% as shown in Chart 7.

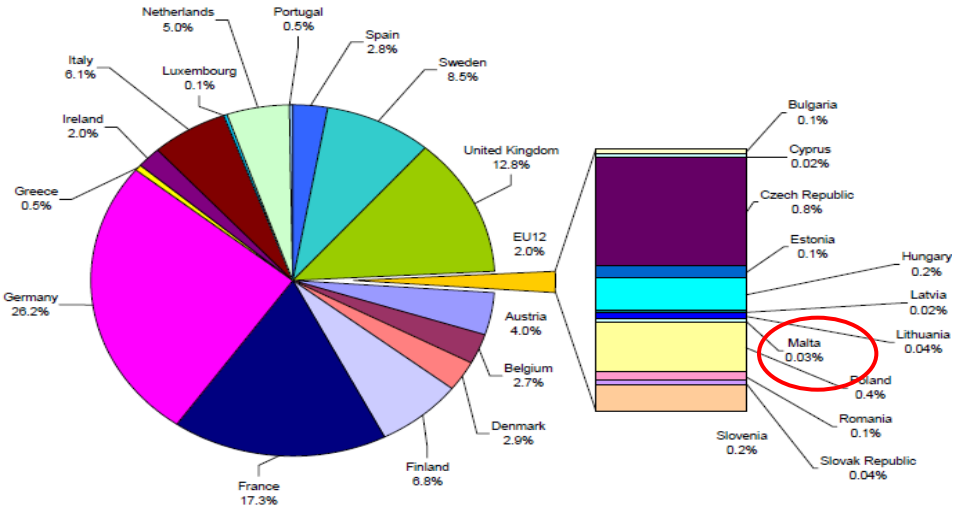

Chart 7 – Distribution of ICT BERD among EU27, 2005[45]

The latest figures*[46] *indicate that the Maltese business sector tripled its R&D expenditure in ICT between 2004 and 2005. ICT R&D expenditure relative to GDP remains lower than average, but one third (compared to 11% in the previous year) of all R&D spending goes to the ICT sector.

[43] http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsc00001&plugin=1
[44] http://www.investslovenia.org/facts_and_figures/infrastructure_and_utilities/secure_docs/2007010913074536/
[45] EUR 23832 EN – 2009 The 2009 report on R&D in ICT in the European Union http://ftp.jrc.es/EURdoc/JRC49951.pdf
[46] Europe's Digital Competitiveness Report; Volume 2: i2010 — ICT Country Profiles; http://ec.europa.eu/information_society/eeurope/i2010/docs/annual_report/2009/sec_2009_1060_vol_2.pdf

3. Review and analysis of local ICT R&D-related strategy papers

A country's dominant source of competitive advantage and growth potential is its ability to create, transfer and exploit knowledge, and its technological and innovative capabilities to create new products and services. There is strong evidence that increased public spending in R&D acts as a driver of economic growth, generating not only good returns on investment but also positive spill-over effects in the economy as a whole. Quoting from the National Strategic Plan for Research and Innovation: 2007-2010:

> *"Firstly, it (...R&D) has a direct impact on innovation that shows up as growth in industrial productivity. Secondly … public funding of R&D can contribute indirectly, by complementing and stimulating private R&D investment… Thirdly, besides providing the foundation for successful innovation resulting in the creation of new products and markets – and ultimately, enhancement of consumer welfare – publicly funded R&D also benefits the private sector through the improvement of production processes and existing products".* [47]

The main policy maker in ICT Research in Malta is the government in liaison with national bodies, stakeholders and organisations. Policies are formulated at Ministerial level through the Office of the Prime Minster, the Ministry of Education and Culture, the Ministry of Resources and Rural Affairs and the Ministry of Finance, Economy and Investment through collaboration and discussion with the national bodies that lie within their responsibility.

However, there is a lack of communication links between the various Ministries and the working groups lying within their responsibility.

Apart from the Intra-Governmental Committee on R&I that links the Ministries to the Cabinet of Ministers, the Malta Industrial Policy Strategy calls for an Inter-Ministerial Working Group stewarded by the Office of the Prime Minister to be set up to examine issues, which include social security taxation, the legal status of researchers, conditions of acceptance of third-country researchers so as to eliminate the barriers to researcher mobility. However we are not aware of such a Working Group having been set up.

The task of improving Maltese participation within FP7-ICT Theme calls is a task that could very well be taken up by such a working group where the various ministries together with representatives from the operational national bodies will have the opportunity to tackle the obstacles that are hindering Malta's complete participation and implement actions to overcome them.

The entities involved in the policy making and strategy implementation are listed below in alphabetical order:

- Chamber of Commerce
- EuroMedITI – Euro-Mediterranean Initiative for Technology and Innovation
- Malta Enterprise
- MCAST – Malta College of Arts, Science and Technology
- MCST – Malta Council for Science and Technology
- MEUSAC – Malta-EU Steering & Action Committee
- Ministry of Education, Culture, Youth and Sport
- Ministry for Infrastructure, Transport and Communications
- MITA – Malta Information Technology Agency
- NCHE – National Commission for Higher Education
- PPCD - Planning and Priorities Coordination Division
- University of Malta

[47] Quoted from the National Strategic Plan for Research and Innovation: 2007-2010 / Building and Sustaining the R&I Enabling Framework, complied by MCST for the Government of Malta

However, there seems to be a lack of a driver or champion which pushes forward the specific needs of ICT R&D activities in a consistent manner in the national agenda in Malta. This in part reflects the insufficient resources and lacking technical capabilities in a number of institutions which could be tasked with such a mission.

The two main strategies defining Malta's performance in ICT R&D are:

- **National Strategic Plan for Research and Innovation 2007-2010**

  This strategy is the responsibility of the Malta Council for Science and Technology (MCST). The strategy sets performance goals in the areas of S&T human capital base, future RTDI capacity, industry-academia collaboration, employment in ICT research, government expenditure on R&D, amongst others. The planned investment in the National R&I Strategy is based on achievable performance goals. The implementation of these goals shall in turn establish the basis for future research investment.

Performance Indicators	Performance Goals			
	2007	2008	2009	2010
Science, Engineering and Technology Human Capital Base				
Researchers per 1,000 worker	0	0	0	+2% of S&T researchers population
Number of PhD enrolments in S&T	+5 persons	+10 persons	+15 persons	+20 persons
Number of Masters / MPhil enrolments in S&T	+5 persons	+8 persons	+8 persons	+8 persons
Future RTDI Capacity				
University enrolments in S&T	0	+5% of 2007 of S&T student population	+5% of 2008 of S&T student population	+5% of 2009 S&T student population
MCAST enrolments in S&T	0	0	+1% of S&T student population	+2% of S&T student population
Private Sector enrolments in S&T	0	+4 new Local firms	+6 new Local firms	+8 new Local firms
R&I Progress and Performance				
Expenditure of Government on R&I	0.3%	0.45%	0.6%	0.75%
Hi-Tech Start-Ups	0	+4 new Local firms	+6 new Local firms	+8 new Local firms
Firms successfully migrating from Incubation Centres	0	+4 new Local firms	+6 new Local firms	+8 new Local firms
European Mediterranean exportation of enhanced innovation	+ 4 enhanced innovation projects	+ 8 enhanced innovation projects	+ 16 enhanced innovation projects	+ 20 enhanced innovation projects
Industry-Academia Collaboration				
Number of Collaborative initiatives	+4 Initiatives	+8 Initiatives	+12 Initiatives	+16 Initiatives
Current R&I Capacity				
Number of internationally accredited laboratories	0	15% of Public Labs	35% of Public Labs	60% of Public Labs
Growth and Wealth Creation				
Employment in S&T	0	0	+100 new positions	+150 new positions
Funding Sources for R&I in Business, higher education and Government				
Venture Capital	+100% on 2006 target	+100% on 2007 target	+100% on 2008 target	+100% on 2009 target
EU	+5% on 2005 EU financing of S&T student population	+20 of S&T student population	+40% of S&T student population	+60% of S&T student population

Table 6 – Performance Indicators and Goals of the National R&I Plan

Table 6 shows the assignment of performance goals to the major and most important performance indicators set out in the strategy.

However it seems that the MCST is still not funded enough to be in a position to deliver its remit in the near future, both in terms of its recurrent budget and staff resources. Better planning, dissemination and more substantial funding on the National Investment Programmes will be necessary to see the required shift towards value added R&D and critical mass from industry towards the EU's 3% of GDP target for R&D.

- ## The Smart Island – National ICT Strategy for Malta 2008-2010

This document outlines a vision for a country where ICT is not a mere information and communications tool but a primary vehicle for putting right social inequality, disadvantages and disabilities while improving the quality of life of the general community. However this strategy does not deal directly with the specific needs of ICT R&D needs of the country and other strategies stemming from the Smart Island Strategy are:

- ## MITA Strategic Plan 2009 – 2012

MITA is the driving force and is responsible for delivering and implementing the assigned programs as set out in The Smart Island 2008-2010. With this context in mind, the Agency has issued its Strategic Plan 2009 – 2012 in which is has allocated five Strategic Priorities together with the corresponding actions. These are:
SP1: *To lead ICT strategy development and drive the deployment of an effective ICT Governance Framework within the public sector.*
SP2: *To deliver and sustain a robust, resilient and secure ICT infrastructure and IT services to Government.*
SP3: *To transform public service delivery through the application of ICTs*
SP4: *To enable the growth of the knowledge economy through the engendering of a life-long ICT learning framework*
SP5: *To deliver quality of life improvements through innovative citizen-centric application of ICTs*

Each of the 82 actions with the strategic priorities of the MITA Strategic Plan merit full support from all parties involved.

The planned strategy for the future of Malta's ICT environment and R&D performance is quite impressive. The actions that have been set out for each strategic priority of the plan involve an intensive exercise and require the participation and cooperation of the various entities on the island... for this to happen it requires a detailed plan of action and a strong spearheading and effort building exercise by MITA to get the commitment and involvement of all the national stakeholders be they public or private organisations.

However, as yet, there is no published timeline / plan of action for the implementation of these actions.

- ## Malta's National e-Learning Strategy 2008-2010

In order to promote access to e-Services, the government launched a large number of electronic services and invested substantially in ICT in public schools in 1994 - 2004. This has allowed the Maltese education sector to be ranked as one of the most technologically connected in the world at the time. ICT in education is frequently used, not merely for the teaching of its use for its own sake, but also as a pedagogical tool. The National e-Learning Strategy focuses on three strands, namely: *infrastructure in schools, teachers' and students' skills and resources*.

Deployment of the e-Learning strategy actions is well underway. All Maltese schools now use computers for teaching and have internet access. Amongst the EU, Malta is a leader in this area as shown in Chart 8 below.

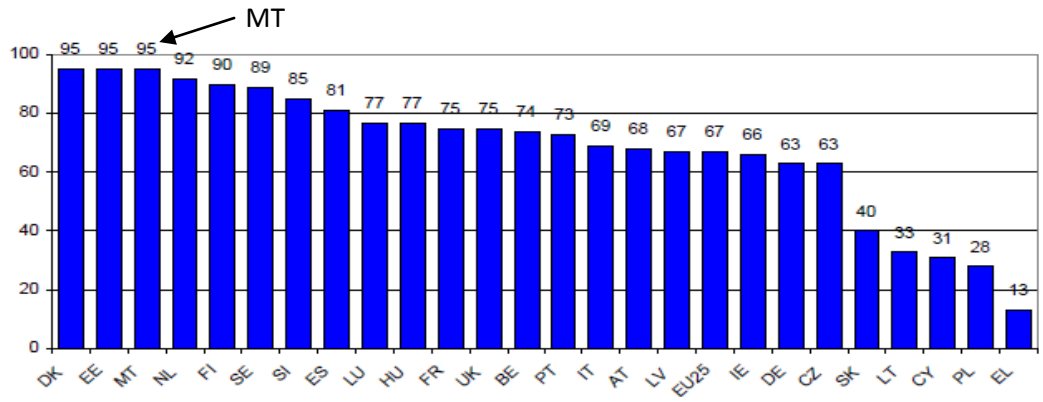

Chart 8 – Percentage of schools with broadband internet access (2006)[48]

A 2006 pan-European survey showed Malta as a top performer with 95% broadband penetration in schools together with Denmark and Estonia (refer to Chart 8). There is very little variation in broadband accessibility between the school types, ranging from 93% in primary schools to 100% in vocational schools.

Maltese teachers are very active users of ICT in class. In 2006 only a minority of 23% of the teachers using computers use them in less than 10% of all lessons, more than half make use of ICT in more than 25% of their lessons and almost a fifth state that they use computers in more than half of their lessons.

Malta's performance in e-Learning augurs well for the continued development of the e-Learning platforms.

- ## E-Health Vision and Strategy

The National ICT Strategy for Malta 2008-2010 sets out an action plan to develop an e-health strategy which encompasses the extensive use and application of ICT in the public and private healthcare system across Malta. The strategy sets the path of establishing ICT not only as a tool but also as a primary contributor to the continuous improvement of the healthcare system.

In 2005, the Government embarked on a formal initiative to formulate a national e-Health vision and strategy. A draft version of this strategy was approved at ministerial level in 2006. However, as yet the draft strategy has not been finalised and published.

The government's main focus in e-health ICT has been on the implementation of an Integrated Health Information System (IHIS) for all of Malta's public hospitals and health centres. This was launched in 2007 with Phase 1 consisting of the first six IHIS applications: The Laboratory Information System (LIS), Radiology Information System (RIS), Picture Archiving and Communications System (PACS), new Patient Master Index (PMI), Electronic Medical Records (EMR) and Order Management and Fulfilment (OMF).

Phases 2 and 3 of the IHIS, which are planned for implementation in the years 2008 to 2010, will see the introduction of a further 21 functionality modules designed to meet both clinical and managerial requirements in an integrated fashion.

- ## E-Government

Malta has been actively developing e-Government since 2001 and is one area in which Malta is leading the field in Europe. As a result of the strategy and its implementation, Malta has been ranked 2nd place by the consulting firm Cap Gemini among all EU member states in terms of sophistication of e-government services and their availability.

[48] http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/1285

The most frequently used administrative public services are now available on-line, including the payment of licences, registration, checking of documents, and so on. More than 60 such services - 90% of those between government and citizen or government and business - now take place by on-line transaction. This has been made possible by a central electronic identity framework which offers a secure, single sign-on authentication mechanism to every person.

Through the development of the e-Government services, and the associated research in the development stages, the e-Gov programme is expected to drive further ICT R&D in this sector. However, while the implementation of e-gov services are at an advanced stage and continually being researched and developed by MITA, their take-up and utilisation amongst the citizens is somewhat lacking.

Other strategies that have been reviewed in this study include: Industry Strategy for Malta 2007-2010, National Strategic Reference Framework 2007-2013, Malta National Reform Program 2008-2010, Quality Assurance Framework for Further and Higher Education in Malta, National Broadband Strategy.

The desk review of the major studies and strategy papers published in the field of ICT R&D indicates that there are a number of strategic policy initiatives which could actually be conducive to ICT R&D in Malta. On the other hand, a unified approach towards actually developing ICT R&D as a key economic driver in Malta, which is consistent and coherent and which would be conducive to the implementation of measures and initiatives in this regard, is at this stage lacking.

Recommendations:

1. **Political Commitment**
   The Government must take on the task of assisting the national bodies and stakeholders in implementing the strategies, in particular the MCST R&I National Strategy. The strategy has been published and is awaiting for political championing and commitment for its implementation.

2. **Domestically Designed Strategy**
   Better planning, dissemination and funding on the National Investment Programmes will be necessary to see the tangible shift towards value added R&I and critical mass from industry towards the EU's 3% of GDP target for R&D. Also, a targeted Innovation Policy could certainly provide more support and direction towards R&D in general.

3. **Increased national funding for R&D**
   Increased R&D performance can only be brought about through increased funding. The target set out by MCST is based on specific targets and performance goals and should be the road plan to be followed by the government for increased funding for R&D-related activity.

4. **All-Encompassing Strategy Document**
   To formulate a single cohesive strategy document specifically designed to cater for the needs of ICT R&D activity in particular. This document should set the base for a unified approach for ICT R&D developments, for R&D support facilities offering services to academia and industry, and for support mechanisms for participation in EU funded programmes.

5. **Legal Framework for R&D Activity**
   To formulate a national framework of regulations for R&D activity with regards to the execution of the activity per se, the funding allocation for the research activity, scientific collaborations both locally and internationally, industry-academia collaboration, etc.

In the absence of concrete developments in these issues, ICT R&D in Malta will probably remain low relative to economic activity and limited to sporadic and isolated activities, rather than being intensively interconnected within

the country's overall economic development. There would be a significant opportunity cost in the Maltese economy in such a case, because the potential for ICT R&D to fit strategically within the country's economic growth is substantial.

4. Review of published works from local ICT R&D players

A number academic institutions, governmental bodies, commercial entities and individual researchers are involved in ICT R&D activity in Malta.

4.1. Public Bodies

Public expenditure on R&D in 2009 amounted to €11.9M.[49] The vast majority of this expenditure is targeted to the higher education sector, mainly to the University of Malta (UoM) which falls under the Government's direct expenditure. According to official data[50], in 2009, a total of 954 employees were engaged in research work. However, the number of researchers with a PhD in the natural sciences and engineering lag behind.[51] Government R&D is carried out mainly by the UoM plus a number of public institutes, including MITA.[52]

Falling under the responsibility of MITC is MITA which has been appointed by the Government of Malta as the prime Agency for propagating ICT policy in the country and the executor of The Smart Island Strategy – 2010. As the government's ICT Agency, MITA[53] supplies ICT services to government. However, the agency has a significant number of commercially based agreements with private sector companies in order to provide services in as effective a manner as possible.

Other public bodies that were reviewed in this study included: Ministry for Infrastructure, Transport and Communications (MITC), Ministry of Education, Culture, Youth and Sport, Department of Technology in Education (DTiE), MCST, EuroMedITI, Commonwealth Network of Information Technology for Development, FITA, FTZ, Heritage Malta, Superintendence of Cultural Heritage, and the International Ocean Institute Malta Operational Centre (IOI MOC).

4.2. Academic Institutions

The bulk of the research activity in academia takes place at the UoM which aims to maintain and confirm its place as a research-intensive institution. Research activity is at the very heart of the University's vision, to stimulate teaching and to build strong links with business and industry as well as with other academic institutions. The UoM is to-date the most research intensive organisation on the island.

In the 2010 Budget speech the government has announced the creation of a **University Trust Fund** for research, innovation and development.[54] This infrastructure will increase the availability of funds utilised for the purpose of R&D activity aimed for commercial and industrial purposes. On the other hand, it will also benefit contributors to the fund through a reduction of the same amount donated (min €150 / max €50k) from their taxable revenue.

R&D activity in the ICT field is carried out within the Faculty of ICT in the areas of Artificial Intelligence, Communications & Computer Engineering, Computer Information Systems and Computer Science, and at the Faculty of Engineering in the areas of Electronic Systems Engineering, Industrial & Manufacturing Engineering, Systems and Control Engineering and Microelectronics & Nanoelectronics.

4.3. Commercial Entities

The desk review process for reviewing ICT R&D published works, has also identified a number of commercial entities that are active in the field. Whereas, in a number of cases the authors could find reference and highlights of the R&D

[49] National Statistics Office, 2009 Data: http://www.nso.gov.mt/statdoc/document_file.aspx?id=2793
[50] National Statistics Office, 2009 Data: http://www.nso.gov.mt/statdoc/document_file.aspx?id=2793
[51] European Commission (2008) 'ERAWATCH Research Report for Malta', European Commission
[52] "The gender challenge in research funding - assessing the European national scenes Malta"; Debbie Millard and Louise Ackers (May 2008); http://ec.europa.eu/research/science-society/document_library/pdf_06/malta-research-funding_en.pdf
[53] http://www.mita.gov.mt/index.html
[54] http://www.finance.gov.mt/image.aspx?site=MFIN&ref=2010_budget_Budget Speech_en

activity being pursued, although limited in detail, in the majority of cases it was observed that many organisations do not showcase their research efforts online.

This is usually due to the sensitive nature of the research which is intended to lead to commercialisation.

4.4. Comments & Observations

ICT Knowledge generation and utilisation in Malta comes in different forms, including participation in collaborative EU funded programmes, Structural Funds and Interreg Programmes, as well as development and innovation work by or for industry and the public sector. This study has shown that significant ICT R&D is being undertaken within the public sector, primarily fuelled by Malta's drive towards better e-Government services. Also the significant increase in ICT infrastructure over the past fifteen years, and the establishment of a Faculty of ICT has resulted in a considerable increase in ICT researcher human capital base. The bulk of ICT research and the accumulation of critical mass are prevalent particularly at the University of Malta.

Despite various constraints, such as heavy lecturing load of academics, lack of funds for laboratory equipment, ICT knowledge generation at the University of Malta has significantly increased, as reflected in the number of research projects undertaken, papers published in international journals and presented at international conferences, over the last years. The quality of publications is evidenced by the large number of citations by other authors that are reported in the Science Citation Index.

Recent announcements in the budget for 2010 are encouraging in this respect and include the investment of €1.7M which are being allocated to:

- Double the Research and Innovation Fund to €700k.
- Devise a National Strategy for the Development of the Digital Gaming Industry from the Maltese Council for Science and Technology, Malta Enterprise and the University of Malta, towards which €250k are being allocated.
- Grant an allowance of €0.5M to the UoM to set up the Malta University Research, Innovation and Development Trust Fund with the aim of encouraging research at the University and to help in its use for commercial and industrial purposes. Whoever gives a donation of not less than €150 , shall be entitled to a reduction of the same amount from the taxable revenue up to a maximum of €50k.
- Give a refund of 15.2% on expenses on which tax has been paid on research projects approved by the Ministry of Finance and the Maltese Council for Science and Technology.
- Give another substantial incentive for persons and entities undertaking research leading to patents covering their inventions. This benefit shall consist in a tax exemption from royalties and similar revenue, up to a maximum amount to be established, resulting from patents on inventions which qualify under the parameters established in the context of the Government's economic and industrial policy[55].

For a country of its size, Malta shows very good promise in ICT R&D as shown by the substantial amount of ICT R&D projects that have been undertaken or are in progress. A substantial amount of R&D projects are also being undertaken within the private sector, however it seems that most of these efforts remain isolated and fragmented, and not aimed at establishing critical mass but rather competitive advantage.

The reality is that until Malta starts dedicating more substantial funding for research and research grants, while encouraging more PhD students, it will be difficult for research institutes to be able to amass the necessary critical mass for the establishment of Centres of Excellence to the same level as those found in the old Member States and other developed countries.

[55] http://www.timesofmalta.com/articles/view/20091109/budget/reserve-fund-for-enterprises-in-difficulty

However the potential is certainly there especially in niche ICT areas like e-government, artificial intelligence, semantics and digitisation to name a few. The establishment of various ICT R&D schemes offered by the MCST and Malta Enterprise in the form of competitive R&D investment seem to be reaping results, especially in establishing working links between industry, academia and the public sector but certainly more can be done.

5. Analysis of Malta's participation in FP6-IST and FP7-ICT

5.1. FP6-IST

The Sixth Framework Programme contributed circa €10M to Maltese entities during 2002-2006, and was particularly successful in receiving funding from the 'Information society technologies' (over €2.6M); 'Sustainable development, global change and ecosystems' (over €1M); 'Aeronautics and space' (over €1M) and 'Horizontal research activities involving SMEs' (over €900k) priority areas. The European Research Area (ERA) programme aims at improving Europe's innovation performance by stimulating a better integration between research and innovation and helping turning research into useful and commercially valuable innovations. Here, Malta received over €900k in funding.

In FP6 IST (Information Society Technologies) Thematic priority. A total of 126 Maltese organisations participated in 111 FP6 projects, which amounts to 1.1% of the total projects submitted, with the total funding received in FP6-IST being slightly over €2.6M. Seven of the projects submitted were coordinated by a Maltese organisation; 1.7% of the total number of proposals submitted in the IST priority in FP6 included a Maltese partner; and 2.4% of the total number of projects funded had a Maltese partner. Refer to Chart 9. This implies that proposals in which Maltese partners participated were, in relation to the overall average, 1.42 times as much more likely to receive funding. 147 proposals with Maltese participants were submitted in the IST priority between 2002 and 2004, and 27 projects were funded. This means a success rate of 18.3% for projects with Maltese partners, compared to an overall success rate of (583/4319) 13.5% in FP6-IST.

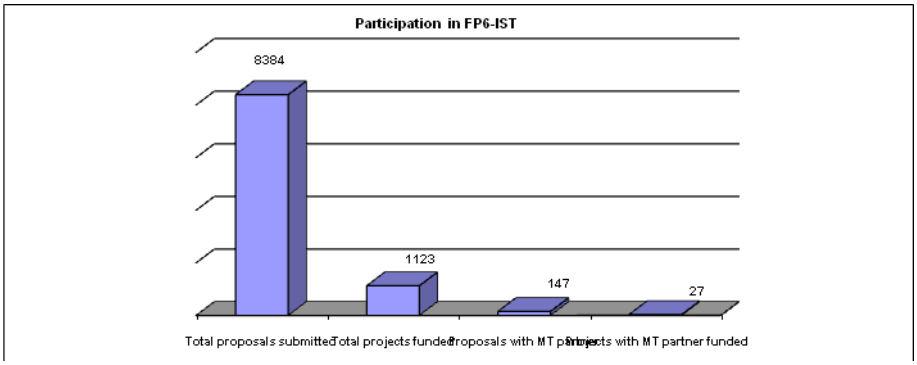

Chart 9 – FP6 proposals submitted, without and with MT participation

The top 5 organisations, in terms of participation in FP6, and in order of most active participation, are the following:

1. **The University of Malta** (www.um.edu.mt) tops the FP6-IST chart, with the overall highest participation in proposals as well as in funded projects, respectively 29 proposals and 6 projects.
2. **Acrosslimits Ltd** (www.acrosslimits.com), a Maltese technology research and consulting SME. It partnered up in 21 project proposals, from which 4 proposals were funded. Through these 4 projects Acrosslimits Ltd established clear working links with 29 project partners.
3. **Malta Council for Science and Technology** (MCST) (www.mcst.gov.mt), the national advisory body to the Maltese Government on S&T policy. The MCST is also the national agency responsible for the management of the local RTDI programme, as well as the national contact organisation for FP7. MCST participated in 14 project proposals of which 2 received funding.
4. **Fondazzjoni Temi Zammit** (FTZ) (www.ftz.org.mt), a Maltese non-profit foundation operating in the field of education and training, focusing mainly on lifelong learning, S&T issues and research activities. FTZ participated in 13 proposals of which 4 were awarded funding, thus establishing links with 58 partners involved in these projects.
5. **Projects in Motion Ltd** (PiM) (www.pim.com.mt), a multidisciplinary research organisation and cluster platform, which participated in 6 proposals out of which 5 had approved funding. PiM established links with 49 project partners through these five projects.

Chart 10 to Chart 12 below provide an overview of Malta's participation in the FP6-IST priority vis-à-vis EU25, EU15 and EU12.

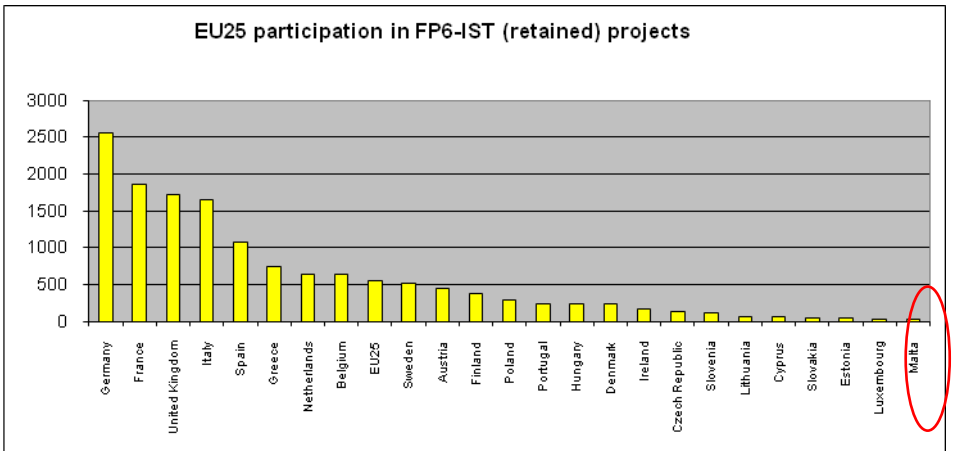

Chart 10 – EU25 overall participation in FP6-IST (approved projects)

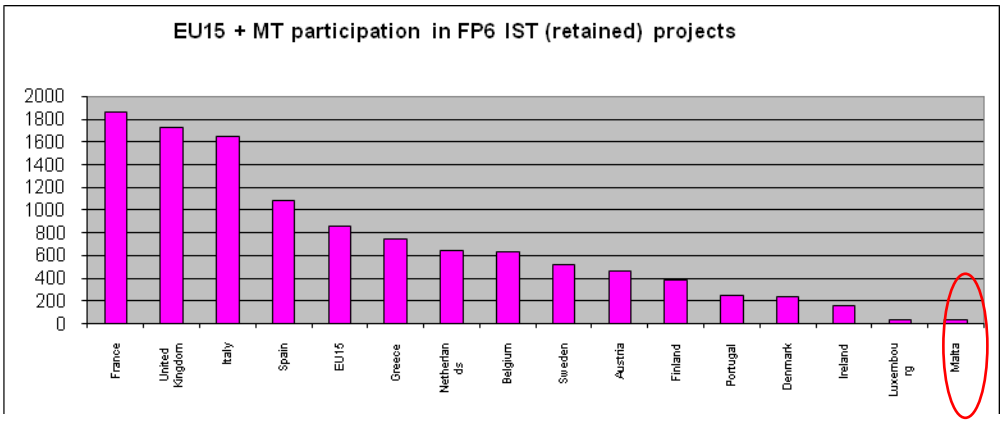

Chart 11 – EU15 overall participation in FP6-IST (approved projects)

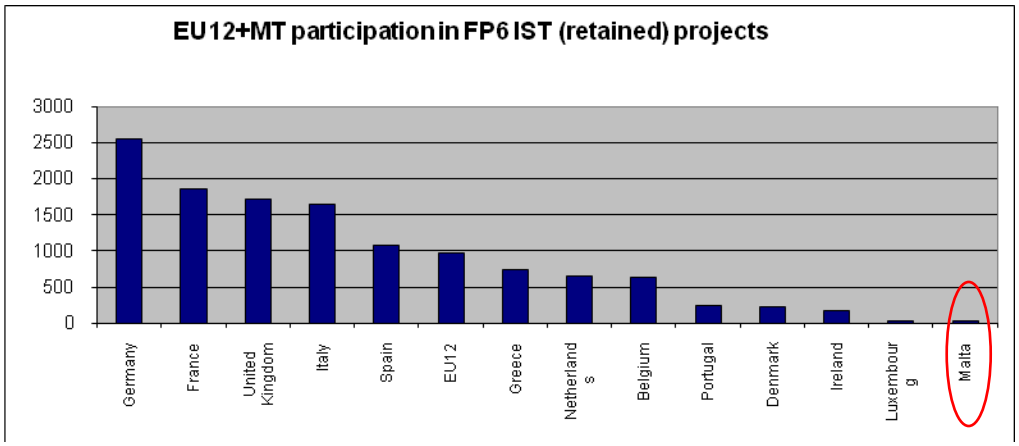

Chart 12 – EU12 overall participation in FP6-IST (approved projects)

In all comparisons Malta places last. The indications are that this is most probably due to the size of the country. In fact, most small member states score in the same manner. The eight countries with lowest number of participation in retained projects are all smaller member states. Therefore, it seems fair to argue that there is a clear link between the country size and its capacity to participate in FP.

5.2. FP7-ICT

In FP7-ICT, **Maltese partners participated in a total of 40 proposals and Maltese organisations received funding for 6 projects, with the total funding requested for successful projects in FP7-ICT estimated at circa €1.5M. This results**

in the highest per capita participation in the accession states.[56] The overall success rate can be qualified as (6/40 =) 15%, which is a bit lower than the (27/147=) 18.3% attained under FP6. However, FP7 is still in the initial phases for such statistical comparisons with FP6 to be meaningful at this stage.

According to a Commission Spring 2009 Report regarding SME participation in FP7, Maltese organisations are participating in 210 eligible proposals (of which 54.3% of participants are SMEs)[57]. 31 organisations are participating in signed project contracts[58], of which 9.7% are SMEs. The foreseen contribution to Malta with regards to signed projects is of €2.8M, of which 14.3% is foreseen to be allocated to SMEs.

The top 5 organisations that participated in FP7-ICT proposals are very similar to the top 5 of the FP6 participation. These are:

1. **University of Malta** (www.um.edu.mt) leading the list with participation in 6 proposals,
2. **Acrosslimits Ltd.** (www.acrosslimits.com) with 5 proposals,
3. **World Match Ltd** (www.worldmatch.com.mt), an e-gaming company, and **Projects in Motion Ltd** (www.pim.com.mt) both participated in 4 proposals.
4. **Ascent Software Ltd** (www.ascent.com.mt), an ICT and software company, participated in 3 proposals.

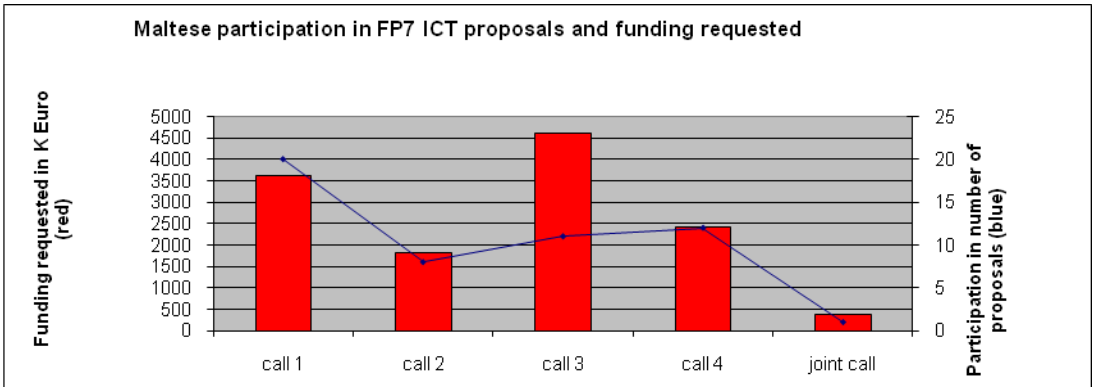

Chart 13 – Relation Maltese participation in FP7 ICT proposals and funding requested, call 1 -4, joint call and FET[59]

Maltese entities mostly participated in Call 1, followed by Call 3 and Call 4 with the most funding being requested in Call 3, amounting to over €4.5M, followed by Call 1 with over €3.5M and call 4 with circa €2.5M (refer to Chart 13). Maltese entities participated least in the joint call, with less than €400k requested funding for one project.

Chart 14 shows the amount of approved projects within FP7-ICT across the EU27 with Malta standing at third from the last. Although this is not a commendable positioning, it is however an improvement when compared to FP6-IST results where the country had participated in a less amount of proposals.

Within the EU15 and EU12 (refer to Chart 15 and Chart 16 respectively), Malta stands in last place.

[56] http://www.independent.com.mt/news.asp?newsitemid=97630
[57] Situation as at 31 December 2008
[58] Situation as at 1 June2009
[59] The funded budget for Socionical (www.socionical.eu) is estimated at EUR 306,480 total cost and a request for EC funding of EUR 231,360. It seems that the Maltese partner took over from the Italian partner once the project started.

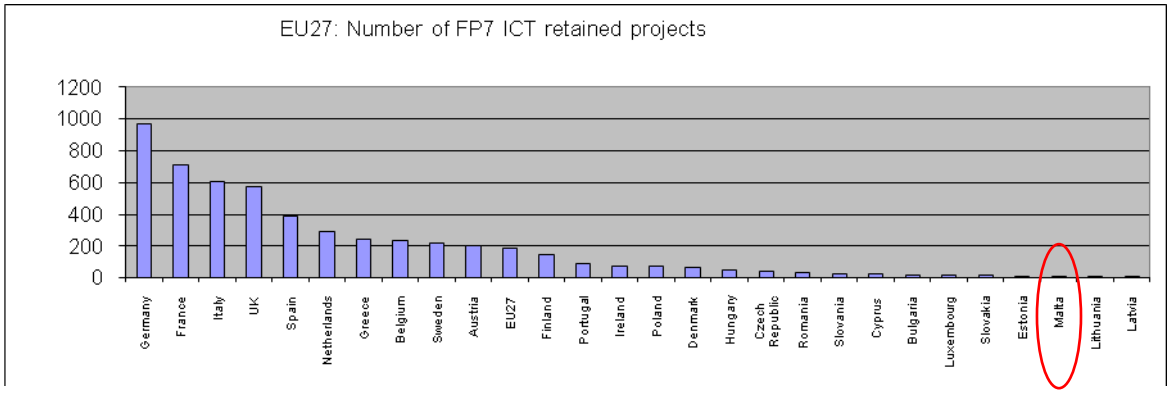

Chart 14 – EU27 – number of FP7 ICT retained projects

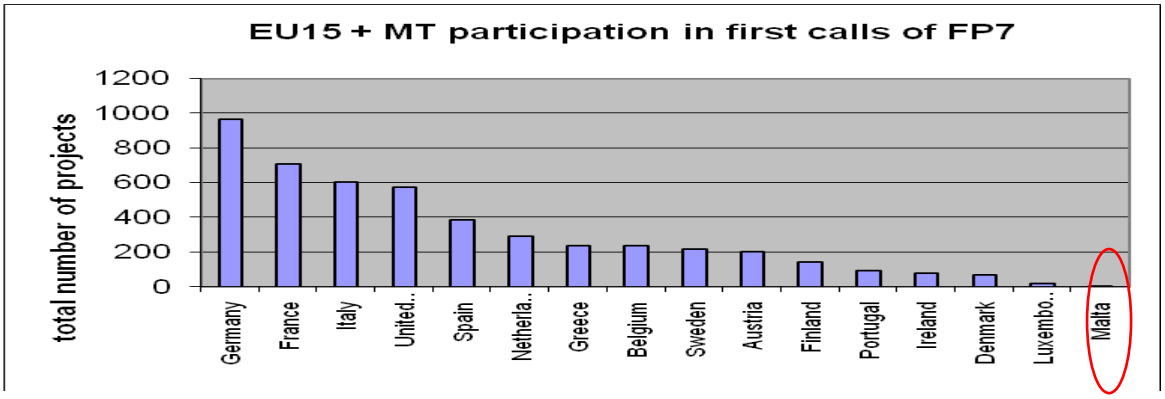

Chart 15 – EU15 + Malta's participation in the first calls of FP7

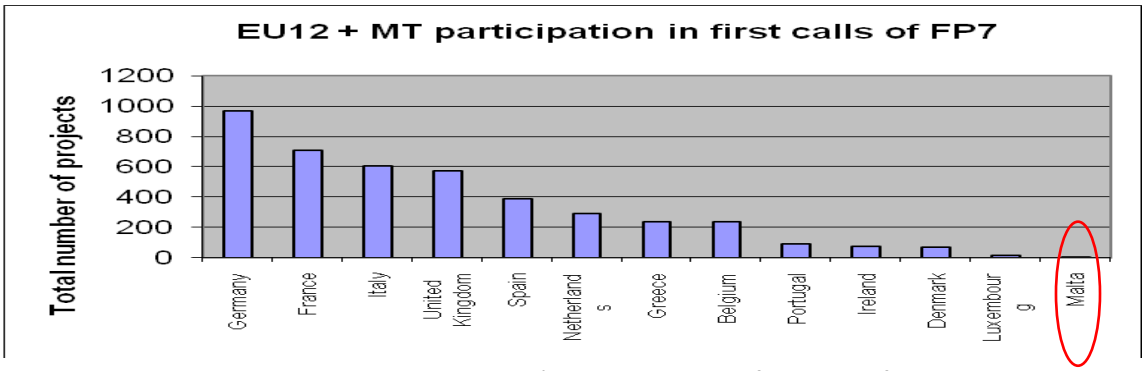

Chart 16 – EU 12 and Malta's participation in first calls of FP7

In all the comparison scenarios detailed in the above charts, it has to be noted that the least performing eight countries in the list are in fact the smallest of the EU Member States, both in terms of population and geographical size. This analysis was also observed during the analysis on FP6-IST, thus strengthens the argument that the size of the Member State has an obvious impact on the country's participation capacity in FP. Following this argument, it can be stated that Malta, being the smallest Member State, and in fact a micro state, might find more difficulties to participate in FP than the other countries.

5.3. Recommendations for Improving FP Participation

The interaction with the major local ICT R&D stakeholders via the live interviews and the online questionnaires pertaining to this study has led to the identification of certain aspects within the local framework that require attention, restructuring or conception, in order to facilitate and improve Malta's participation within the FP7 ICT Theme programs.

The topics that have been identified cover various areas including availability of funding grants and venture capital, human resource cultivation, advancement of the ICT infrastructure and project support services, clustering

opportunities and promotion of R&D culture. The identified areas shall be dealt with in this section and recommendations in each regard are listed for each area.

1. National Funding

Lack of national funds for research projects is considered a weakness by small local organizations.[60] FP programmes alone are not sufficient to cater for the funding needs for Malta. Being a small country, local organisations feel the need for local funds to be made available by government bodies charged with facilitating R&D activity.

The EU FP7 programmes have been valuable in providing an amount of funding made available to Maltese organisations. This is undoubtedly useful, but the FP programmes presuppose international acclaim and publication levels from the local organisations in order for them to form part of a consortium of European Science leaders in the field. This international standing is only built on the basis of research backed by local funds.

The 'National Strategic Plan for Research and Innovation: 2007-2010', compiled by MCST, recommends that Malta allocates 0.75% of its GDP to R&I by 2010. By this year, the R&I budget was supposed to be €3.6M. However as yet, it is only €700k.[61] It is interesting to note that according to official statistics published by NSO, total expenditure by General Government on R&D in 2009 amounted to €11.9M. The majority of expenditure is based on recurrent expenditure most notably labour costs. Furthermore, over 95% of this expenditure refers to expenditure by the higher education sector which is directly financed by Government. The national R&I fund accounts for a only a small proportion of the funds. Data issued by Eurostat on total expenditure by the business sector, government and higher education sector in Malta as a proportion of GDP in 2008 amounted to 0.54%.

Maltese researchers are competing for this money with every MCST call being oversubscribed. This is a sign that there is the drive towards expanding R&D but it makes fund acquisition extremely difficult for most of the organisations. This is a matter of concern also in view of the fact that the number of submitted proposals is increasing every year.

Furthermore, the government should focus more on funding RTD activity that is more likely to generate novel ideas with economic potential for the country and the generation of new jobs.

The recent actions by the government in this regard are commendable; such as the University Trust Fund for Research and Innovation and the system of tax credits offered to companies investing in R&D. Further recommendations to address these issues include:

- To increase the national funding for R&D activity in line with the MCST recommendation of 0.75% of GDP.
- To target and intensify R&D funds with an increased focus in thematic areas of importance to the national economy.
- To create an efficient mechanism for coordination of EU-RF ICT R&D collaboration at the national level.

2. S&T Graduates and PhD Candidates

In order to increase the performance of Maltese entities as R&D Centres of Excellence, there must be a larger influx of S&T graduates and PhD candidates. The development of a clear strategy is required in order to attract more students to post-secondary and tertiary level education, in those specific subject areas that address Malta's development needs and to attract and provide more adults with learning opportunities.

[60] Extracted from DELPHI survey for this project study

[61] http://www.independent.com.mt/news.asp?newsitemid=96205

The government has commissioned an exercise in collaboration with the NCHE with the aim of identifying which subject areas are to be targeted for future skill requirements in order to sustain a competitive economy and ensure having the required skills to do so. However, more collaborative research is required between the University of Malta and the business community to identify future skill requirements and thus improve the responsiveness of education to future labour market requirements.

In this regard, the suggested actions are:

- To formulate a strategy for attracting more students to higher level education in areas specific to the development of Malta's economy.
- To create a forum for collaboration between UoM and the business community with the aim of identifying future market skill requirements and promotion of applied research.
- To promote the Malta University Trust Fund among the business community while ensuring that the research being carried out is in fact relevant to the national economy.
- To create an external policy promoting Malta as an international destination for higher education and to attract foreign investment into the provision of educational services.

3. ICT infrastructure

Unlocking the true potential of physical ICT R&D infrastructures, requires a sound skills infrastructure. Efforts in skills infrastructure are being undertaken by academic stakeholders like the Faculty of ICT, Faculty of Education and Faculty of Engineering at the University of Malta as well as within MCAST.

It has been argued that EU funding serves as a key impetus towards creating better research infrastructures through direct or indirect funding. EU funding enables the creation of local and international research networks, clusters and other infrastructures in Malta and by far outweighs National expenditure and budgets dedicated to capacity building. Part of these infrastructures last solely for the duration of a particular project while others remain functional and are used frequently.

The recommendations in the MCST R&I Plan made to Government that are directly linked to the improvement of R&I/ICT RTD infrastructure include: to increase Government funding, to create supporting frameworks and enabling platforms, to expand the Human Capital Base and to create business-academia linkages for cooperation.

It is argued that an increase in funding for research infrastructures should bring a clear improvement in the capacity and hence the number of participation in FP by Maltese entities.

Close analysis of Malta's participation in FP programmes, clearly shows that Maltese FP participants are not involved in high-end research projects that require substantial infrastructure. Consequently improved research infrastructures as proposed in the MCST R&I Plan could increase even further Malta's FP participation in R&D Collaborative Projects (IPs and STREPS).

Additionally, it is clear that there is a fair mix of educational and research institutions, foundations and other non-profit organisations as well as commercial firms that have participated in FP in Malta. However, SME participation still remains a challenge due to lack of human and financial resources. Improving the research infrastructure, both in physical and educational terms, and improving SME access to existing and planned ICT infrastructures can go a long way in increasing SME participation in the FPs.

With regards to the extent to which RTD infrastructure meets the needs of current researchers and whether the planned infrastructure is adequate we recommend that a detailed study on forecasts would be required to

undertake such an assessment. For example it would be extremely useful to present a demand forecast of ICT students to be able to assess whether the current and planned research infrastructure is adequate or not.

Suggested actions are:

- To increase the national funding for R&D activity in line with the MCST recommendation of 0.75% of GDP.
- To create national supporting frameworks and enabling platforms for efficient ICT R&D infrastructures.
- To expand the Human Capital Base and to create business-academia linkages for cooperation.
- To commission a detailed national study on the extent to which RTD infrastructure meets the needs of current researchers.

4. Venture Capital and Business Incubation

The culture among Maltese organisations for making venture capital available for R&D activity is currently lacking in Malta. Furthermore, the pool of high-tech start-ups from which future companies could emerge is very small.

The actions being suggested in this context in order to increase the birth rate and survival rate of new high-tech companies are:

- Promoting a business and risk-taking culture.
- Government bodies as well as private organisations must be the catalysts for the establishment of venture capital culture.[62]
- Improving the availability of seed money and venture capital.
- Simplifying and reducing bureaucratic requirements for start-up companies.
- Expanding the network of business incubators and other support services for high-tech companies.
- Providing better access of start-up companies to high-quality market information.
- Promoting the purchasing of local high-tech products through government procurement.
- Promoting the export of high-tech products by keeping export taxes low and by promoting high-tech products abroad.

5. SME & Academia R&D and Entrepreneurship Culture

Throughout the DELPHI survey pertaining to this study, it was evident that most business entities have no clear R&D strategy and invest substantially less in both intramural and extramural R&D than their counterparts in

[62] http://www.timesofmalta.com/business/view/20091022/news/r-amp-d-next-step-in-industrial-enterprise-development-me-chairman

advanced market economies. Furthermore, there is a limited capacity and experience of SMEs to absorb innovations from external sources.

The culture amongst local SMEs is that they are averse to engaging in R&D activity since they consider it risky and time consuming. Due to the smallness of such organisations, research activity is considered a misuse of time and human resource tend to be utilised towards more productive short term goals with surer returns on investment.

The importance of an adequate organisational culture and structure for effective participation and management in FP7 ICT projects may be the most difficult step in Malta. The concept of moving towards knowledge-based setups remains crucial in having the necessary competitive edge required to participate effectively and succeed in FP7. Maltese businesses need to aspire to undertake more R&D or learning efforts by which research opportunities can be harnessed and put to productive use. Business organisations need to invest in employee development and enable a continuous learning environment at the workplace however a process of learning needs to be institutionalised to obtain real change and long-lasting cultural attitudes that embrace and instigate R&D opportunities.

The suggestion is to campaign for a promotion of the importance of R&D within private organisations spearheaded by the government through incentives or grant schemes that are tailor made to cater for the special circumstances of the SMEs. In the end all private institutions are concerned about their bottom line, the facilitation of the process of undertaking R&D must be complemented with the facilitation of the transformation of R&D activities into marketable, and profitable, ventures.

Within academia there is a weak entrepreneurship culture, and academic research is currently being given more importance than applied research or its commercialisation. The push towards applied research could create more opportunities for the business community in terms of cutting edge technology and can foster partnerships or increased collaboration between academics and private industry.

The actions being proposed in this regard are:

- To address the lack of an efficient mechanism for coordination of EU and Regional Funds in ICT R&D at a national level.
- To campaign for a promotion of the importance of R&D within the private organisations through government incentives or grant schemes that are tailor made to cater for the special circumstances of the SMEs.
- To organise mass-media and educational campaigns encouraging more focus on creativity, entrepreneurship and innovation.
- To direct R&D activity within the UoM towards applied research spearheaded by the needs of the local economy.
- To address the legal barriers that inhibits public-private partnerships in innovation.
- To promote research and communication links between public entities and private industry.

6. National Support Structures – Communication & Coordination

There must be a stronger and wider-reaching communication of the opportunities available for research activity with regards to available funds, both from the EU and locally. Research support is currently not coordinated and researchers, both in the academic and industrial field, are offered support by numerous entities across the islands which seem disconnected from each other.

National funds for RTD activity are managed by the MCST, ME, the MGSS and the STEPS programmes. Support for ERDF and European Structural Funds is managed by the PPCD. These entities have been overviewed in the previous deliverables pertaining to this study.

These entities are not bound together by a common strategy. It is evident that research support is currently not coordinated in a holistic manner and researchers, both in the academic and industrial field, are being offered fragmented support by several entities across Malta. There is weak coordination of S&T stakeholders across different levels of government and no coordination of ICT R&D collaboration at the national level that compliment EU ICT research roadmaps.

The recommendation is to have a coordinated mechanism through which, ultimately, all the different funds and non-financial support could be channelled. [63]

This will also reduce the duplication of resources, while specific departments may be deployed to chase funds and search for new possibilities, as scientists often find it nearly impossible to effectively juggle between working in their area of specialisation, lecturing, managing projects, accounting and chasing possible resources.

Suggestions from local SMEs to the National Support Structures include a call for improvement in the quality of training seminars in the areas of proposal writing, financial methodologies and project management. It is important to note that while the MCST conducts ad hoc info days about the 7FP these are usually rather superficial and far apart. Much more could be done to bring experts from abroad that could conduct training workshops on the various aspects of FP7 like proposal writing, project management and the financial guidelines to build awareness. A list of potential service providers for this task includes Hyperion[64], Europa Media[65], Single Image[66] and EFP Consulting[67].

The actions being proposed in this regard are:

- To improve information dissemination from national coordinating bodies.
- To sustain a better coordinated mechanism through which professional proposal writing/project management advice related to EU funding programmes can be channelled.
- To provide better training seminars covering effective proposal writing, financial methodologies and project management for successful participation in FP7 calls.
- To create a unified and comprehensive strategy document with the involvement of all above mentioned national bodies in consultation with the UoM and private entities with the aim of improving communication.
- To improve the use of and dissemination of partner searches including a more timely distribution of simple partner searches emanating from projects like Ideal-IST.

7. Political Support and Policy

Political support is needed for R&D activity in Malta. Private entities feel the need for drastic improvement to the political support being offered to ICT R&D activities.

[63] http://www.independent.com.mt/news.asp?newsitemid=96205
[64] http://www.hyperion.ie/
[65] http://www.europamedia.org/
[66] http://www.singleimage.co.uk/
[67] http://www.efpconsulting.com/

Even if the national agencies/bodies are striving to increase R&D activity, they depend on the government's commitment to contribute the necessary funding in order to build the infrastructure, human capacity and capacity-building resources.

In an open letter[68] to the Prime Minister, a number of Maltese scientists have called for the appointment of a Parliamentary Secretary focusing on Research, Science and Technology. This was suggested in the light of the fact that current responsibility for RTD falls within the Ministry for Resources and Rural Affairs, where the Minister's portfolio is vast and consequently RTD and S&T are not given their due importance.

With regards to policy making, the need was felt by local enterprises to have more support by the research community to address market needs. Priority setting procedures are generally weak on a national level and are dominated by the researchers themselves. The business community would benefit from having priority areas set in line with the needs of knowledge and technology users in order to reap results from the research activity and establish Malta as a provider of high-tech or value-added ICT services and R&D.

- To appoint a Parliamentary Secretary for Research, Science and Technology.
- To increase the national funding for R&D activity in line with the MCST recommendation of 0.75% of GDP.
- To set in place priority setting procedures regulating the direction of R&D activity focusing mainly on areas of economic importance with full consultation with the users of the knowledge and technology.

8. International Promotion of Local Organisations

It is important to note that Maltese organisations mainly participate in proposals as partners and not as coordinators/lead-partners. This can be attributed to the lack of experience in managing transnational R&D efforts amongst Maltese organisations, a lack of R&D culture, lack of R&D facilities, low number of researchers and limited national funds dedicated for research. However, it is also attributed to the lack of clear networks and linkages (previous project experiences, research exchanges, private contacts, etc) to major research organisations/centres of excellence in other EU countries that are very active in FP funding. It is evident that better 'connected' participants find it easier to participate, and have better chances of receiving funding for FP projects.

In view of this, the need is felt for the increased promotion of local organisations within the EU Member States to enable recognition of successful and competent Maltese Centres of Excellence and thus facilitating their entry into international teams participating in FP7 ICT-Theme projects. This should be executed through the NCP bodies.

The first step to achieving this is to have an updated central shared database of scientists and RTD organisations in both academic and industrial fields.

- To increase visibility of Malta's ICT R&D competences in Europe through international promotion and relationship building exercises.
- To maintain an up-to-date database of key players (both individuals and organisations) in the ICT R&D field.

[68] http://www.independent.com.mt/news.asp?newsitemid=96205

9. Local Clustering

There is the need to have a national body that coordinates public and private organisations grouped by their area of competence. The aim is to achieve synergy between various local entities in order to establish critical mass and facilitate submission of project proposals within the FP7-ICT Themes.

Research policies must be better coordinated at a national level with a strong effort to be made on providing clustering platforms. The government should encourage R&D activity amongst SMEs by offering the possibility of state-SME joint ventures, research contracts and cooperative research projects in areas of national economic importance.

- To engage a national body with the task of clustering public and private organisations according to their area of expertise.
- To promote clustering efforts of local public and private organisations in order to increase participation and accepted project proposals within the FP7-ICT Theme calls.
- To encourage and offer state-SME join ventures, R&D contracts and cooperative research projects thus incentivising SMEs to improve their research capacity and contributing to the advancement of the economy.

Apart from the issues requiring attention at a national level, Maltese organisations have also put forward their concerns and difficulties on issues that must be dealt with at a European level. Through the execution of the survey, the majority of the participating entities have communicated that the first steps into the FP programmes can be quite daunting and difficulties noted by Maltese organisations include the following:

1. Joining proposals or writing them requires a steep learning curve and considerable experience which is lacking,
2. proposal submission imposes additional workloads and financial burdens on limited resources,
3. establishing transnational and reliable partnerships requires time,
4. financial implications require clear understanding of specific contractual obligations and financial guidelines,
5. finding competent researchers with specific expertise in complex ICT areas, and within short time spans is in most cases difficult,
6. the FP is highly competitive and has high rejection rates.

1. Smallness of local private R&D players

It has been observed that the bigger players in the R&D field prefer to team up with other organisations of similar stature and reputation. This leaves the small players from the smaller member states, such as Malta, out of the picture and with a limited number of opportunities for building teams.

There is the need to increase the awareness that small organisations can give a valid contribution to R&D activity and to incentivise participation of such small organisations within teams.

The suggested action from local private organisations is to include an obligation whereby project proposals must include team players of smaller size but with high technical potential. This is also in view of the fact that SME participation rates are still very low especially in the new member states.

Furthermore, the establishment of an EU-wide system that analyses area, country and country-group specifics would help to identify small R&D players that have a potential to contribute to larger projects. This is to be done in collaboration with the local NCPs. Countries would report the needs and opportunities of their R&D scenario and thus

create common collaborations and best practices within the EU FP programmes. This EU in-house system would provide a basic analysis of scientific and technological profiles amongst the countries to support weaker member states and create a common basis for the definition of opportunities.

2. Opportunities for highly focused R&D projects

In the case of small countries such as Malta, with a number of entities with limited R&D infrastructure, the majority of the R&D projects are small and are particularly focused on a narrow theme that does not involve an extensive geographical spread.

This is the nature of the majority of the R&D projects undertaken by local private organisations that have the technical knowledge required but not the necessary infrastructure in terms of equipment and finance. Local organisations feel the need to have more opportunities made available to them in this respect.

The EU should give importance to this situation by including a fair amount of small projects within the approved budgets for FP projects. This can be done after an evaluation of the international dimension of the country's R&D players and their specific outcomes such as publications, patents, etc.

Together with the local NCPs, EU officials will recognise those players and specific areas that are highly active in the country and allow openings for these small entities to compete for funding set aside purposely for small scale but highly focused R&D projects.

3. Simplification of application process within FP calls

The feedback obtained during the DELPHI survey process pertaining to this study has indicated that the current FP application process is regarded as very complicated and time consuming. Considering the smallness of Maltese private organisations with limited human resources, the time resources are limited with individuals having to cope with executing various tasks in order to keep the organisation running and at the same time sustaining the required competitive advantage. The DELPHI survey conducted within this study has highlighted a concern from individuals who do not have the time to go through the lengthy application process since it forces them to fall back on other priorities within the organisation.

However, the opportunity offered by the FP programmes is undoubtedly recognised and the suggestion is to have a more simplified and streamlined application process across all calls.

4. Payment Terms

Of particular concern in this area is the instances of late payments by the EU FP authorities. Timeliness of payments is crucial in sustaining the activity of a research entity and especially in the case of more vulnerable R&D players, such as individual researchers and small- and medium-sized companies.

Improvement in payment timeliness can be achieved through regular internal EU monitoring of dues and simplified associated procedures.

Of benefit to the entity awaiting payment would be to pay interest accordingly with the delay incurred, although this is not the best solution for both parties.

6. ICT Infrastructure

E-infrastructures are defined as next generation transnational ICT research and education infrastructures that provide researchers with a controlled, secure, seamless, easy and economical access to shared science and engineering resources, through a fully integrated and advanced information and communication infrastructure.

This essential infrastructure is already fundamental for scientists around the globe and has the potential for eventually changing the everyday life of all citizens. [69] Consequently, this constitutes an important item on the EU agenda where an important EU goal is the creation of an ERA based on e-infrastructures, where researchers living and working in different countries have on demand access to state-of-the-art networking, computing services, instruments and scientific resources, in order to pursue their research.

This chapter discusses the existing and planned physical and educational ICT research infrastructures in Malta, and any relevant support schemes that can foster ICT infrastructural development. From this research it can be concluded that there are no private ICT research infrastructures in Malta of sufficient dimensions and quality to be worthy of mention within the scope of this report.

6.1. Physical Infrastructure

The Maltese Government has been prioritising IT in its agenda for more than two decades. Over this period, Malta has progressed in leaps and bounds from its infancy stage to a fully fledged leader in all aspects of the Information and Communication Technologies (ICT) spectrum, both according to local and international standards. A consistent central pillar of this rapid improvement was public policy and investment in ICT. The quantum leaps in the sector have led Government in declaring ICT as one of its aspiring six centres of excellence to be realised by 2015.

The review of the local ICT physical infrastructure includes the following elements:

1. **Broadband Communication**

   Malta's Broadband Strategy[70] was the outcome of a joint effort between the (at the time) Ministry for Competitiveness and Communications, the Malta Communications Authority and the Ministry for Information Technology and Investment (MITI). It adopted the common principles present in the majority of the broadband strategies of other countries but it also recognized the particular characteristics of Malta's geographical isolation which gives rise to the presence of some remote areas with no or little internet connectivity.

   The sudden disruptions registered in 2008 in international connectivity caused widespread havoc in Malta, but the recent submarine cables connecting Malta to the European grid finally ensured the nation can react quickly to connectivity outages. Recent legislative amendments have also put in place a mechanism whereby providers of international bandwidth have to have redundancy schemes in place with their competitors in situations where outages occur and therefore traffic needs to be transferred through another cable.

   The Ministry for Communication needs to pursue more aggressively its efforts to improve the resilience of international connectivity critical infrastructure with the telecoms providers in order to ensure that any future accidents have a lower impact on the Maltese economy and information society. This includes facilitating more connections to mainland Europe (laid via alternative routes to the existing ones), North Africa and potentially to the Middle-East, landing in different locations and connecting to different nodes, hence establishing Malta

[69] ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/e-infrastructure/20070608-e-infrastructure-folder_en.pdf
[70] http://www.vus.sk/broadband/nbbs/mt_nbbs.pdf (Dec 2004)

as a real regional hub for electronic services. Additionally new fiscal incentives to assist private enterprise in investing in more connectivity need to be drawn up as soon as possible.[71]

2. GEANT at the UoM IT Services Centre

In collaboration with foreign institutions, the UoM is carrying out ICT research in the EUMEDCONNECT[72] project that seeks to create a high performance computer network in the Mediterranean in order to improve collaboration among scientists. The countries in the Mediterranean region that are able to benefit from the EUMEDCONNECT project are Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, the Palestinian Authority, Syria, Tunisia and Turkey. The network aims to provide support to projects in the Mediterranean region, in particular in the fields of e-science and e-learning. It connects the national research and educational networks of 11 of the project's 12 partners at speeds of up to 622Mbps.

GÉANT offers the research community in Malta a unique capability to enable ground-breaking research collaboration though high speed connectivity and advanced services is one of the most prominent European success stories. While Malta' GEANT efforts are commendable, much more effort needs to be done to ensure better uptake of its research potential and facilities across the Maltese research community.

3. IP V6 Task Force

The objective of the Task Force, led by the Malta Communications Authority, is to explore the required milestones leading to an eventual nationwide transition to IPv6. ***The Task Force should act as a Centre of Excellence on IPv6 and evangelise the need to fast-track transition.***

Connections with similar groups in other jurisdictions shall be established to ensure that Malta remains at the forefront of best practice in this area. Research will also be carried out to accumulate knowledge and develop competencies.

Links to other, similar organizations will also be set up. In fact the Maltese Task Force has just been affiliated to the EU IPv6 Task Force.

4. Super Computer Cluster, Faculty of Science, UoM

Through the utilisation of Structural Funds (2007-2013), the UoM is currently in the process of setting up a super-computer laboratory led by the Department of Physics within the Faculty of Science. The lab will be a university-wide resource and will be available to all students and researchers. To date, the lab is installed and operational and currently running simulation programs.

Even though the cluster is still at implementation phase it remains crucial that the necessary strategies for industrial involvement and coordination among local authorities and university are in place in order to garner the necessary critical mass for its use in a meaningful way.

5. SmartCity Malta

SmartCity Malta[73] is a joint venture between SmartCity (Dubai) and the Government of Malta and is a self-sustained township/technology park for the knowledge economy. Currently in the first phases of construction, SmartCity's vision is to create a global network of self-sustained business townships to foster the knowledge

[71] http://www.timesofmalta.com/articles/view/20080806/local/fault-on-submarine-cable-affects-overseas-links
[72] http://www.eumedconnect.net/
[73] http://www.smartcity.ae/malta/index.html

economy. ***Recent doubts have been raised[74] following a slowdown in the project implementation, confirming the general impression that the project was faltering. [75] Government needs to pursue more concretely this crucial project and ensure that the public is kept informed about whether this project will actually materialise.***

6. European Network of Living Labs and MARSEC-XL

EuroMedITI[76] is a Malta-led European Initiative for Innovation and Economic Growth in the Mediterranean Region. The principal objective of EuroMedITI is that of engaging European and Mediterranean Businesses, Academic and Research Entities, and National Governments for the development, customisation and deployment of innovating technologies in sectors that have a special relevance to the Euro-Mediterranean Region.

While the efforts at EuroMedITI are commendable, very little information is available on the progress made and the status of the infrastructures mentioned. However it is clear that more resources need to be placed at EuroMedITI, and more political commitment given to ensure it achieves these ambitious targets. Attempts to reach the office at EuroMedITI proved futile.

7. ICT Cluster of Excellence Gozo

On 24 June 2009 Malta Government Agency EuroMedITI Ltd and Synaptic Laboratories Limited signed a Partnership Agreement. The Partners will undertake a detailed four month study for the establishment of a globally unique, virtual ICT Cluster of Excellence in Gozo. [77]

The tools and processes developed by the organizations involved in the proposed cluster are expected to provide sophisticated protection against this risk, as well as preventing unauthorized access to Government and corporate operating systems and programmes, which would be possible through the use of quantum computer attacks.

8. Geographical Information System (GIS) Alliance

The Government of Malta signed a strategic alliance agreement with ESRI[78] to facilitate the use of GIS technology throughout various sectors of the government and private industry.[79] This agreement aims at encouraging and supporting the local ICT industry in organizing itself into specialized niche areas to provide a comprehensive suite of services. ***According to the 'Spatial Data Infrastructures in Europe: State of play. (Autumn 2006)' report, no Maltese National Spatial Data Infrastructure (NSDI) policy framework is in place.[80]***

In this report one of the main difficulties identified for Malta with regards to GIS is the lack of resources to convert digital data, and more effort needs to be given to this crucial field.

9. Business Process Outsourcing (BPO)

A relatively new economic sector contributing to the Maltese economy, BPO is one of the most recent success stories to emerge in Malta. Call centres offering multilingual services across a diverse range of business sectors from financial services to airline reservations which have been enjoying significant success, while other areas such as shared services, data processing and management services are quickly gaining ground.

[74] http://www.maltastar.com/pages/ms09dart.asp?a=4487
[75] http://www.timesofmalta.com/articles/view/20090917/local/smartcity-slowdown-confirmed
[76] http://www.euromediti.com/index.asp?cat=20
[77] http://www.euromediti.com/news.asp?news=25
[78] http://www.esri.com/about_esri.html
[79] http://www.esri.com/news/arcnews/fall07articles/malta-partners.html
[80] http://inspire.jrc.ec.europa.eu/reports/stateofplay2006/rcr06MTv101.pdf

While call centres may be the most visible and successful sector of the BPO industry other areas of Malta's service economy are equally gaining a foothold in providing high performance services. A broad range of service areas from consulting, shared services, data processing, data storage, digital media and software development projects are being delivered from Malta, offering companies significant cost reductions and improved operational effectiveness.

10. i-Gaming infrastructure

It can be argued that one of the greatest success stories of the ICT sector in Malta to date is in the area of online sports betting better referred to as i-Gaming, e-Ggaming or remote gaming. Launched fairly quietly along with ground-breaking and highly sophisticated dedicated legislation just a few years ago, within months Malta has attracted some of the biggest headliners to move to Malta, including Betfair, Expekt, Unibet, Interwetten and CBM Bookmakers and today hosts 10% of all i-Gaming companies in the world. Respected across the world for its excellent regulatory framework and reliable infrastructure (though vulnerable as mentioned earlier), Malta's i-Gaming sector is registering new i-Gaming companies regularly - adding further to the strength of this sector.[81]

However it is important to keep in mind that Malta's i-gaming legislation is fairly vulnerable and Member states are pushing towards the fair treatment of gambling services in the internal market. Consequently if better tax regimes are offered elsewhere, the sector could easily seek alternative operation.[82]

11. Kordin Business Incubation Centre (KBIC)

Malta Enterprise currently manages the Kordin Business Incubation Centre (KBIC)[83] offering a common administration facility for its clients and a range of other services including access to finance, management counselling and the linkage to expert advice.

Preparations are underway to create a new incubation centre worth €2M which will focus on attracting more innovative enterprises. The new incubation centre which would specialise in biotechnology and human sciences, while the current centre would focus more on engineering-based projects, the maritime sector and ICT. [84]

While this is an important pillar for providing attractive spaces for innovative companies, results in the past have not been very encouraging for the ICT domain, and more needs to be done to assist companies with more ambitious plans to make use of this opportunity, and create value added.

12. Malta Industrial Parks and Life Sciences Centre

Administered by Malta Enterprise, the Malta Industrial Parks Ltd (MIPL) provides competitive rents for Maltese factories or companies, ensuring that rent is better priced and thus contributing towards the sharpening of the competitive edge of the manufacturing sector. ***These efforts will help provide the necessary spaces and impetus for the creation of new ICT setups, in close proximity to each other and hopefully enable more focused clustering opportunities.***

13. Malta National Laboratory

The Malta National Laboratory Co. Ltd (MNL)[85], which commenced its operations in 2000, is an independent provider of scientific testing services. The mission of the company is "to be an autonomous scientific facility

[81] http://www.maltaenterprise.com/ict.aspx
[82] http://www.timesofmalta.com/articles/view/20090908/local/eu-court-deals-blow-to-international-internet-gaming
[83] http://www.maltaenterprise.com/starting_a_business.aspx
[84] http://www.businesstoday.com.mt/2009/06/10/t6.html
[85] http://www.mnl.com.mt/

capable of serving the needs of industry and public interests in a customer oriented and commercial manner in compliance with international standards". It's four main operative divisions are Chemical, Biological, Forensic and the Engineering Divisions. It is Malta's largest analytical laboratory with state of the art equipment offering a wide array of testing services to both the public and private sectors.

EU accession has created new demands for extended testing services and for the provision of related services such as inspection and certification. To our knowledge very little attention has been given to ICT standards, and activity at MNL is barely visible.

14. National Metrology Services

The labs have been set-up jointly with EU funds co-financed by the Malta Government and are managed by the Malta Standards Authority. ***It is also relevant to note that the MSA has been awarded ERDF funding in connection with its project proposal for "Developing National Metrology Capacity in Support of Industry". For this purpose, €1M of funding has been made available to furnish the required instrumentation, refurbish the already available site and acquire the necessary training and accreditation in the areas of development.***

Such a facility could provide industrial and academic players with the necessary benchmark data for process improvement, check fixtures, automation equipment, coordinate measuring machines, force gauges and Finite element analysis (FEA) computer simulation techniques used in engineering analysis.

In general it can be said that Malta has created a reliable physical ICT infrastructural set-up which forms the core of ICT research infrastructure available.

6.2. Academic Infrastructure

If the potential of physical ICT infrastructures is to be fully unlocked, then it needs to be complemented with sound skill infrastructures. Research infrastructure must be combined with appropriate skills and knowledge in order to lead towards effective application, since without the relevant skills and knowledge the infrastructure cannot be used to its full potential.

1. University of Malta

The UoM provides 93% of tertiary level programmes offered in Malta. Funding for public higher education institutions is allocated through the Ministry for Education, Culture, Youth & Sports. As the principal research performer in this sector, the UoM absorbs the largest proportion of these funds. Other important sources of funds include those secured through EU programmes (such as the Research Framework Programme, Leonardo da Vinci etc.) and structural funds earmarked for both infrastructural capacity building and research projects at the university and vocational colleges. Amongst recent projects of the university are the new faculty of ICT and the upgrading of laboratories in the engineering, chemical and biology fields.[86]

The UoM has recently been awarded €17.3M from the ERDF for a three-year project entailing the construction and completion of a fully functional brand new state-of-the-art building for the Faculty of ICT[87]. The building shall allow the Faculty to offer high-quality day and evening degree courses at both under-graduate and post-graduate levels, as well as various diploma and training courses. The overall aim is to have an ICT Faculty building that shall contribute to the knowledge infrastructure and research capacity within the University.

[86] http://cordis.europa.eu/erawatch/index.cfm?fuseaction=ri.content&topicID=66&parentID=65&countryCode=MT
[87] http://www.um.edu.mt/ict

The Government's commitment to such initiatives as SmartCity and Smart Island might imply that more ICT graduates will be needed in the future. Government targets for 2010 are to ensure that there will be 1500 ICT graduates every year coming out of MCAST and the UoM.[88] The University's output currently stands at about 40 to 50 graduates per year and thanks to this new Faculty building, the UoM will be able to house a greater number of graduates. This project also offers the Faculty the means to induce further interest in the field of ICT and foster the growth of a healthy ICT research community, thus providing the right environment for effective collaboration between the UoM and other academic and commercial organisations.

The UoM is the government reference point in terms of RTDI advice, support and services, as it brings together key technical expertise in S&T through its research facilities and institutes, and is also a research performer for industry to which it provides a range of expertise and services. It is the key R&D player in Malta.

The reform of the university that is currently underway is placing greater emphasis on the need for improving research facilities and the need to attract and strengthen a population of post-doctoral researchers.

2. Malta College for Arts, Science & Technology (MCAST)

MCAST[89] provides vocational and professional education and training. Through a number of specialized institutes, MCAST aims to build a workforce with the necessary skills to support economic development in emerging sectors such as ICT. One of the goals of the college is to start offering first degree level programmes in the near future. ICT education and research falls under the responsibility of the Information and Communication Technology Institute[90].

3. National Commission for Higher Education (NCHE)

The NCHE[91] is a consultative and advisory body to government on the higher and further education sectors. Through it's mission "*to promote more and better further and higher education to empower students with knowledge and skills for their future*", it is entrusted with the furtherance and expansion of higher education to meet education requirements.

It acts as a broker between the government and relevant higher education institutions by successfully establishing a structured dialogue, through a series of regular consultations with all stakeholders in the sector to take on suggestions, recommendations and address concerns for the sector and that would serve as input towards the development of a national strategy for higher education.

4. Malta Council for Science and Technology (MCST)

Reporting to the Ministry for Resources & Rural Affairs, MCST[92] is the principal agency on S&T policy and initiatives. Its main responsibility is for the coordination of science, technology and innovation policies at the national level.

MCST has recently obtained funding the European Regional Development Fund to undertake a project titled "Manufacturing Research Platform". One of the action lines of this project is the undertaking of three research projects in manufacturing that are to serve as a vehicle of increased collaboration between industry and academia. Specifically one of these three research projects aims to undertake applied research on the theme Exploiting ICT in Manufacturing organisations operating in the Maltese Islands.

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[88] The National ICT Strategy for Malta 2008-2010
[89] www.mcast.edu.mt
[90] http://www.mcast.edu.mt/institutes_informationandcommunicationtechnology.asp
[91] http://www.ppcd.gov.mt/07_13
[92] http://www.mcst.gov.mt/

Also, MCST manages the National Investment Programmes[93] under the National Research & Innovation Policy 2007-2010. The National R&I Investment Programme is a funding programme providing financial support for R&I projects in the fields of science and technology.

MCST is also the National Contact Point organisation (NCPO) and responsible for creating awareness and providing support for EU's Research and Development Framework Programme (FP7). While this effort provides basic information on participation in such a programme, more could be done in promoting this crucial programme. In August 2009 MSCT launched a *Call for Applications for participation in Brokerage Events* to facilitate participation in FP7 through participation in brokerage events.[94]

5. Malta Enterprise

Even though ME does not undertake any R&D itself, it is a crucial element in Maltese ICT R&D since it co-finances a number of research projects, both directly and indirectly. Malta Enterprise (ME) has been appointed as an intermediate body responsible for administering six ERDF Grant Schemes operating under Malta's OP I Cohesion Policy 2007-2013. The schemes, "20millionforindustry"[95], were announced in the government budget speech for 2009.

Malta became a member of EUREKA[96] in 2006 with ME as the national coordinator. ME has successfully facilitated the participation of a number of companies including Maltese SMEs in the programme in sectors of activity including environment, clean energy and engineering.

The ME FP7 Exploratory Award Scheme[97] provides assistance, in the form of a grant, to help SME's develop project proposals for submission to the European Commission's Seventh Framework Programme (FP7). The Fund is intended to stimulate the capacity of SME's to participate in FP7 through aiding businesses overcome the barriers and challenges faced in developing and submitting successful proposal submissions.

Unfortunately an important factor impeding the establishment of Centers of Excellence is the lack of researchers and PhD students /graduates. According to the UoM, the number of PhD researchers employed by the University working on R&D projects in 2006 was 357 males and 67 females. The ICT Faculty at the UoM currently has circa 23 PhD candidates. Consequently it is expected that the new Faculty of ICT building will adequately provide the ICT infrastructure and drive for both the current ICT faculty to grow and conduct R&D; and to support more PhD students who wish to continue their ICT studies locally.

6.3. Improving Malta's ICT Infrastructure

To fully exploit the potential of ICT collaboration and research and the ambitious ICT infrastructure that is being planned, a number of issues raised by various local stakeholders, like the Federation of Industry, as a reaction to the 2010 Pre-Budget document[98] need to be addressed. These include the following generic recommendations that are of interest to ICT infrastructure:

- The construction of new factories should not relate solely to the provision of land at favourable rates, but more importantly to the need of upgrading the concept of industrial estates to industrial and science parks, featuring a strategic concentration of activities backed up by shared facilities,

[93] http://www.mcst.gov.mt/page.aspx?id=39
[94] http://www.mcst.gov.mt/news.aspx?nid=171
[95] http://www.20millionforindustry.com/
[96] http://www.eureka.be/contacts/member.do?memId=MT
[97] http://www.mcst.gov.mt/page.aspx?id=76
[98] http://www.budget2009.com.mt/media/Flimkienghalgejjienisostennibli.pdf

- The grant schemes currently being put into action by ME through the new Malta Enterprise Act should be further enhanced so that they reach a wider range of small businesses that are willing to take up the challenges of innovative research, development and internationalisation. Eligibility should be extended to more sectors and not merely to manufacturers, so that the present discrimination between enterprises qualifying for state aid is furthered rewarded, including those relating to research and innovation. [99]
- Expansion of KBIC remains an important measure, since aggressive support to those start-ups which show promise of innovation, needs to be provided in order to induce growth. The Business Incubation Centre requires dedicated support to ensure that the new budding entrepreneurial firms get the appropriate level of hand-holding in the initial two years of their operation. It is essential for the Centre to be equipped with sufficient managerial talent in this regard.
- Setting up an Entrepreneurship Research Unit to help SMEs access EU Funding and provide better coordination of national SME policies to increase the SME contribution to Community programmes, and ensure that the projects that are supported would have a better economic impact.
- Establishment of a one-stop-shop for business support that tackles the existing barriers for information and communication flow between different government entities.
- Heavier investment towards ICT infrastructure that will contribute to enhance the performance of all SMEs, and upgrade Malta's enterprise profile.[100]

Other key challenges towards ensuring the planned infrastructure highlighted in this document meet the needs of ICT researchers locally also need to be tackled and these include:

Overcoming human obstacles and resistances

ICT infrastructural success is a matter of mindset rather than technology. It requires human resistances and obstacles to be identified and addressed as early as possible in order to ensure that everyone is given unencumbered access to the new facilities to fully appropriate and exploit new technologies.

Integrating systems, services and delivery channels

The key to ICT infrastructural uptake and success lies in integrating services across organizational boundaries and across layers of the public and private sectors, and to manage a horizontal and vertical integration smoothly. Efforts by MITA as outlined in their Strategic Plan 2009-2012 intend to address this.

Enabling interoperability on a wide scale

ICT infrastructures require information systems to speak the same language, which means having not only a common alphabet but also a vocabulary. In technical terms, it requires norms and standards to be defined. Efforts by MITA as outlined in their Strategic Plan 2009-2012 intend to address this.

Strengthening European cooperation and joint working

The EU and current and future Member States must increasingly work together to develop common norms and standards for interoperability, implement pan-European e-government services, enhance the effectiveness of benchmarking and the exchange of best practices, and in some cases share the financial burden of developing e-government systems and infrastructures. This is still not something that seems to be addressed concretely and holistically.

Enhancing private sector contribution towards ICT infrastructure

Governments can benefit from private sector expertise and experience in many ways: innovative thinking, technical know-how, infrastructure deployment, process re-engineering, project management, risk management and even project funding. To achieve excellent ICT infrastructure and all it entails in terms of flexibility and responsiveness, the

[99] http://www.budget2009.com.mt/media/constitutedbodies/GRTU_Recommendations.pdf
[100] http://www.budget2009.com.mt/media/constitutedbodies/MFOI_prebudget2009.pdf

public sector will therefore increasingly need to establish partnerships with private players and in some cases outsource IT systems or even business processes where necessary. Government will gain from exchanging experience in this area in order to build adequate relationships with their private suppliers and partners.

Strengthening ICT infrastructure leadership at all levels

All the above-mentioned challenges can only be successfully addressed if ICT infrastructure locally benefits from strong leadership at all levels and not just at the Ministry of IT and Investments. This shared leadership is a prerequisite to ensure political and organizational commitment and timely delivery of the planned infrastructure, while reducing resistance to change and addressing public sector-specific cultural issues in a positive way.

7. Survey Analysis of Malta's ICT RTD capabilities

The overall aim of this study is to identify the competences of local ICT R&D players and to suggest actions to be taken to improve their participation within FP calls. In order to gather perceptions and information from the key ICT R&D players in Malta, a DELPHI structure based survey process was utilised. The survey seeks to gather views about the potential of various IST application areas to contribute to EU goals, the key players within these areas, the particular types of application that are most promising and where EU capabilities were strongest, together with the problems and barriers that are faced, impeding performance to EU required levels.

The survey also served to analyse the present situation of Malta's performance within the FP7-ICT Theme areas. Therefore, the study also contained discussions around aspects of the FP system among an expert participant base from local public and private institutions and entities. The technique utilised to implement the survey is described in detail in Report 6.

A total of over 350 entities were contacted and invited to participate in this study resulting in a total active participation of 36 entities. 82% of the participant base were identified by the contractor during the selection process while 18% were identified through referrals from within the same participant base. Those entities that refused to participate to the survey did so for either of two reasons; (i) the organisation is a national authority and does not undertake research activity, or (ii) the organisation decided to withdraw participation due to business interests.

When considering the small number of local entities that actually participate in the FP program, this participation rate was something to be expected. Prior to sending out the invitations and dissemination through the referral lists, the authors acknowledged the fact that a number of the invitations would fall on deaf ears, i.e. arriving at organisations that are not interested in participating in FP and who would thus look on the survey invitation as a waste of time and resources for their organisation. This perception has been confirmed through the responses received, where only 10% of the entities contacted (36 out of 350) responded to the survey invitation.

Overall, the participating organisations were helpful and cooperative in completing the survey and in allocating time to the contractor.

All participants to the survey, including those that have taken a role in an approved project, those who have submitted proposals but were not accepted and also those who have never prepared a project proposal, were asked to identify the benefits they expected to gain through participation in an FP project, and also to identify what are considered to be the main barriers to participation in the FP calls. The results are listed in descending importance in Table 7 and Table 8 respectively.

Benefits obtained through participation in FP	% of participants
Funding of R&D projects	17%
Establishment of new contacts	17%
Acquiring knowledge of new methods and techniques	15%
New product / service development	14%
New knowledge of the area or the market	13%
Improvement of an existing product	10%
Knowledge of different cultural environment	9%
Development of patented know-how	4%
Enhanced reputation resulting from increased exposure	1%

Table 7 – Major benefits gained or expected to gain through participation in FP projects

Barriers faced when applying for FP calls	% of participants
Administrative complexity of running a project	32%
Insufficient financial resources for starting a project	28%
Difficulty to find a reliable and competent partner	17%
Insufficient awareness of the programme	13%
Insufficient understanding of programme conditions	10%

Table 8 - Major barriers to participating in FP program calls

7.1. Identification of local ICT R&D competences

The survey also allowed the identification of the key ICT R&D players in Malta. A full list of the players split by their competences in line with the FP7-ICT Theme Challenges and Objectives can be found in ANNEX V.

Chart 17 illustrates the size of the expert base per FP7-ICT Theme Challenge as identified following the execution of the survey. The chart contains a further split between private or public organizations or individuals performing ICT research per Theme Challenge.

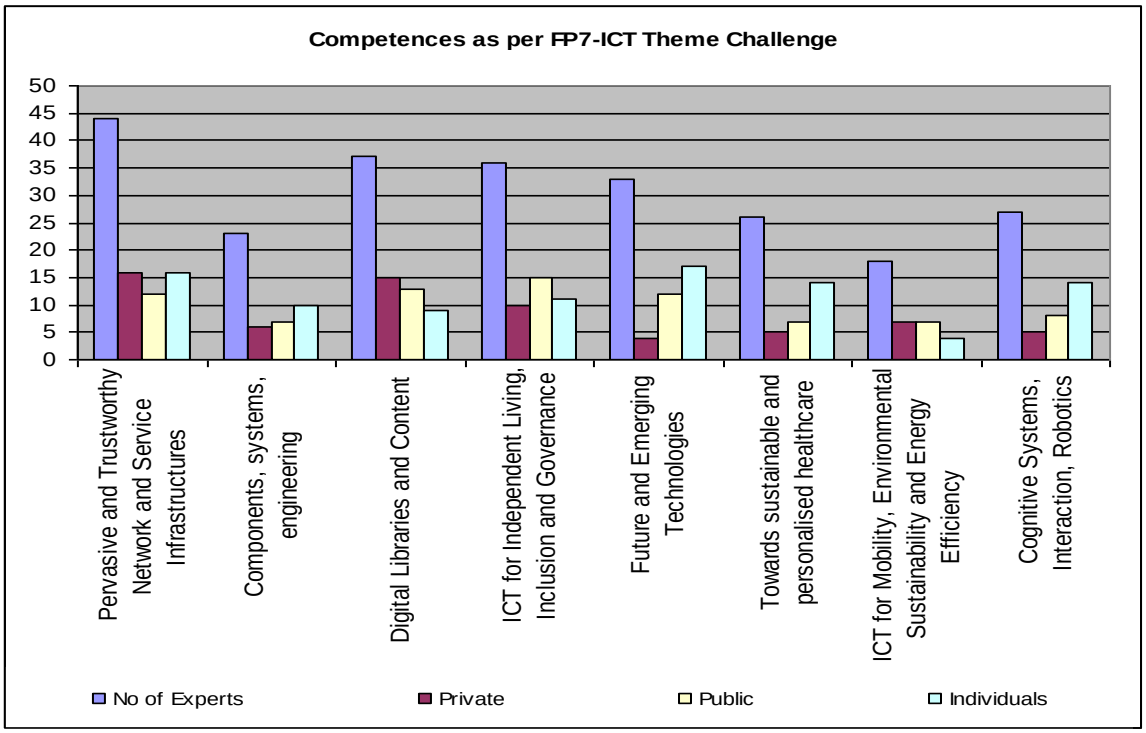

Chart 17 – Split of identified competences among FP7-ICT Theme Challenges

In five out of the eight FP7-ICT Theme Challenges, it can be seen that the majority of expertise lies with the individual researchers and thus within the Faculties at the UoM where these persons perform their R&D activity.

From an overall perspective, it can be concluded that ICT R&D activity in Malta is well distributed among the various FP7-ICT Theme challenges and objectives. A strong base of expertise was observed to be originating at the UoM. This overall dominance is reasonable when considering the nature of the organisation that is geared to pure R&D activity and furthering technological expertise.

All participants to the DELPHI survey have indicated that the FP7-ICT Theme topics are in line with their research interests.

The competence matrix (refer to Table 9) was compiled following an analysis of the identified competences of local ICT R&D players in relation to their publication levels. The competences in each of the strategic objectives where then matched against statistics of applied and retained proposals relative to those same strategic objectives.

Objective Number	High Competence - Low Share	Entities that claim competence	Entities that actually participated in FP6/FP7 thematic areas		Objective Number	High Competence - High Share
ICT-2009.1.2	Internet of Services, Software and Virtualisation	16	0		ICT-2009.4.1	Digital libraries digital preservation
ICT-2009.4.3	Intelligent Information Management	14	0		ICT-2009.4.2	Technology enhanced learning
ICT-2009.7.3	ICT for Governance and Policy Modelling	11	0			
ICT-2009.1.3	Internet of Things and Enterprise environments	11	0			
ICT-2009.1.1	The Network of the Future	9	0			
ICT-2009.7.2	Accessible & assistive ICT	8	1			
ICT-2009.1.6	Future Internet experimental facility and experimentally driven research	8	0			
ICT-2009.5.1	Personal health systems	7	1			
ICT-2009.1.4	Trustworthy ICT	6	0			
	Low Competence - Low Share					**Low Competence - High Share**
ICT-2009.1.5	Networked Media and 3D Internet	5	0			
ICT-2009.6.4	ICT for env services	4	1			
ICT-2009.7.1	ICT & aging	4	1			
ICT-2009.5.2	ICT for Patient Safety	4	0			
ICT-2009.3.5	Engineering of Networked Monitoring and Control systems	4	0			
ICT-2009.3.6	Computing Systems	4	0			
ICT-2009.2.1	Cognitive systems and robotics	3	1			
ICT-2009.5.3	Virtual Physiological Human	3	0			
ICT-2009.2.2	Language-Based Interaction	3	0			
ICT-2009.6.1	ICT for Safety and Energy Efficiency in Mobility	3	0			
ICT-2009.6.2	ICT for Mobility of the Future	3	0			
ICT-2009.6.3	ICT for Energy Efficiency	3	0			
ICT-2009.6.5	Novel ICT Solutions for Smart Electricity Distribution Networks	3	0			
ICT-2009.8.0	FET-Open: Challenging Current Thinking	3	0			
ICT-2009.8.9	Coordinating Communities, Plans and Actions in FET Proactive Initiatives	3	0			
ICT-2009.8.10	Identifying new research topics, Assessing emerging global S&T trends in ICT for future FET Proactive initiatives	3	0			
ICT-2009.5.4	International Cooperation on Virtual Physiological Human	2	0			
ICT-2009.3.4	Embedded Systems Design	2	0			
ICT-2009.8.4	FET proactive 4: Human-Computer Confluence	2	0			
ICT-2009.8.6	FET proactive 6: Towards Zero-Power ICT	2	0			
ICT-2009.3.1	Nanoelectronics Technology	1	0			
ICT-2009.3.2	Design of Semiconductor Components and Electronic Based Miniaturised Systems	1	0			
ICT-2009.3.3	Flexible, Organic and Large Area Electronics	1	0			
ICT-2009.3.7	Photonics	1	0			
ICT-2009.3.8	Organic Photonics and Other Disruptive Photonics Technologies	1	0			
ICT-2009.3.9	Microsystems and Smart Miniaturised Systems	1	0			

Table 9 – Competence Share Matrix for Malta ICT R&D as per FP7-ICT Theme Objective

The competence/share matrix shows that for most of the FP7 objectives, Maltese entities qualified as low competence – low share. However, one has to point out that Maltese entities have high competence in a good number of topics - namely internet of services, intelligent information management, ICT for governance and internet of things - even though these exist with a low share. This might explain why these competences have not been put to practice within FP7 as yet. Maltese entities seem to have the highest competence and highest share in digital libraries and technology enhanced learning.

7.2. Opportunities and barriers for Malta's increased participation in FP

By means of a SWOT analysis, the study aimed to identify the strengths and weaknesses of the local ICT R&D players, and to identify target areas that need to be addressed in order to enable the release of Malta's hidden potential and allow for an increased participation within FP.

STRENGTHS

6. FP-ICT Theme topics are in line with business research interests
7. Flexibility of local organisations
8. Sound national ICT infrastructure
9. Existing areas of expertise
10. University of Malta has a strong potential for FP participation

WEAKNESSES

10. Insufficient funding available for financing submission and participation to FP
11. Insufficient understanding of the FP rules
12. Difficulty in finding reliable and competent partners
13. Problematic communication with project partners
14. Difficulty in keeping within budget throughout the duration of the project
15. Smallness of the organisations is a disadvantage for being accepted in project teams
16. Limited access to high-tech equipment
17. Limited professional contacts
18. SMEs lack researcher human capital

OPPORTUNITIES

5. Increased funding for R&D activity
6. New knowledge of methods and techniques in the respective ICT area
7. Improving an existing product
8. Increased market and contact base

THREATS

9. Lack of awareness about FP and the opportunities it presents among private and public entities
10. Participation in FP considered time consuming, risky and complicated
11. Fear of excessive bureaucracy and delays from the Commission
12. Expense of submitting a rejected proposal.
13. Intellectual property risks
14. Low support from national research infrastructure
15. Lack of national funds and venture capital for research
16. Complex administration process

Although this exercise has highlighted an imbalance between the strengths and opportunities versus the threats and weaknesses involved in Malta's participation within the FP7-ICT Theme projects, with the threats and weaknesses outweighing the strengths and opportunities, the authors still consider participation in FP as beneficial to local organisations and something which we must strive to achieve.

The results of the survey and desk reviews pertaining to this study have shown that there is a fair mix of Maltese educational and research institutions, foundations and other non-profit organisations as well as commercial firms that are active in ICT R&D and that have participated in FP. However, SME participation still remains a challenge due to lack of human and financial resources.

The value added that may be obtained through the opportunities available in FP participation by far outweigh the threats that are hindering Malta's increased participation. What is required at this stage are actions which can further increase the value added of Malta's FP participation and work to further enhance the identified strengths of the local organisations and also actions addressing ways to minimise the identified threats and weaknesses which exist in the system. Actions include:

- Launching an **educational campaign** among local R&D entities promoting the opportunities on offer through participation in FP projects and providing an explanation of the rules of the programme.
- Establishing an **efficient national structure** providing advice, support and guidance to local organisations that show an interest in submitting a proposal within one of the FP7-ICT Theme areas. The support should also include courses on project management, financial budgeting and resource mapping.

- Increasing the **funds** available for helping local entities realise their R&D plans and projects.
- Setting a strategy for encouraging more local ICT experts in entering R&D activity and thus increasing the **human capital base** for research activity.
- Reduction in the level of **bureaucracy and excessive administration** load that exists during the proposal submission, evaluation process and project duration stages to encourage more entities to submit proposals to FP.

It is through these actions that Maltese organisations and researchers will be given a helping hand in increasing their participation within FP7 calls. Improvement in these areas can go a long way in increasing overall participation in the FPs. Up to the present date, trends for Malta show a modest participation rate in the FP programme. However closer analysis of these projects that are undertaken, shows clearly that Maltese FP participants are not involved in high end projects that require substantial infrastructure. Consequently improved research infrastructures as proposed in the R&I Plan could increase even further Malta's FP participation in R&D Collaborative Projects (IPs and STREPS).

8. Conclusions

8.1. S&T in Education

The share of science and technology (S&T) graduates is 3.4%, well below the EU average of 12.9%[101]. Therefore, although the latest data[102] available by field of study shows a substantial influx of graduates into the country's economy in all areas, including those of S&T, this is not sufficient when compared to the EU average.

Overall S&T graduates represented 3.9% of the total labour force in 2006 compared to 4.8% of the EU27 average[103].

Furthermore, Malta compares poorly in terms of EU averages in the indicators of early school leavers and lifelong learning[104]. These two issues have been identified as government policy challenges to be resolved as soon as possible[105].

8.2. Malta's ICT Economy

In 2003, Malta's expenditure on ICT was 4.1% of the country's GDP. This is very much below the 20% mark of the EU15 average.

The latest figures[106] indicate that the Maltese business sector tripled its R&D expenditure in ICT between 2004 and 2005. ICT R&D expenditure relative to GDP remains lower than average, but one third (compared to 11% in the previous year) of all R&D spending goes to the ICT sector, resulting in a steep increase of Malta's ranking (from 23rd to 8th position).

8.3. Malta's ICT R&D Strategy

When analysing the policy makers responsible for Malta's ICT R&D strategy, we have identified that there is a lack of communication links between the various responsible Ministries and the working groups lying within their responsibility.

Apart from the Intra-Governmental Committee on R&I that links the Ministries to the Cabinet of Ministers, the Malta Industrial Policy Strategy calls for an Inter-Ministerial Working Group stewarded by the Office of the Prime Minister to be set up to examine issues, which include social security taxation, the legal status of researchers, conditions of acceptance of third-country researchers so as to eliminate the barriers to researcher mobility. However we are not aware of such a Working Group having been set up.

The task of improving Maltese participation within FP7-ICT Theme calls is a task that could very well be taken up by such a working group where the various ministries together with representatives from the operational national bodies will have the opportunity to tackle the obstacles that are hindering Malta's complete participation and implement actions to overcome them.

There seems to be a lack of a driver or champion which pushes forward the specific needs of ICT R&D activities in a consistent manner in the national agenda in Malta. This in part reflects the insufficient resources and lacking technical capabilities in a number of institutions which could be tasked with such a mission.

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[101] Source: EIS, 2007
[102] Source: University of Malta statistics as quoted in Malta in Figures 2008, National Statistics Office
[103] Eurostat Release No. 34/2008 EU27 R&D spending stable at 1.84% GDP in 2006, 10th March 2008
[104] Source: eurostat
[105] Smart Island Strategy https://mitc.gov.mt/page.aspx?pageid=263
[106] Europe's Digital Competitiveness Report; Volume 2: i2010 — ICT Country Profiles; http://ec.europa.eu/information_society/eeurope/i2010/docs/annual_report/2009/sec_2009_1060_vol_2.pdf

The two main strategies defining Malta's performance in ICT R&D are:

1. **National Strategic Plan for Research and Innovation 2007-2010**
   This strategy is the responsibility of the Malta Council for Science and Technology (MCST). However it seems that the MCST is still not funded enough to be in a position to deliver its remit in the near future, both in terms of its recurrent budget and staff resources. Better planning, dissemination and more substantial funding on the National Investment Programmes will be necessary to see the required shift towards value added R&D and critical mass from industry towards the EU's 3% of GDP target for R&D.

2. **The Smart Island – National ICT Strategy for Malta 2008-2010**
   This document outlines a vision for a country where ICT is not a mere information and communications tool but a primary vehicle for putting right social inequality, disadvantages and disabilities while improving the quality of life of the general community. However this strategy does not deal directly with the specific needs of ICT R&D needs of the country and other strategies stemming from the Smart Island Strategy are:

   - **MITA Strategic Plan 2009 – 2012**
     The planned strategy for the future of Malta's ICT environment and R&D performance is quite impressive. The actions that have been set out for each strategic priority of the plan involve an intensive exercise and require the participation and cooperation of the various entities on the island... for this to happen it requires a detailed plan of action and a strong spearheading and effort building exercise by MITA to get the commitment and involvement of all the national stakeholders be they public or private organisations.
     Each of the 82 actions pertaining to the MITA Strategic Plan merit full support from all parties involved.
     As yet, there is no published timeline / plan of action for the implementation of these actions.

   - **Malta's National e-Learning Strategy 2008-2010**
     Deployment of the e-Learning strategy actions is well underway. All Maltese schools now use computers for teaching and have internet access.
     A 2006 pan-European survey showed Malta as a top performer with 95% broadband penetration in schools together with Denmark and Estonia. There is very little variation in broadband accessibility between the school types, ranging from 93% in primary schools to 100% in vocational schools.
     Maltese teachers are very active users of ICT in class. In 2006 only a minority of 23% of the teachers using computers use them in less than 10% of all lessons, more than half make use of ICT in more than 25% of their lessons and almost a fifth state that they use computers in more than half of their lessons.
     Malta's performance in e-Learning augurs well for the continued development of the e-Learning platforms.

   - **E-Health Vision and Strategy**
     A draft version of this strategy was approved at ministerial level in 2006. As yet the draft strategy has not been finalised and published.
     However, the government's main focus in e-health ICT has been on the implementation of an Integrated Health Information System (IHIS) for all of Malta's public hospitals and health centres. This was launched in 2007 with Phase 1 consisting of the first six IHIS applications: The Laboratory Information System (LIS), Radiology Information System (RIS), Picture Archiving and Communications System (PACS), new Patient Master Index (PMI), Electronic Medical Records (EMR) and Order Management and Fulfilment (OMF).
     Phases 2 and 3 of the IHIS, which are planned for implementation in the years 2008 to 2010, will see the introduction of a further 21 functionality modules designed to meet both clinical and managerial requirements in an integrated fashion.

   - **E-Government**
     The most frequently used administrative public services are now available on-line, including the payment of licences, registration, checking of documents, and so on. More than 60 such services - 90% of those between

government and citizen or government and business - now take place by on-line transaction. This has been made possible by a central electronic identity framework which offers a secure, single sign-on authentication mechanism to every person.

Through the development of the e-Government services, and the associated research in the development stages, the e-Gov programme is expected to drive further ICT R&D in this sector. However, while the implementation of e-gov services are at an advanced stage and continually being researched and developed by MITA, their take-up and utilisation amongst the citizens is somewhat lacking.

Other strategies that have been reviewed in this study include: Industry Strategy for Malta 2007-2010, National Strategic Reference Framework 2007-2013, Malta National Reform Program 2008-2010, Quality Assurance Framework for Further and Higher Education in Malta, National Broadband Strategy.

The desk review of the major studies and strategy papers published in the field of ICT R&D indicates that there are a number of strategic policy initiatives which could actually be conducive to ICT R&D in Malta. On the other hand, a unified approach towards actually developing ICT R&D as a key economic driver in Malta, which is consistent and coherent and which would be conducive to the implementation of measures and initiatives in this regard, is at this stage lacking.

Recommendations:

1. **Political Commitment**
   The Government must take on the task of assisting the national bodies and stakeholders in implementing the strategies, in particular the MCST R&I National Strategy. The strategy has been published and is awaiting for political championing and commitment for its implementation.
2. **Domestically Designed Strategy**
   Better planning, dissemination and funding on the National Investment Programmes will be necessary to see the tangible shift towards value added R&I and critical mass from industry towards the EU's 3% of GDP target for R&D. Also, a targeted Innovation Policy could certainly provide more support and direction towards R&D in general.
3. **Increased national funding for R&D**
   Increased R&D performance can only be brought about through increased funding. The target set out by MCST is based on specific targets and performance goals and should be the road plan to be followed by the government for increased funding for R&D-related activity.
4. **All-Encompassing Strategy Document**
   To formulate a single cohesive strategy document specifically designed to cater for the needs of ICT R&D activity in particular. This document should set the base for a unified approach for ICT R&D developments, for R&D support facilities offering services to academia and industry, and for support mechanisms for participation in EU funded programmes.
5. **Legal Framework for R&D Activity**
   To formulate a national framework of regulations for R&D activity with regards to the execution of the activity per se, the funding allocation for the research activity, scientific collaborations both locally and internationally, industry-academia collaboration, etc.

In the absence of concrete developments in these issues, ICT R&D in Malta will probably remain low relative to economic activity and limited to sporadic and isolated activities, rather than being intensively interconnected within the country's overall economic development. There would be a significant opportunity cost in the Maltese economy in such a case, because the potential for ICT R&D to fit strategically within the country's economic growth is substantial.

8.4. ICT R&D Activity in Malta

For a country of its size, Malta shows very good promise in ICT R&D as shown by the substantial amount of ICT R&D projects that have been undertaken or are in progress. A substantial amount of R&D projects are also being undertaken within the private sector, however it seems that most of these efforts remain isolated and fragmented, and not aimed at establishing critical mass but rather competitive advantage. This study has shown that significant ICT R&D is being undertaken within the public sector, primarily fuelled by Malta's drive towards better e-Government services. Also the significant increase in ICT infrastructure over the past fifteen years, and the establishment of a Faculty of ICT has resulted in a considerable increase in ICT researcher human capital base. The bulk of ICT research and the accumulation of critical mass are prevalent particularly at the UoM.

Despite various constraints, such as heavy lecturing load of academics, lack of funds for laboratory equipment, ICT knowledge generation at the UoM has significantly increased, as reflected in the number of research projects undertaken, papers published in international journals and presented at international conferences, over the last years. The quality of publications is evidenced by the large number of citations by other authors that are reported in the Science Citation Index.

The reality is that until Malta starts dedicating more substantial funding for research and research grants, while encouraging more PhD students, it will be difficult for research institutes to be able to amass the necessary critical mass for the establishment of Centres of Excellence to the same level as those found in the old Member States and other developed countries.

However the potential is certainly there especially in niche ICT areas like e-government, artificial intelligence, semantics and digitisation to name a few. The establishment of various ICT R&D schemes offered by the MCST and Malta Enterprise in the form of competitive R&D investment seem to be reaping results, especially in establishing working links between industry, academia and the public sector but certainly more can be done.

8.5. FP7-ICT Participation

The statistics of Malta's participation both in FP6-IST and FP7-ICT Themes have been discussed and analysed in full in report 3 pertaining to this study and a summary of the analysis is presented in section **Error! Reference source not found.** of this report. The identified actions that are required in order to improve Malta's participation in FP7-ICT Theme calls at a local level are:

1. **National Funding**
   - To increase the national funding for R&D activity in line with the MCST recommendation of 0.75% of GDP.
   - To target and intensify R&D funds with an increased focus in thematic areas of importance to the national economy.
   - To create an efficient mechanism for coordination of EU-RF ICT R&D collaboration at the national level.
2. **S&T Graduates and PhD Candidates**
   - To formulate a strategy for attracting more students to higher level education in areas specific to the development of Malta's economy.
   - To create a forum for collaboration between UoM and the business community with the aim of identifying future market skill requirements and promotion of applied research.
   - To promote the Malta University Trust Fund among the business community while ensuring that the research being carried out is in fact relevant to the national economy.
   - To create an external policy promoting Malta as an international destination for higher education and to attract foreign investment into the provision of educational services.
3. **ICT infrastructure**
   - To increase the national funding for R&D activity in line with the MCST recommendation of 0.75% of GDP.

- To create national supporting frameworks and enabling platforms for efficient ICT R&D infrastructures.
- To expand the Human Capital Base and to create business-academia linkages for cooperation.
- To commission a detailed national study on the extent to which RTD infrastructure meets the needs of current researchers.

4. Venture Capital and Business Incubation

- Government to promote a business and risk-taking culture.
- Government bodies as well as private organisations must be the catalysts for the establishment of venture capital culture.
- Improving the availability of seed money and venture capital.
- Simplifying and reducing bureaucratic requirements for start-up companies.
- Expanding the network of business incubators and other support services for high-tech companies.
- To provide better access of start-up companies to high-quality market information.
- To promote the purchasing of local high-tech products through government procurement.
- To promote the export of high-tech products by keeping export taxes low and by promoting high-tech products abroad.

5. SME & Academia R&D and Entrepreneurship Culture

- To address the lack of an efficient mechanism for coordination of EU and Regional Funds in ICT R&D at a national level.
- To campaign for a promotion of the importance of R&D within the private organisations through government incentives or grant schemes that are tailor made to cater for the special circumstances of the SMEs.
- To organise mass-media and educational campaigns encouraging more focus on creativity, entrepreneurship and innovation.
- To direct R&D activity within the UoM towards applied research spearheaded by the needs of the local economy.
- To address the legal barriers that inhibits public-private partnerships in innovation.
- To promote research and communication links between public entities and private industry.

6. National Support Structures – Communication & Coordination

- To improve information dissemination from national coordinating bodies.
- To sustain a better coordinated mechanism through which professional proposal writing/project management advice related to EU funding programmes can be channelled.
- To provide better training seminars covering effective proposal writing, financial methodologies and project management for successful participation in FP7 calls.
- To create a unified and comprehensive strategy document with the involvement of all above mentioned national bodies in consultation with the UoM and private entities with the aim of improving communication.
- To improve the use of and dissemination of partner searches including a more timely distribution of simple partner searches emanating from projects like Ideal-IST.
- To reinforce suitable instruments for SMEs such as 'Take up actions' or exploratory awards.

7. Political Support and Policy

- To appoint a Parliamentary Secretary for Research, Science and Technology.
- To increase the national funding for R&D activity in line with the MCST recommendation of 0.75% of GDP.
- To set in place priority setting procedures regulating the direction of R&D activity focusing mainly on areas of economic importance with full consultation with the users of the knowledge and technology.
- To ensure better integration of SMEs in the policy making process.

8. International Promotion of Local Organisations

- To increase visibility of Malta's ICT R&D competences in Europe through international promotion and relationship building exercises.
- To maintain an up-to-date database of key players (both individuals and organisations) in the ICT R&D field.

9. Local Clustering

- To engage a national body with the task of clustering public and private organisations according to their area of expertise.

- To promote clustering efforts of local public and private organisations in order to increase participation and accepted project proposals within the FP7-ICT Theme calls.
- To encourage and offer state-SME join ventures, R&D contracts and cooperative research projects thus incentivising SMEs to improve their research capacity and contributing to the advancement of the economy.
- To pursue a clustering and networking strategy introduced in Malta's Industry Strategy for 2007-2013 which is intended to synergise Maltese industry at a local level as well as at a regional and international level through: Activating Supply Chain Vendors Clusters Initiatives (SCVCI), Activating Indus-try Grouping Clusters Initiatives (IGCI) and Activating Targeted National Clusters Initiatives (TNCI).

The identified actions that are required in order to improve Malta's participation in FP7-ICT Theme calls at a EU level are:

1. Smallness of local private R&D players

- To include an obligation whereby project proposals must include team players of smaller size but with high technical potential. This is also in view of the fact that SME participation rates are still very low especially in the new member states.
- To establish an EU-wide system that analyses area, country and country-group specifics thus helping to identify small R&D players that have a potential to contribute to larger projects. This is to be done in collaboration with the local NCPs. Countries would report the needs and opportunities of their R&D scenario, thus creating common collaborations and best practices within the EU FP programmes. This EU in-house system would provide a basic analysis of scientific and technological profiles amongst the countries to support weaker member states and create a common basis for the definition of opportunities.
- To enhance coordination between SME support projects and within the relevant Commission services

2. Opportunities for highly focused R&D projects

- To include a fair amount of small projects within the approved budgets for FP projects. This can be done after an evaluation of the international dimension of the country's R&D players and their specific outcomes such as publications, patents, etc.
- Together with the local NCPs, EU officials will recognise those players and specific areas that are highly active in the country and allow openings for these small entities to compete for funding set aside purposely for small scale but highly focused R&D projects.
- Increase resources for IST priorities of interest to SMEs.

3. Simplification of application process within FP calls

- However, the opportunity offered by the FP programmes is undoubtedly recognised and the suggestion is to have a more simplified and streamlined application process across all calls.

4. Payment Terms

- Improvement in payment timeliness can be achieved through regular internal EU monitoring of dues and simplified associated procedures, improving their cash flow, clarifying the financial rules and access to management, and by exploring how to facilitate subcontracting to SMEs.
- Of benefit to the entity awaiting payment would be to pay interest accordingly with the delay incurred, although this is not the best solution for both parties
- Establishment of an SME ombudsman office to tackle any issues arising in project execution. A code of conduct should be established.

8.6. ICT Infrastructure

Malta performs very well in terms of the provision of online public services; with 92% of public services for citizens and 100% of public services for enterprises available online. In terms of take up, however, it performs less well. While an above average proportion of enterprises use online pubic services (74%, compared to an EU average of 68%), use by citizens is relatively low.

1. Broadband

Although plans and strategies have been published, the country's broadband infrastructure leaves a lot to be desired. In view of this it is evident that the strategy objectives and targets have not been met. The Ministry for

Communication needs to pursue more aggressively its efforts to improve the resilience of international connectivity critical infrastructure with the telecoms providers in order to ensure that any future accidents have a lower impact on the Maltese economy and information society. This includes facilitating more connections to mainland Europe (laid via alternative routes to the existing ones), North Africa and potentially to the Middle-East, landing in different locations and connecting to different nodes, hence establishing Malta as a real regional hub for electronic services. Additionally new fiscal incentives to assist private enterprise in investing in more connectivity need to be drawn up as soon as possible.

2. GEANT at the UoM IT Services Centre

GÉANT offers the research community in Malta a unique capability to enable ground-breaking research collaboration though high speed connectivity and advanced services is one of the most prominent European success stories. While Malta' GEANT efforts are commendable, much more effort needs to be done to ensure better uptake of its research potential and facilities across the Maltese research community.

3. IP V6 Task Force

The Task Force should act as a Centre of Excellence on IPv6 and evangelise the need to fast-track transition. Connections with similar groups in other jurisdictions shall be established to ensure that Malta remains at the forefront of best practice in this area. Research will also be carried out to accumulate knowledge and develop competencies. Links to other, similar organizations will also be set up. In fact the Maltese Task Force has just been affiliated to the EU IPv6 Task Force.

4. Super Computer Cluster, Faculty of Science, UoM

Even though the cluster is still at implementation phase it remains crucial that the necessary strategies for industrial involvement and coordination among local authorities and university are in place in order to garner the necessary critical mass for its use in a meaningful way.

5. SmartCity Malta

Recent doubts have been raised107following a slowdown in the project implementation, confirming the general impression that the project was faltering. 108 Government needs to pursue more concretely this crucial project and ensure that the public is kept informed about whether this project will actually materialise.

6. European Network of Living Labs and MARSEC-XL at EuroMedITI

While the efforts at EuroMedITI are commendable, very little information is available on the progress made and the status of the infrastructures mentioned. However it is clear that more resources need to be placed at EuroMedITI, and more political commitment given to ensure it achieves these ambitious targets. Attempts to reach the office at EuroMedITI proved futile.

7. ICT Cluster of Excellence Gozo

The tools and processes developed by the organizations involved in the proposed cluster are expected to provide sophisticated protection against this risk, as well as preventing unauthorized access to Government and corporate operating systems and programmes, which would be possible through the use of quantum computer attacks.

8. Geographical Information System (GIS) Alliance

According to the 'Spatial Data Infrastructures in Europe: State of play. (Autumn 2006)' report, no Maltese National Spatial Data Infrastructure (NSDI) policy framework is in place.[109]

In this report one of the main difficulties identified for Malta with regards to GIS is the lack of resources to convert digital data, and more effort needs to be given to this crucial field.

[107] http://www.maltastar.com/pages/ms09dart.asp?a=4487
[108] http://www.timesofmalta.com/articles/view/20090917/local/smartcity-slowdown-confirmed
[109] http://inspire.jrc.ec.europa.eu/reports/stateofplay2006/rcr06MTv101.pdf

9. Business Process Outsourcing (BPO)

While call centres may be the most visible and successful sector of the BPO industry other areas of Malta's service economy are equally gaining a foothold in providing high performance services. A broad range of service areas from consulting, shared services, data processing, data storage, digital media and software development projects are being delivered from Malta, offering companies significant cost reductions and improved operational effectiveness.

10. i-Gaming infrastructure

However it is important to keep in mind that this legislation is fairly vulnerable and Member states are pushing towards the fair treatment of gambling services in the internal market. Consequently if better tax regimes are offered elsewhere, the sector could easily seek alternative operation.110

11. Kordin Business Incubation Centre (KBIC)

Preparations are underway to create a new incubation centre worth €2M which will focus on attracting more innovative enterprises. The new incubation centre which would specialise in biotechnology and human sciences, while the current centre would focus more on engineering-based projects, the maritime sector and ICT. [111]

While this is an important pillar for providing attractive spaces for innovative companies, results in the past have not been very encouraging for the ICT domain, and more needs to be done to assist companies with more ambitious plans to make use of this opportunity, and create value added.

12. Malta Industrial Parks and Life Sciences Centre

These efforts will help provide the necessary spaces and impetus for the creation of new ICT setups, in close proximity to each other and hopefully enable more focused clustering opportunities

13. Malta National Laboratory

EU accession has created new demands for extended testing services and for the provision of related services such as inspection and certification. To our knowledge very little attention has been given to ICT standards, and activity at MNL is barely visible.

14. National Metrology Services

The Malta Standards Authority has been awarded ERDF funding in connection with its project proposal for "Developing National Metrology Capacity in Support of Industry". For this purpose, €1M of funding has been made available to furnish the required instrumentation, refurbish the already available site and acquire the necessary training and accreditation in the areas of development.
Such a facility could provide industrial and academic players with the necessary benchmark data for process improvement, check fixtures, automation equipment, coordinate measuring machines, force gauges and Finite element analysis (FEA) computer simulation techniques used in engineering analysis.

The UoM is the government reference point in terms of RTDI advice, support and services, as it brings together key technical expertise in S&T through its research facilities and institutes, and is also a research performer for industry to which it provides a range of expertise and services. It is the key R&D player in Malta.

Unfortunately an important factor impeding the establishment of Centres of Excellence is the lack of researchers and PhD students /graduates. Consequently it is expected that the new Faculty of ICT building will adequately provide the ICT infrastructure and drive for both the current ICT faculty to grow and conduct R&D; and to support more PhD students who wish to continue their ICT studies locally.

The suggested actions to improve Malta's ICT infrastructure are:

[110] http://www.timesofmalta.com/articles/view/20090908/local/eu-court-deals-blow-to-international-internet-gaming
[111] http://www.businesstoday.com.mt/2009/06/10/t6.html

1. The construction of new factories should not relate solely to the provision of land at favourable rates, but more importantly to the need of upgrading the concept of industrial estates to industrial and science parks, featuring a strategic concentration of activities backed up by shared facilities,
2. The grant schemes currently being put into action by ME through the new Malta Enterprise Act should be further enhanced so that they reach a wider range of small businesses that are willing to take up the challenges of innovative research, development and internationalisation. Eligibility should be extended to more sectors and not merely to manufacturers, so that the present discrimination between enterprises qualifying for state aid is furthered rewarded, including those relating to research and innovation. 112
3. Expansion of KBIC remains an important measure, since aggressive support to those start-ups which show promise of innovation, needs to be provided in order to induce growth. The Business Incubation Centre requires dedicated support to ensure that the new budding entrepreneurial firms get the appropriate level of hand-holding in the initial two years of their operation. It is essential for the Centre to be equipped with sufficient managerial talent in this regard.
4. Setting up an Entrepreneurship Research Unit to help SMEs access EU Funding and provide better coordination of national SME policies to increase the SME contribution to Community programmes, and ensure that the projects that are supported would have a better economic impact.
5. Establishment of a one-stop-shop for business support that tackles the existing barriers for information and communication flow between different government entities.
6. Heavier investment towards ICT infrastructure that will contribute to enhance the performance of all SMEs, and upgrade Malta's enterprise profile.[113]

8.7. Overall Considerations

Although it has been noted that Malta's participation within the FP is somewhat lacking when compared to that of other Member States, this must all be seen in the light of the local R&D scene and the opportunities available for researchers and R&D active organisations. Local incentives for R&D is limited, human resources are scarce, political championing is lacking and support structures in many cases inadequate, but this is primarily due to Malta's size and limited resources.

The areas covered include better strategic R&D planning, increased R&D activity on a local level via clustering and also internationally through FP participation, and improvements to the local ICT Infrastructure. Several actions and recommendations are detailed in the aforementioned section with the intention of improving the local setup with regards to ICT R&D performance enablers that aim for higher standards and involvement of the local ICT R&D performers in international projects. However it important to note that Malta is making significant progress across all of these fronts thanks to the clever and strategic use of Structural Funds available for the 2007-2013 period.

The attainment of an equitable ERA involves an effort from all EU-wide countries that will take time, and results will not be seen overnight. However, addressing the individual actions that have been suggested through this study, and through the other studies undertaken amongst the other countries, will definitely go a long way towards achieving a sound and well-performing ERA, while ensuring Malta increases its uptake of future FP opportunities.

[112] http://www.budget2009.com.mt/media/constitutedbodies/GRTU_Recommendations.pdf
[113] http://www.budget2009.com.mt/media/constitutedbodies/MFOI_prebudget2009.pdf

ANNEX I SWOT Analysis – National Environment for ICT R&D as Influenced and Defined by the Published National Strategies and Policy Papers

STRENGTHS

- Malta ranked 2nd among EU member states in terms of sophistication of e-government services and their availability – Cap Gemini study
- ICT qualified persons and ICT R&D performers, are on the increase
- Malta in 11th position in broadband leadership in innovation economies – Cisco study
- Malta as a top performer with 95% broadband penetration in schools – pan European survey
- National Strategic Plan for Research and Innovation 2007-2010 provides a sound roadmap for the growth of Malta's R&I culture
- Malta's performance in e-Learning augurs well for the continued development of the e-Learning platforms

WEAKNESSES

- Malta relatively weak in terms of innovation – EU Innovation Scoreboard
- lack of local financing for national R&I funds (€700k budgeted for 2010 instead of the targeted €3.6M)
- 63rd position (4th from last) in digital broadband quality divide ranks – Cisco study
- Lack of funds for MCST to deliver its remit, both in terms of its recurrent budget and staff resources
- MCST lacks levers to push other entities towards implementing recommendations of the R&I strategy
- lack of national clustering and networking efforts
- Non-coordinated research support with various entities offering support in a disconnected manner

OPPORTUNITIES

- New ICT Faculty under construction at the UoM
- UoM in collaboration efforts with foreign universities
- Constant amelioration of the national ICT infrastructure
- National policy makers directing efforts towards increasing public and private sector investments in research & innovation
- The existence of a number of strategic policy initiatives which could actually be conducive to ICT R&D in Malta
- Overall well-formulated vision for ICT R&D excellence

THREATS

- Lack of a unified and comprehensive strategy document towards actually developing ICT R&D as a key economic driver in Malta.
- Lack of political championing and aggressive strategy implementation
- Lack of a driver or champion to push forward the specific needs of ICT R&D activities in a consistent manner within the national agenda for Malta
- Malta's major economic orientation in the ICT sector is more towards development rather than research
- No legal framework for R&D activity
- Take-up and utilisation of e-Gov services amongst citizens is lacking

ANNEX II SWOT Analysis of the Intensity of Malta's ICT R&D Performance as a Result of the Activity by Public & Private Organisations and Individuals

STRENGTHS

- Significant ICT R&D being undertaken within the public sector, primarily fuelled by Malta's drive towards better e-Government services
- High research intensity at the UoM
- ICT knowledge generation at the UoM has significantly increased, as reflected in the number of research projects undertaken, papers published in international journals and presented at international conferences

WEAKNESSES

- Lack of funds for UoM laboratory equipment
- Weak links between UoM and private industry, in provision of R&D services to industry, and commercialisation of results
- Lack of researchers and PhD students /graduates
- Lack of funding for research and research grants

OPPORTUNITIES

- An improvement in national ICT infrastructure
- UoM to forge links with research counterparts at foreign universities and research institutes, and to find external sources of funding for equipment
- New ICT Faculty and super computer cluster at UoM
- Establishment of the Malta University Holding Company Limited
- Setup of University Research Trust Fund as announced in government Budget 2010
- Private firms supporting and collaborating with final year UoM student projects
- Access to the GÉANT2 network managed by the University IT Services Centre
- MCST ICT in Manufacturing Research Project

THREATS

- A substantial amount of R&D projects undertaken within the private sector are not aimed at establishing critical mass but rather competitive advantage. Therefore, these efforts remain isolated and fragmented.
- Heavy lecturing load of academics at UoM diverts from the time dedicated to research
- In view of the rapid expansion of the student population and the consequent increase in academic staff, the University budget, which is mostly from public funds, is being spent mainly in personnel and capital costs. This leaves very little money for investment in research.

ANNEX III SWOT Analysis of Malta's FP7 Participation Performance

STRENGTHS

- The major proportion of Malta's participation was in ICT Theme projects
- under FP6 Malta ranked 1st amongst all EU Member States (EU-27) for the overall number of funded projects on a per capita basis
- FPs have provided a substantial increase in R&D funding and transnational cooperation

WEAKNESSES

- majority of funding receiving was towards Specific Support Actions, which are not really high-tech R&D projects
- Maltese organisations lack experience in managing transnational R&D efforts and therefore do not participate as coordinators/lead-partners
- lack of R&D culture
- lack of R&D facilities
- low number of researchers
- low national funds for research
- Maltese organisations seem to lack clear networks and linkages to major research organisations/centres of excellence in other EU countries that are very active in FP funding
- Weak efforts in the dissemination of FP7
- weak coordination of S&T stakeholders across different levels of government
- no coordination of ICT R&D collaboration at the national level to compliment EU ICT research roadmaps
- Joining proposals or writing them requires a steep learning curve and considerable experience which is lacking amongst local organisations
- Financial implications require clear understanding of specific contractual obligations and financial guidelines

OPPORTUNITIES

- Malta's participation in SSAs and CAs gave Malta a significant opportunity to participate in R&D capacity building and are a perfect vehicle for first steps in FP participation
- Through Malta's participation in FPs, R&D and innovation awareness has increased
- More focus towards Integrated projects and STREPS
- MCST to financially assist Maltese organisations to participate at FP7 brokerage events
- Malta Enterprise FP7 Exploratory Award Scheme

THREATS

- Malta is a new member states with less experience and infrastructure
- Comparing funding received in FP6 IST with that requested in FP7 ICT (first four calls) shows that Malta requested roughly one third less funds in FP7 ICT than it obtained in the same calls (first four calls) in FP6 IST. This indicates that Malta seems to have lost the momentum it gained in FP6.
- Weak coordination between the various national stakeholders like the Enterprise Europe Network Malta and MCST
- Malta provides the least in national R&D funds and industry spends less in both intramural and extramural R&D than other EU countries
- most Maltese organisations are micro SMEs with little human resources to chase and prepare project proposals or to find partners or simply to read and understand the call documentation

ANNEX IV SWOT Analysis of the National ICT Infrastructure and its Influence on Malta's R&D Performance

STRENGTHS

- Broadband accessibility that is above EU average
- International connectivity: 2 satellite stations; 4 submarine fibre optic cables
- E-Gov services ranked 2nd among the EU-27
- Fully-liberalised communications market
- ICT regional centre of excellence – including Microsoft, Oracle, IBM & CISCO training centres amongst others
- UoM virtual campus and intranet
- Access to the GÉANT2 network managed by the University IT Services
- Multilingual, innovative workforce and good ICT infrastructure places Malta as a top contender for business process outsourcing

WEAKNESSES

- Lack of government funding still way below the target set by MCST in National R&I Strategy
- No private ICT research infrastructures in Malta of sufficient dimensions and quality to be considered as potential centres of excellence
- Low proportion of expenditure on R&D by the higher education sector in Malta
- R&D infrastructure of private firms remains isolated and publicly unknown
- Those firms contributing to FDI in Malta's ICT economy conduct their R&D activity abroad

OPPORTUNITIES

- UoM Super Computer Cluster – construction completion planned for mid-2010
- New Faculty of ICT at the UoM
- Upgrading of laboratories in the engineering, chemical and biology fields at the UoM
- SmartCity Malta ($300M investment)
- Growth in the economic sectors of software development, i-Gaming and e-Services
- University Trust Fund for Research, Innovation and Development as announced in Budget 2010
- Malta Enterprise 20millionfor industry grant scheme
- Malta Enterprise Grant Scheme for Sustainable Tourism Projects by Enterprises
- Malta Enterprise FP7 Exploratory Award Scheme
- Establishment of the UoM Commercialisation Office to address the issues of intellectual property policies and patent registration

THREATS

- Due to Malta's geographical isolation, broadband internet provision is obtained solely through submarine cables that is extremely vulnerable to physical damage
- Digital divide concerns

ANNEX V Identified R&D Competences within the FP7-ICT Themes

Research Groups and Individual Researchers – Competences per FP7-ICT Theme Challenge & Objectives

FP7-ICT Theme & Objective Number	Website	Email

Pervasive and Trustworthy Network and Service Infrastructures

ICT-2009.1.1 – The Network of the Future

Research Team	Department of Computer Information Systems, Faculty of ICT, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM

ICT-2009.1.2 – Internet of Services, Software and Virtualisation

Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Computer Information Systems, Faculty of ICT, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM

ICT-2009.1.3 – Internet of Things and Enterprise environments

Research Team	Department of Computer Information Systems, Faculty of ICT, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM

ICT-2009.1.4 – Trustworthy ICT

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Computer Information Systems, Faculty of ICT, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM

ICT-2009.1.5 – Networked Media and 3D Internet

Research Team	Department of Computer Information Systems, Faculty of ICT, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM

ICT-2009.1.6 – Future Internet experimental facility and experimentally driven research

Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Computer Information Systems, Faculty of ICT, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM

Cognitive Systems, Interaction, Robotics

ICT-2009.2.1 – Cognitive Systems and Robotics

Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM

ICT-2009.2.2 – Language-Based Interaction

Research Team	Department of Computer Information Systems, Faculty of ICT, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM
Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM

Components, systems, engineering

ICT-2009.3.1 – Nanoelectronics Technology

Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM

ICT-2009.3.2 – Design of Semiconductor Components and Electronic Based Miniaturised Systems

Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM
Research Team	Communication Therapy Division, Institute of Health Care, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM

ICT-2009.3.3 – Flexible, Organic and Large Area Electronics

Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM

ICT-2009.3.4 – Embedded Systems Design

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM
Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM
Research Team	Department of Industrial Electrical Power Conversion, Faculty of Engineering, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM

ICT-2009.3.5 – Engineering of Networked Monitoring and Control systems

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM

ICT-2009.3.6 – Computing Systems

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM

ICT-2009.3.7 – Photonics

Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM

ICT-2009.3.8 – Organic Photonics and Other Disruptive Photonics Technologies

Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM

ICT-2009.3.9 – Microsystems and Smart Miniaturised Systems

Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM

Digital Libraries and Content

ICT-2009.4.1 – Digital Libraries and Digital Preservation

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Primary Education, Faculty of Education, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM

ICT-2009.4.2 – Technology-Enhanced Learning

Research Team	Department of Computer Science, Faculty of ICT, UoM

ICT-2009.4.3 – Intelligent Information Management

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM

Towards sustainable and personalised healthcare

ICT-2009.5.1 – Personal Health Systems

Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM
Research Team	Communication Therapy Division, Institute of Health Care, UoM
Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM

ICT-2009.5.2 – ICT for Patient Safety

Research Team	Department of Computer Information Systems, Faculty of ICT, UoM
Research Team	Communication Therapy Division, Institute of Health Care, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM
Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM

ICT-2009.5.3 – Virtual Physiological Human

Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM
Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM

ICT-2009.5.4 – International Cooperation on Virtual Physiological Human

Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM
Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM

ICT for Mobility, Environmental Sustainability and Energy Efficiency

ICT-2009.6.1 – ICT for Safety and Energy Efficiency in Mobility

Research Team	Department of Computer Science, Faculty of ICT, UoM

Research Team	Department of Primary Education, Faculty of Education, UoM
Research Team	Department of Industrial Electrical Power Conversion, Faculty of Engineering, UoM

ICT-2009.6.2 – ICT for Mobility of the Future

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Industrial Electrical Power Conversion, Faculty of Engineering, UoM

ICT-2009.6.3 – ICT for Energy Efficiency

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Industrial Electrical Power Conversion, Faculty of Engineering, UoM

ICT-2009.6.4 – ICT for Environmental Services and Climate Change Adaptation

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Industrial Electrical Power Conversion, Faculty of Engineering, UoM

ICT-2009.6.5 – Novel ICT Solutions for Smart Electricity Distribution Networks

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Industrial Electrical Power Conversion, Faculty of Engineering, UoM

ICT for Independent Living, Inclusion and Governance

ICT-2009.7.1 – ICT & Ageing

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Communication Therapy Division, Institute of Health Care, UoM
Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM

ICT-2009.7.2 – Accessible and Assistive ICT

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Computer Information Systems, Faculty of ICT, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Communication Therapy Division, Institute of Health Care, UoM
Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM

ICT-2009.7.3 – ICT for Governance and Policy Modelling

Research Team	Department of Computer Science, Faculty of ICT, UoM

Future and Emerging Technologies

ICT-2009.8.0 – FET-Open: Challenging Current Thinking

Research Team	Department of Computer Science, Faculty of ICT, UoM

ICT-2009.8.1 – FET proactive 1: Concurrent Tera-device Computing

Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM

ICT-2009.8.2 – FET proactive 2: Quantum Information Foundations and Technologies

Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM

ICT-2009.8.3 – ICT-2009.8.3 – FET proactive 3: Bio-chemistry-based Information Technology

Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM

ICT-2009.8.4 – FET proactive 4: Human-Computer Confluence

Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM
Research Team	Department of Industrial Electrical Power Conversion, Faculty of Engineering, UoM

ICT-2009.8.5 – FET proactive 5: Self-Awareness in Autonomic Systems

Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM

ICT-2009.8.6 – FET proactive 6: Towards Zero-Power ICT

Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM

ICT-2009.8.7 – FET proactive 7: Molecular-Scale Devices and Systems

Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM

ICT-2009.8.8 – FET proactive 8: Brain-Inspired ICT

Research Team	Department of Communications & Computer Engineering, Faculty of ICT, UoM
Research Team	Department of Computer Information Systems, Faculty of ICT, UoM
Research Team	Department of Intelligent Computer Systems, Faculty of ICT, UoM
Research Team	Department of Computer Science, Faculty of ICT, UoM
Research Team	Department of Microelectronics & Nanoelectronics, Faculty of ICT, UoM
Research Team	Department of Systems & Control Engineering, Faculty of Engineering, UoM

ICT-2009.8.9 – Coordinating Communities, Plans and Actions in FET Proactive Initiatives

Research Team	Department of Computer Science, Faculty of ICT, UoM

ICT-2009.8.10 – Identifying new research topics, Assessing emerging global S&T trends in ICT for future FET Proactive initiatives

Research Team	Department of Computer Science, Faculty of ICT, UoM

Public & Private Entities – Competences per FP7-ICT Theme Challenge & Objectives

FP7-ICT Theme	Website
Pervasive and Trustworthy Network and Service Infrastructures	
ICT-2009.1.1 – The Network of the Future	
Ascent Software Limited	www.ascentsoftware.eu
Charonite - Maltalinks Ltd	www.maltalinks.com
Computer Domain Ltd	www.computerdomain.net
EBN Internet & Media	www.ebnsoftware.com
EuroMedITI	www.euromediti.com
Exigy Ltd	www.exigy.com
Fondazzjoni Temi Zammit	www.ftz.com.mt
Icon Studios Ltd	www.icon.com.mt
UoM, Faculty of ICT, Department of Computer Information Systems	www.um.edu.mt/ict/cis
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/
Seasus Ltd	www.seasus.com
ICT-2009.1.2 – Internet of Services, Software and Virtualisation	
Allied Newspaper Ltd	www.timesofmalta.com
Ascent Software Limited	www.ascentsoftware.eu
Charonite - Maltalinks Ltd	www.maltalinks.com
Datatrak Solutions Ltd	www.datatrak.ws
Diplo Foundation	www.diplomacy.edu
EBN Internet & Media	www.ebnsoftware.com
Exigy Ltd	www.exigy.com
Heritage Malta	www.heritagemalta.org
Icon Studios Ltd	www.icon.com.mt
International Call Management	www.opeskine.com
MEPA	www.mepa.org.mt
Megabyte Ltd	www.megabyte.net
MITA	www.mita.gov.mt
Philip Toledo Ltd	www.ptl.com.mt
Seasus Ltd	www.seasus.com
Strategyworks Ltd	www.strategyworks.net
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/
UoM, Faculty of ICT, Department of Computer Information Systems	www.um.edu.mt/ict/cis
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/
WorldMatch Ltd	www.wm.com.mt
ICT-2009.1.3 – Internet of Things and Enterprise environments	
Ascent Software Limited	www.ascentsoftware.eu
Commonwealth Network of IT for Development (COMNET-IT)	www.comnet-it.org
Computer Domain Ltd	www.computerdomain.net
EBN Internet & Media	www.ebnsoftware.com
EuroMedITI	www.euromediti.com
Exigy Ltd	www.exigy.com

Megabyte Ltd	www.megabyyte.net
MITA	www.mita.govv.mt
Projects in Motion	www.pim.comy.mt
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/
UoM, Faculty of ICT, Department of Computer Information Systems	www.um.edu.mty/ict/cis
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/
Seasus Ltd	www.seasus.com

ICT-2009.1.4 – Trustworthy ICT

Ascent Software Limited	www.ascentsoftware.eu
Charonite - Maltalinks Ltd	www.maltalinks.com
EBN Internet & Media	www.ebnsoftware.com
EuroMedITI	www.euromediti.com
MITA	www.mita.gov.mt
Seasus Ltd	www.seasus.com
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/
UoM, Faculty of ICT, Department of Computer Information Systems	www.um.edu.mt/ict/cis
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/

ICT-2009.1.5 – Networked Media and 3D Internet

Exigy Ltd	www.exigy.com
Heritage Malta	www.heritagemalta.org
Icon Studios Ltd	www.icon.com.mt
MEPA	www.mepa.org.mt
Seasus Ltd	www.seasus.com
UoM, Faculty of ICT, Department of Computer Information Systems	www.um.edu.mt/ict/cis
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/
WorldMatch Ltd	www.wm.com.mt

ICT-2009.1.6 – Future Internet experimental facility and experimentally driven research

Charonite - Maltalinks Ltd	www.maltalinks.com
Computer Domain Ltd	www.computerdomain.net
Diplo Foundation	www.diplomacy.edu
EuroMedITI	www.euromediti.com
Fondazzjoni Temi Zammit	www.ftz.com.mt
MITA	www.mita.gov.mt
Seasus Ltd	www.seasus.com
UoM, Faculty of ICT, Department of Computer Information Systems	www.um.edu.mt/ict/cis
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/
WorldMatch Ltd	www.wm.com.mt

Cognitive Systems, Interaction, Robotics

ICT-2009.2.1 – Cognitive Systems and Robotics

Ascent Software Limited	www.ascentsoftware.eu
Engineria Ltd	www.engineria.com
Malta College of Arts, Science & Technology - MCAST	www.mcast.edu.mt
Projects in Motion	www.pim.com.mt
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/

ICT-2009.2.2 – Language-Based Interaction

Ascent Software Limited	www.ascentsoftware.eu
Charonite - Maltalinks Ltd	www.maltalinks.com
Exigy Ltd	www.exigy.com
Foundation for Information Technology Accessibility (FITA)	www.knpd.org/mittsfita
UoM, Faculty of ICT, Department of Computer Information Systems	www.um.edu.mt/ict/cis
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/

UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/

Components, systems, engineering

ICT-2009.3.1 – Nanoelectronics Technology

ST Microelectronics Ltd	www.st.com
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/

ICT-2009.3.2 – Design of Semiconductor Components and Electronic Based Miniaturised Systems

ST Microelectronics Ltd	www.st.com
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/

ICT-2009.3.3 – Flexible, Organic and Large Area Electronics

ST Microelectronics Ltd	www.st.com
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/

ICT-2009.3.4 – Embedded Systems Design

Advanced Industrial Systems Ltd	www.ais.com.mt
Charonite - Maltalinks Ltd	www.maltalinks.com
EuroMedITI	www.euromediti.com
Malta College of Arts, Science & Technology - MCAST	www.mcast.edu.mt
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/
UoM, Faculty of Engineering, Department of Industrial Electrical Power Conversion	www.eng.um.edu.mt

ICT-2009.3.5 – Engineering of Networked Monitoring and Control systems

Advanced Industrial Systems Ltd	www.ais.com.mt
Engineria Ltd	www.engineria.com
EuroMedITI	www.euromediti.com
Integrated Resources Management Co Ltd	www.environmentalmalta.com
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/

ICT-2009.3.6 – Computing System

Advanced Industrial Systems Ltd	www.ais.com.mt
Charonite - Maltalinks Ltd	www.maltalinks.com
Engineria Ltd	www.engineria.com
EuroMedITI	www.euromediti.com
Exigy Ltd	www.exigy.com
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/

ICT-2009.3.7 – Photonic

ST Microelectronics Ltd	www.st.com
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/

ICT-2009.3.8 – Organic Photonics and Other Disruptive Photonics Technologies

ST Microelectronics Ltd	www.st.com
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/

ICT-2009.3.9 – Microsystems and Smart Miniaturised Systems

Charonite - Maltalinks Ltd	www.maltalinks.com
ST Microelectronics Ltd	www.st.com
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/

Digital Libraries and Content

ICT-2009.4.1 – Digital Libraries and Digital Preservation

AcrossLimits Ltd	www.acrosslimits.com
Ascent Software Limited	www.ascentsoftware.eu
Charonite - Maltalinks Ltd	www.maltalinks.com
Computer Domain Ltd	www.computerdomain.net
EuroMedITI	www.euromediti.com
Foundation for IT Accessibility (FITA)	www.knpd.org/mittsfita
Heritage Malta	www.heritagemalta.org
Icon Studios Ltd	www.icon.com.mt
Malta Council for Culture and the Arts – The Caravaggio Foundation	www.maltaculture.com
Megabyte Ltd	www.megabyte.net
MEPA	www.mepa.org.mt
MITA	www.mita.gov.mt
Projects in Motion	www.pim.com.mt
Repro House Ltd	www.reprohouseltd.com
Seasus Ltd	www.seasus.com
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/

ICT-2009.4.2 – Technology-Enhanced Learning

AcrossLimits Ltd	www.acrosslimits.com
Ascent Software Limited	www.ascentsoftware.eu
Exigy Ltd	www.exigy.com
Foundation for IT Accessibility (FITA)	www.knpd.org/mittsfita
Fondazzjoni Temi Zammit	www.ftz.com.mt
Foundation for Information Technology Accessibility (FITA)	www.knpd.org/mittsfita
Heritage Malta	www.heritagemalta.org
Institute of Tourism Studies	www.its.edu.mt
MEPA	www.mepa.org.mt
METIS Co Ltd	www.metiseducation.org
MITA	www.mita.gov.mt
Projects in Motion	www.pim.com.mt
Seasus Ltd	www.seasus.com
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/

ICT-2009.4.3 – Intelligent Information Management

AcrossLimits Ltd	www.acrosslimits.com
Ascent Software Limited	www.ascentsoftware.eu
Charonite - Maltalinks Ltd	www.maltalinks.com
Computer Domain Ltd	www.computerdomain.net
Datatrak Solutions Ltd	www.datatrak.ws
Diplo Foundation	www.diplomacy.edu
EBN Internet & Media	www.ebnsoftware.com
Exigy Ltd	www.exigy.com
Heritage Malta	
Megabyte Ltd	www.megabyte.net
MEPA	www.mepa.org.mt
MITA	www.mita.gov.mt
Philip Toledo Ltd	www.ptl.com.mt
Projects in Motion	www.pim.com.mt
Seasus Ltd	www.seasus.com
Strategyworks Ltd	www.strategyworks.net
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/

Towards sustainable and personalised healthcare

ICT-2009.5.1 – Personal Health Systems

AcrossLimits Ltd	www.acrosslimits.com
Ascent Software Limited	www.ascentsoftware.eu
Information Systems Ltd	www.isl.com.mt
Megabyte Ltd	www.megabyte.net
Malta Council for Science and Technology (MCST)	www.mcst.gov.mt
MITA	www.mita.gov.mt
St James Hospital Ltd	www.stjameshospital.com
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/

ICT-2009.5.2 – ICT for Patient Safety

AcrossLimits Ltd	www.acrosslimits.com
Ascent Software Limited	www.ascentsoftware.eu
Information Systems Ltd	www.isl.com.mt
Malta Council for Science and Technology (MCST)	www.mcst.gov.mt
St James Hospital Ltd	www.stjameshospital.com
UoM, Faculty of ICT, Department of Computer Information Systems	www.um.edu.mt/ict/cis
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/

ICT-2009.5.3 – Virtual Physiological Human

Ascent Software Limited	www.ascentsoftware.eu
Civil Protection Department (Ministry for Home Affairs)	www.mjha.gov.mt
Malta Council for Science and Technology (MCST)	www.mcst.gov.mt
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/

ICT-2009.5.4 – International Cooperation on Virtual Physiological Human

Ascent Software Limited	www.ascentsoftware.eu
Malta Council for Science and Technology (MCST)	www.mcst.gov.mt
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/

ICT for Mobility, Environmental Sustainability and Energy Efficiency

ICT-2009.6.1 – ICT for Safety and Energy Efficiency in Mobility

Ascent Software Limited	www.ascentsoftware.eu
Datatrak Solutions Ltd	www.datatrak.ws
Fondazzjoni Temi Zammit	www.ftz.com.mt
MEPA	www.mepa.org.mt
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of Engineering, Department of Industrial Electrical Power Conversion	www.eng.um.edu.mt

ICT-2009.6.2 – ICT for Mobility of the Future

Ascent Software Limited	www.ascentsoftware.eu
Charonite - Maltalinks Ltd	www.maltalinks.com
Foundation for IT Accessibility (FITA)	www.knpd.org/mittsfita
Seasus Ltd	www.seasus.com
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of Engineering, Department of Industrial Electrical Power Conversion	www.eng.um.edu.mt

ICT-2009.6.3 – ICT for Energy Efficiency

Malta Council for Science and Technology (MCST)	www.mcst.gov.mt
Malta Resources Authority	www.mra.org.mt
MEPA	www.mepa.org.mt
Projects in Motion	www.pim.com.mt
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/

UoM, Faculty of Engineering, Department of Industrial Electrical Power Conversion	www.eng.um.edu.mt

ICT-2009.6.4 – ICT for Environmental Services and Climate Change Adaptation

Heritage Malta	www.heritagemalta.org
Integrated Resources Management Co Ltd	www.environmentalmalta.com
Malta Resources Authority	www.mra.org.mt
MEPA	www.mepa.org.mt
Projects in Motion	www.pim.com.mt
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of Engineering, Department of Industrial Electrical Power Conversion	www.eng.um.edu.mt

ICT-2009.6.5 – Novel ICT Solutions for Smart Electricity Distribution Networks

Ascent Software Limited	www.ascentsoftware.eu
Fondazzjoni Temi Zammit	www.ftz.com.mt
Malta Resources Authority	www.mra.org.mt
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of Engineering, Department of Industrial Electrical Power Conversion	www.eng.um.edu.mt

ICT for Independent Living, Inclusion and Governance

ICT-2009.7.1 – ICT & Ageing

AcrossLimits Ltd	www.acrosslimits.com
Ascent Software Limited	www.ascentsoftware.eu
Charonite - Maltalinks Ltd	www.maltalinks.com
Foundation for IT Accessibility (FITA)	www.knpd.org/mittsfita
Malta Council for Science and Technology (MCST)	www.mcst.gov.mt
Maltese Association of Gerontology & Geriatrics	soc.um.edu.mt/magg/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/

ICT-2009.7.2 – Accessible and Assistive ICT

AcrossLimits Ltd	www.acrosslimits.com
Charonite - Maltalinks Ltd	www.maltalinks.com
Datatrak Solutions Ltd	www.datatrak.ws
Foundation for Information Technology Accessibility (FITA)	www.knpd.org/mittsfita
InRoads	www.inroads.com.mt
Malta Council for Science and Technology (MCST)	www.mcst.gov.mt
Maltese Association of Gerontology & Geriatrics	http://soc.um.edu.mt/magg/
MEPA	www.mepa.org.mt
Projects in Motion	www.pim.com.mt
Seasus Ltd	www.seasus.com
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/
UoM, Faculty of ICT, Department of Computer Information Systems	www.um.edu.mt/ict/cis
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/

ICT-2009.7.3 – ICT for Governance and Policy Modelling

Ascent Software Limited	www.ascentsoftware.eu
Charonite - Maltalinks Ltd	www.maltalinks.com
Commonwealth Network of IT for Development (COMNET-IT)	www.comnet-it.org
Diplo Foundation	www.diplomacy.edu
Exigy Ltd	www.exigy.com
Foundation for IT Accessibility (FITA)	www.knpd.org/mittsfita
Fondazzjoni Temi Zammit	www.ftz.com.mt
Heritage Malta	www.heritagemalta.org
Icon Studios Ltd	www.icon.com.mt
Malta Council for Science and Technology (MCST)	www.mcst.gov.mt
MedEcology Foundation	www.medecology.org
MEPA	www.mepa.org.mt
MITA	www.mita.gov.mt
Seasus Ltd	www.seasus.com

UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/

Future and Emerging Technologies

ICT-2009.8.0 – FET-Open: Challenging Current Thinking

EuroMedITI	www.euromediti.com
Fondazzjoni Temi Zammit	www.ftz.com.mt
Santucci & Brown International	www.santuccibrown.com
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/

ICT-2009.8.1 – FET proactive 1: Concurrent Tera-device Computing

UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/

ICT-2009.8.2 – FET proactive 2: Quantum Information Foundations and Technologies

Ascent Software Limited	www.ascentsoftware.eu
Charonite - Maltalinks Ltd	www.maltalinks.com
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/

ICT-2009.8.3 – ICT-2009.8.3 – FET proactive 3: Bio-chemistry-based Information Technology

Charonite - Maltalinks Ltd	www.maltalinks.com
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/

ICT-2009.8.4 – FET proactive 4: Human-Computer Confluence

Ascent Software Limited	www.ascentsoftware.eu
EuroMedITI	www.euromediti.com
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/
UoM, Faculty of Engineering, Department of Industrial Electrical Power Conversion	www.eng.um.edu.mt

ICT-2009.8.5 – FET proactive 5: Self-Awareness in Autonomic Systems

EuroMedITI	www.euromediti.com
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/

ICT-2009.8.6 – FET proactive 6: Towards Zero-Power ICT

Ascent Software Limited	www.ascentsoftware.eu
ST Microelectronics Ltd	www.st.com
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/

ICT-2009.8.7 – FET proactive 7: Molecular-Scale Devices and Systems

ST Microelectronics Ltd	www.st.com
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/

ICT-2009.8.8 – FET proactive 8: Brain-Inspired ICT

EuroMedITI	www.euromediti.com
UoM, Faculty of ICT, Department of Communications & Computer Engineering	www.um.edu.mt/ict/
UoM, Faculty of ICT, Department of Computer Information Systems	www.um.edu.mt/ict/cis
UoM, Faculty of ICT, Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/
UoM, Faculty of ICT, Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/
UoM, Faculty of Engineering, Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/

ICT-2009.8.9 – Coordinating Communities, Plans and Actions in FET Proactive Initiatives

Commonwealth Network of IT for Development (COMNET-IT)	www.comnet-it.org
EuroMedITI	www.euromediti.com
Fondazzjoni Temi Zammit	www.ftz.com.mt
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/

ICT-2009.8.10 – Identifying new research topics, Assessing emerging global S&T trends in ICT for future FET Proactive initiatives

Computer Society of Malta	www.csm.org.mt
Diplo Foundation	www.diplomacy.edu
Fondazzjoni Temi Zammit	www.ftz.com.mt
UoM, Faculty of ICT, Department of Computer Science	www.um.edu.mt/ict/cs/

ANNEX VI Competence Benchmark of ICT R&D Players

Centres of ICT R&D Excellence

	Organisation	Website	Objective Number of ICT RTD fields of excellence (in accordance with FP7 – ICT Themes ICT-2009)
PUBLIC BODIES	Faculty of ICT	www.um.edu.mt/ict	1.1/1.2/1.3/1.4/1.5/1.6/2.1/2.2 3.1/3.2/3.3/3.4/3.5/3.6/3.7/3.8/3.9 4.1/4.2/4.3/5.1/5.2/5.3/5.4 6.1/6.2/6.3/6.4/6.5/7.1/7.2/7.3 8.0/8.1/8.2/8.3/8.4/8.5/8.7/8.8/8.9/8.10
	Faculty of Education	www.um.edu.mt/educ	4.1/6.1
	Faculty of Engineering	www.um.edu.mt/eng	2.1/2.2/3.4/5.1/5.2/5.3/5.4 6.1/6.2/6.3/6.4/6.5/7.1/8.3/8.4/8.5/8.6/8.8
	Heritage Malta	www.heritagemalta.org/	1.2/1.5/4.1/4.2/4.3/6.4/7.3
	MITA (Malta Information Technology Agency)	www.mita.gov.mt/	1.2/1.3/1.4/1.6/4.1/4.2/4.3/5.1/7.3
INDUVIDUAL RESEARCHERS	**University of Malta**		
	Prof Juanito Camilleri UoM Rector	www.um.edu.mt/about/uom/administration	1.1/1.2/1.3/1.4/1.5/1.6/2.1/2.2 3.1/3.2/3.3/3.4/3.5/3.6/3.7/3.8/3.9 4.1/4.2/4.3/5.1/5.2/5.3/5.4 6.1/6.2/6.3/6.4/6.5/7.1/7.2/7.3 8.0/8.1/8.2/8.3/8.4/8.5/8.6/8.7/8.8/8.9/8.10
	Faculty of ICT, UoM		
	Dr Ernest Cachia Faculty Dean	www.um.edu.mt/ict/cs/staff/Dr.ErnestCachia	1.1/1.2/1.3/1.4/1.5/1.6/2.1/2.2 3.1/3.2/3.3/3.4/3.5/3.6/3.7/3.8/3.9 4.1/4.2/4.3/5.1/5.2/5.3/5.4 6.1/6.2/6.3/6.4/6.5/7.1/7.2/7.3 8.0/8.1/8.2/8.3/8.4/8.5/8.7/8.8/8.9/8.10
	Dr Gordon J. Pace Department of Computer Science	www.um.edu.mt/ict/cs/staff/Dr.GordonPace	1.1/1.4/3.2/3.4/3.6/4.2/6.4/8.0/8.2/8.3/8.4/8.8/8.9/8.10
	Dr Adrian Francalanza Department of Computer Science	www.um.edu.mt/ict/cs/staff/Dr.AdrianFrancalanza	2.2/3.6/4.3/7.2/8.1/
	Dr Kevin Vella Department of Computer Science	www.um.edu.mt/ict/cs/staff/Dr.KevinVella	1.2/1.3/1.6/2.1/3.1/3.5/3.6/4.1/4.3/5.1/5.2/5.4/6.1/6.2/6.3/6.5/7.1/7.3/
	Christian Colombo Department of Computer Science	www.christiancolombo.com/	3.4/3.5/3.6
	Dr Vitězslav Nezval Department of Computer Information Systems	www.um.edu.mt/ict/cis/staff/vn	1.1/1.2/1.3/1.4/1.5/1.6/2.2/5.2/7.2/8.8
	Professor Albert Leone Ganado Department of Computer Information Systems	www.um.edu.mt/ict/cis/staff/alg	1.1/1.5/1.6/2.2/5.2/
	Mr Mike Rosner Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/staff/Mr.MikeRosner	1.1/1.2/1.3/1.4/1.5/1.6/2.2/3.5/3.6/4.1/4.3/5.2/7.2/8.4/8.5/8.8
	Dr John Abela Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/staff/Dr.JohnAbela	3.6/8.4/8.5/8.8
	Dr Matthew Montebello Department of Intelligent Computer Systems	staff.um.edu.mt/mmon1/	1.1/1.2/1.4/1.5/3.5/8.4/8.5/8.8
	Dr Chris Staff Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/staff/Dr.ChrisStaff	1.2/4.1/4.3/7.2/
	Dr Alexiei Dingli Department of Intelligent Computer Systems	www.um.edu.mt/ict/ai/staff/Dr.AlexieiDingli	1.1/1.2/1.3/1.5/1.6/2.2/5.2/8.4/8.5/8.8
	Prof Ing Paul Micallef Department of Communications & Computer Engineering Faculty of ICT	www.um.edu.mt/ict/cce/staff/paulmicallef	1.2/1.3/1.5/1.6/2.2/3.4/3.5/3.6/4.1/4.3/5.3/8.1/8.4/8.8
	Dr Ing Victor Buttigieg Department of Communications & Computer Engineering	www.um.edu.mt/ict/cce/staff/victorbuttigieg	1.2/1.3/2.2/3.4/3.6/8.1/8.4/

	Dr Ing Carl J. Debono Department of Communications & Computer Engineering	www.um.edu.mt/ict/cce/staff/carldebono	1.6/3.5/5.3/
	Dr Adrian Muscat Department of Communications & Computer Engineering	staff.um.edu.mt/amus1/	3.4/3.5/3.6
	Dr Ing Saviour Zammit Department of Communications & Computer Engineering	www.um.edu.mt/ict/cce/staff/saviourzammit	1.5/4.1/4.3/
	Mr Reuben Farrugia Department of Communications & Computer Engineering	www.um.edu.mt/ict/cce/staff/reubenfarrugia	4.1/4.3/8.8/
	Prof Joseph Micallef Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/staff/joseph	1.4/2.2/3.1/3.2/3.3/3.4/3.7/3.8/3.9/5.1/5.2/5.3/5.4/7.2/8.2/8.4/8.7/8.8
	Ing Ivan Grech Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/staff/ivan	3.1/3.2/3.3/3.4/3.7/3.8/3.9/5.1/
	Dr Edward Gatt Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/staff/edward	2.2/5.2/5.3/5.4/7.2/8.2/8.4/8.7/8.8
	Mr Owen Casha Department of Microelectronics & Nanoelectronics	www.um.edu.mt/ict/mne/staff/owen	1.4
	Faculty of Engineering, UoM		
	Prof Cyril Spiteri Staines Dept of Industrial Electrical Power Conversion	www.eng.um.edu.mt/~cispit/	3.4/6.1/6.2/6.3/6.4/6.5/8.4/
	Prof Ing Simon Fabri Department of Systems & Control Engineering	www.eng.um.edu.mt/~sgfabr/	2.1/2.2/3.4/5.1/5.2/5.3/5.4/7.1/8.3/8.4/8.5/8.6/8.8
	Prof Ing Kenneth Camilleri Department of Systems & Control Engineering	www.um.edu.mt/eng/sce/staff/kennethcamilleri	2.1/2.2/3.4/5.1/5.2/5.3/5.4/7.1/8.3/8.4/8.5/8.6/8.8
	Faculty of Education, UoM		
	Dr Suzanne Gatt	www.educ.um.edu.mt	4.1/6.1
	Malta Council for Science and Technology		
	Dr Nicholas Sammut Chairman	www.mcst.gov.mt/page.aspx?id=51	5.1/5.2/5.3/5.4/6.3/7.1/7.2/7.3
	Dr Brian Warrington CEO & FP7 National Coordinator	www.mcst.gov.mt/page.aspx?id=51	5.1/5.2/5.3/5.4/6.3/7.1/7.2/7.3
	IPv6 Task Force Malta		
	Ing Clara Delia Chairperson	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6
	Mr. Dave Mifsud Computer Services Centre, University of Malta	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6/4.1/4.2/4.3
	Mr. Robert Sultana Malta Internet Foundation & UoM	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6
	Ing Francis Farrugia Malta Standards Authority	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6
	Mr Kenneth Ciangura GO mobile	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6
	Ing. Conrad Chircop Air Malta plc	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6
	Ing. Arthur Pace Maltacom plc	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6

	Dr. Ing. Saviour Zammit Techinvest Ltd	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.5/4.1/4.3/
	Ing. Mark Ebejer Vodafone Malta Ltd	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6
	Ing. Mark Pace Balzan Engineer Melita Cable plc	www.mt.ipv6tf.org/aboutus/taskforcemembers.asp	1.1/1.2/1.3/1.4/1.5/1.6

National Centres of ICT R&D Excellence

	Organisation	**Website**	**Objective Number of ICT RTD fields of excellence (in accordance with FP7 – ICT Themes ICT-2009)**
PUBLIC BODIES	Diplo Foundation	www.diplomacy.edu	1.2/1.6/4.3/7.3/8.10
	Euro-Mediterranean Initiative for Technology and Innovation (EuroMedITI)	www.euromediti.com	1.1/1.3/1.4/1.6/3.4/3.5/3.6/4.1/8.0/8.4/8.5/8.8/8.9
	International Ocean Institute Malta Operational Centre (IOI MOC)	www.capemalta.net/ioimoc	
	Malta College of Arts, Science & Technology (MCAST)	www.mcast.edu.mt	2.1/3.4
	The Commonwealth Network of IT for Development (COMNETIT)	www.comnet-it.org	1.3/7.3/8.9

Centres of ICT R&D Competence (Potential Centres of Excellence)

	Organisation	**Website**	**Objective Number of ICT RTD fields of excellence (in accordance with FP7 – ICT Themes ICT-2009)**
PUBLIC BODIES	Fondazzjoni Temi Zammit (FTZ)	www.ftz.org.mt	1.1/1.6/4.2/6.1/6.5/7.3/8.0/8.9/8.10
	Foundation for Information Technology Accessibility (FITA)	www.knpd.org/mittsfita	2.2/4.1/4.2/6.2/7.1/7.2/7.3
	Living Lab EuroMediti	www.euromediti.com	1.1/1.3/1.4/1.6/3.4/3.5/3.6/4.1/8.0/8.4/8.5/8.8/8.9
	Malta Council for Culture and the Arts – The Caravaggio Foundation	www.maltaculture.com	4.1
	Malta Communications Authority (MCA)	www.mca.org.mt	1.1/1.2/1.3/1.4/1.5/1.6
	Malta Resources Authority	www.mra.org.mt	6.3/6.4/6.5
	Maltese Association of Gerontology & Geriatrics	www.um.edu.mt/eurgeront/magg	7.1/7.2
	MEPA	www.mepa.org.mt	1.2/1.5/4.1/4.2/4.3/6.1/6.3/6.4/7.2/7.3
	Superintendence of Cultural Heritage	www.culturalheritage.gov.mt	4.1
	The Department of Technology in Education	www.education.gov.mt	4.2
	UoM IT Services Centre	www.um.edu.mt/itservices	1.1/1.2/1.3/1.4/1.5/1.6
PRIVATE ORGANISATIONS	Abertax Quality Ltd	www.abertax.com	5.1/2.1//6.2
	Across Limits	www.acrosslimits.com	4.1/4.2/4.3/5.1/5.2/7.1/7.2
	AIS - Advanced Industrial Systems Ltd	www.ais.com.mt	3.4/3.5/3.6
	All Secure International	www.asiops.com	1.2/1.4
	Allied Newspapers Ltd	www.progresspress.com.mt	1.2
	Ascent Software Ltd	www.ascent.com.mt	1.1/1.2/1.3/1.4/2.1/2.2/4.1/4.2/4.3/5.1/5.2/5.3/5.4/6.1/6.2/6.5/7.1/7.3/8.2/8.4/8.6
	Charonite Ltd	www.charonite.com	1.1/1.2/1.4/1.6/2.2/3.4/3.6/3.9/4.1/4.3/6.2/7.1/7.2/7.3/8.2/8.3
	Computer Domain Ltd	www.computerdomain.net	1.1/1.3/1.6/4.1/4.3
	Computime Ltd	www.computime.com.mt	1.2/1.3/1.4/1.6/2.2/
	Crimsonwing Malta Ltd	www.crimsonwing.com	1.1/1.2/1.3/1.4/1.5/1.6/2.2/4.3/5.2/
	Cyberspace Solutions Ltd	www.cyberspace.com.mt	1.2/1.3/1.5/4.1/4.2/4.3/5.1/5.2/5.3/5.4/6.1/6.2/6.3/6.4/6.5/7.1/7.2/7.3
	Datatrak Holdings plc	www.datatrak.ws	1.2/4.3/6.1/7.2
	Electronic Systems Design Ltd	www.esdl.com.mt	4.3/6.5/7.3
	Engineria	www.engineria.com	2.1/3.5/3.6

	Exigy Ltd	www.exigy.com	1.1/1.2/1.3/1.5/2.2/3.6/4.2/4.3/7.3
	Global IT Solutions	www.adesign.com.mt	1.1/1.2/1.3/1.5/1.6/4.3/5.1/6.1/6.2/7.1/7.2/7.3/8.0/8.7/8.8
	GO plc	www.go.com.mt	1.2/6.1
	HOB Software Malta	www.hobsoft.com	1.1/1.2/1.3/1.4/3.6/4.3/
	ICON	www.icon.com.mt	1.1/1.2/1.5/4.1/7.3
	Information Systems Ltd	www.progressive.com.mt	5.1/5.2
	Integrated Resources Management Co Ltd	www.environmentalmalta.com	3.5/6.4
	Ixaris Systems Ltd	www.ixaris.com	1.2/1.4/4.3/7.3
	Malta Industrial Innovation for SMEs (MIIS)	www.miis.com.mt	2.1/2.2/3.1/3.2/3.4/3.5/3.6/3.9/4.1/4.2/4.3/6.1/6.2/6.3/6.4/6.5/7.1/7.2/7.3/8.0/8.1
	Megabyte Ltd	www.megabyte.net	1.2/1.3/4.1/4.3/5.1
	Methode Electronics Malta Ltd	www.methode-eur.com	1.4/2.1/3.4/3.5/6.1/
	onNeutral	www.onNeutral.com	1.2/1.4/3.6
	Philip Toledo Ltd (PTL)	www.ptl.com.mt	1.2/4.3
	Paragon Ltd	www.paragoneurope.eu	1.3/4.1/6.3/7.1/7.2/7.3
	Prochrony Systems Ltd	www.prochrony.com	1.2/1.3/1.5/2.2/3.4/3.6/4.2/4.3/5.1/5.2/
	Projects in Motion Limited	www.pim.com.mt	1.3/2.1/4.1/4.2/4.3/6.3/6.4/7.2
	RS2 Software plc	www.rs2.com	1.2/1.3/3.6/7.3
	Seasus	www.seasus.com	1.1/1.2/1.3/1.4/1.5/1.6/4.1/4.2/4.3/6.2/7.2/7.3
	Shireburn Software Ltd	www.shireburn.com	1.2/1.3/1.4/4.3/7.3
	St James Hospital	www.stjameshospital.com	5.1/5.2
	Strategyworks Ltd	www.strategyworks.net	1.2/4.3
	STMicroelectronics Malta	www.st.com	3.1/3.2/3.3/3.7/3.8/3.9/8.6/8.7
	Technology (Malta) Ltd	www.technologymalta.eu	1.2/3.2/3.4/3.5/3.6/3.9/5.1/5.2/6.3
	Transactium Ltd	www.transactium.com	1.2/1.3/1.4/3.4/7.2
	World Match Ltd	www.worldmatch.com.mt	1.2/1.5/1.6

Project Quality Control/QA Signature Sheet

Contract Number:	30-CE-0261559/00-50
Project Title:	Malta - RTD Technological audit
Task Number:	9
Task Title:	MALTA – RTD TECHNOLOGICAL AUDIT – Simplified Report
Planned Delivery Date:	July 2010
Actual Delivery Date:	12th July 2010

Tasks for this report	**Status of validation**
To produce a public version of Deliverable 8 in a form accessible to a broad public and decision making constituency	S

Key:

S	Meets standards according to the contract, no revisions required
D	Discussion needed
L	Low degree of revision required
M	Moderate degree of revision required
H	High degree of revision required
N/A	Not applicable

Evaluation & Quality Assurance Officer	**Name:**	**Signature:**	**Date:**
	Mr. Brian Restall		July/2010

Project Information Page

Project name	**Malta – RTD TECHNOLOGICAL AUDIT**	
Project №	30-CE-0261559/00-50	
Country	**Malta**	
	Client	**Contractor:**
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Name of report	Deliverable 9 MALTA – RTD TECHNOLOGICAL AUDIT – Simplified Report	
Period	2010	
Date	12th July 2010	