ERAWATCH COUNTRY REPORTS 2010: Malta

ERAWATCH Network – Independent expert

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Acknowledgements and further information:

This analytical country report is one of a series of annual ERAWATCH reports which are produced for EU Member and Countries Associated to the EU Seventh Research Framework Programme (FP7). ERAWATCH is a joint initiative of the European Commission’s Directorate General for Research and Innovation and Joint Research Centre.

The analytical framework and the structure of the reports have been developed by the Institute for Prospective Technological Studies of the Joint Research Centre (JRC-IPTS) with contributions from Directorate General for Research and Innovation and the ERAWATCH Network. The report has been produced by the ERAWATCH Network in the framework of the specific contract, ERAWATCH Research Inventory and Analytical Country Reports 2010 and 2011, commissioned by JRC-IPTS.

In particular, it has benefited from comments and suggestions of Terttu Luukkonen, who reviewed the draft report. The contributions and comments of Nick Harrap from JRC-IPTS and DG-RTD are also gratefully acknowledged.

The report is only published in electronic format and available on the ERAWATCH website. Comments on this report are welcome and should be addressed to jrc-ipts-erawatch-helpdesk@ec.europa.eu.

The opinions expressed are those of the authors only and should not be considered as representative of the European Commission’s official position.
Executive Summary

With a total population of 412,970 inhabitants\(^1\), Malta is the smallest EU Member State accounting for a 0.1% share of the EU25 total population (Eurostat\(^2\)). The Gross Domestic Product (GDP) per capita at €13,400/inhabitant is well below the EU27 average of €25,000/inhabitant (Eurostat 2010).

Despite the economic downturn, Malta managed to maintain balanced growth compared to other Eurozone countries (reference 2008-2009)\(^3\); though this reflects a situation of uneven growth across sectors. The rate of unemployment was contained; in fact it fell from 7.2% in 2009 to 6.2% in 2010 which is below the EU27 average of 9.6%\(^4\).

In 2002-2006, gross expenditure on R&D (GERD) progressively increased, however provisional values from Eurostat indicate a decrease to 0.55% GDP in 2009 (equivalent to approx. €32.1m). This is well below the EU27 average of 2.01% for 2009 and below Malta’s 2010 Lisbon target of investing 0.75% GDP in R&I. Eurostat data on GERD by source of fund show that in 2009, the business sector was by far the largest R&D funder (with 51.4% share of GERD), followed by the government sector (31.3% share of GERD) and funds coming from abroad (17.2% share of GERD). In terms of R&D performers, the business sector is ahead of the other sectors with a BERD of 0.34% of GDP, followed by the higher education sector (0.18% GDP) and the general government sector (0.03% GDP). On the basis of statistical trends, there are indications that the government is funding more R&I; whilst funds from abroad and the business sector decreased. The bulk of public funds are going to support R&I activity including infrastructures and skills-building in the higher education sector.

The national R&I Strategy 2007-2010 has been serving as a common reference for the implementation of policies and measures relating to research, innovation and education. In 2010, the research and innovation portfolio shifted back to the Prime Minister’s Office, signalling renewed commitment to place R&I high on the political agenda.

The recommendations of the R&I Strategy have guided the areas of intervention in the strategic reference framework for structural funding and the measures of the National Reform Programme. This has afforded for more joined-up approaches to policy and governance, including better coordination amongst the principal agencies with shared competencies in these policy fields.

The Malta Council for Science & Technology (MCST) is currently updating the national R&I strategy to cover a longer time horizon. One of the challenges is the sustainability of public R&I funding and the need to shift towards institutionalization of a multi-annual funding programme over the current system that relies on annual budgetary cycles. This would also give the public university greater autonomy to implement research agendas and recruit research personnel.

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\(^2\) Eurostat (2010): Main Demographic Indicators, accessed 1st November 2010

\(^3\) Heise M. et al., (2010): The Euro Monitor: Indicators for Balanced Growth, Allianz

During 2009, total estimated public sector expenditure on R&D activities amounted to €11.9m, up by 4.4% over 2008. As reported in 2009, a significantly higher portion of structural funds in the second programming period (approx. €89m) have been deployed for R&I infrastructures and human resources capacity building mainly in the further and higher education sectors. The national R&I funding programme is benefiting from a higher budget in 2011 (€1.1m) compared to previous years (€700,000). In 2010, the government launched a number of project-oriented research initiatives at national scale in up-coming areas such as in Digital Gaming and Biobanks (€250,000 per initiative). These are being driven jointly by university, Malta Enterprise and MCST.

The policy mix promoting private sector investment has been further enriched with a package dedicated to stimulate R&D in industry (€3.5m), an R&D tax credit and further incentives to stimulate innovation activity amongst small and medium-sized enterprises (SMEs) that make up over 90% of Malta’s business sector. One factor influencing the achievement of private R&D investment targets relates to structural limitations, namely the fact that SMEs are typically low R&D performing firms and have a low risk-taking attitude especially in view of the economic crisis where lack of own funds emerges as a limitation.

In terms of education policies, measures are steered towards increasing the number of PhDs through various scholarship schemes (equivalent to an investment of circa €11m over six years), and making researcher careers more attractive. Nonetheless, the number of S&T graduates and more generally, the level of human resources in S&T remain well below the EU-average. There could be various bottlenecks here including poor transfer of researchers to an appropriate R&D setting in industry, the lack of a post-doctoral research community at the university and looking upstream of the education system, low interest in S&T subjects amongst students.

Knowledge Triangle

<table>
<thead>
<tr>
<th>Research policy</th>
<th>Recent policy changes</th>
<th>Assessment of strengths and weaknesses</th>
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<tbody>
<tr>
<td>Science and research portfolio re-located within Office of the Prime Minister giving them a higher profile on national political agenda;</td>
<td>• Enhanced coordination of public entities engaged in implementing national R&amp;D projects is a strength as it allows to dovetail research initiatives underway at different levels (strategic/policy, implementation);</td>
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<tr>
<td>National R&amp;D funding increasingly channelled towards specific projects and initiatives in priority economic areas;</td>
<td>• The issue of the sustainability of national R&amp;I funding is an emerging challenge;</td>
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<td>New R&amp;D incentive package to stimulate research and development in industry;</td>
<td>• Despite a new incentive package to boost private sector R&amp;D, BERD remains below the Lisbon target; this is influenced by the inherently low level of R&amp;D performed amongst indigenous SMEs.</td>
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<td>Assistance to participate in EU’s Eurostars programme for R&amp;D in SMEs.</td>
<td>• Platforms of strategic importance in manufacturing and health to identify research niche specialisations;</td>
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<td>A budget increase allocated to the national R&amp;I funding programme (from €700,000 in 2010 to €1.1m in 2011);</td>
<td>• Corporate Research &amp; Knowledge Transfer Office set up at the university to draft IP strategy and facilitate collaborative research with industry.</td>
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### Innovation policy
- Enhanced support for initiatives stimulating academia-industry linkages, beyond those offered through the national R&I funding programme;
- Further financial incentives for enterprise targeted at supporting innovation in SMEs, development of e-business, and provision of advisory services.

### Education policy
- Number of students enrolled in tertiary and vocational education increasing (30% increase of students enrolled at university in 2010 intake);
- New university and vocational course offerings reflecting industry/market demand (e.g. MSc Sustainable Energy Technology, diploma in Aviation Maintenance);
- The government to set up an interactive science centre as part of a nation-wide campaign to popularize science (2010 NRP Measure).

### Other policies
- Financial incentives (€10m) for industry and households to implement eco-innovations namely energy efficiency, renewable energies, green production processes;
- Establishment of the EU Small Enterprise Charter in last quarter of 2010.

### Assessment of strengths and weaknesses
- Indigenous enterprises exhibiting low innovation performance and risk-taking attitude, influences their ability to effectively absorb incentives made available through the policy mix.
- The absence of a stand-alone innovation policy may result in a ‘dilution’ of initiatives.
- A strength countering the above weakness is the recent targeting of policy initiatives towards overcoming structural problems in the system (such as focussing on SMEs and stimulating their innovative performance).
- Low levels of S&T graduates and researchers may limit absorptive capacity of R&I system.
- Demand for R&D personnel contingent on structural features, namely the prevalence of low-tech SMEs and large production-oriented MNCs.
- Mismatches between skills output and industry demand may stall growth in particular economic areas; a strength is the fact that the vocational education sector is quickly responding to emerging skills needs and trying to re-dress courses that are relevant to the economy.

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6 MNC: multi-national corporation
European Research Area

The permeation of the ERA dimension in the national research and innovation system is limited in the extent of policies and measures specifically addressing this aspect.

From a small country perspective, a number of challenges arise. Cooperation and coordination of research programmes raises issues of concentration of resources in particular areas of strength, sustainability of the funding system and prioritization. Malta’s national funding programme has opened up to participation of foreign entities only as non-beneficiary partners and the programme promotes research undertaken “at home”. With regard to researchers, Malta has adopted legislation for the inward mobility of third country researchers and outward mobility occurs mainly via scholarship schemes. However brain drain remains a strong concern.

Academia-industry collaboration received greater prominence in the policy mix; apart from collaborative research funded under the national R&I programme, industry-academia linkages are being strengthened through research projects identified by sectoral research platforms (such as the ERDF7-funded manufacturing projects on ICT and energy efficiency) and contracted research projects with industry.

An evaluation of Malta’s participation in FP6 undertaken by MCST showed that Malta performed very well in terms of extent of participation and funds secured (approx. €10m in FP6). The FP programme has contributed to building research capacity through international collaboration and networking at the University of Malta. In 2010, the FP Unit within the Council for Science & Technology (MCST) was strengthened to maximize further participation of Maltese organisations in the programme.

The importance of establishing an intellectual property (IP) framework for publicly funded research was flagged in the National Research & Innovation Strategy and gained momentum in 2010 with the setting up of the Corporate Research & Knowledge Transfer Office (CORTO) within the University of Malta. The draft IPR strategy drafted by CORTO is expected to create the right environment for science-industry linkages and commercialisation of research.

Malta is coordinating an OMC-NET ERAPRISM8 project that is analysing emerging policy challenges facing small Member States (MS) and how these can better engage in the ERA; one of its principal aims is to define small country-specific policy responses to these R&I challenges (for example with respect to R&I indicators, joint programming and innovative procurement).

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7 ERDF: European Regional Development Fund
8 ERAPRISM: Policies for Research and Innovation in Small Member States – Open Method of Coordination is project funded by DG Research; [http://www.erapris.eu](http://www.erapris.eu)
Assessment of the national policies/measure supporting the strategic ERA objectives (derived from ERA 2020 Vision)

<table>
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<th>ERA objectives</th>
<th>Main policy changes</th>
<th>Assessment of national strengths and weaknesses with regard to the specific ERA objective</th>
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| 1 Ensure an adequate supply of human resources for research and an open, attractive and competitive single European labour market for male and female researchers | • Malta has put in place a legal framework for the admittance of third country researchers.  
• the university giving greater visibility to research and researcher status;  
• boosting the number of PhDs in science and technology;  
• Attractive working conditions for researchers including improved salaries, small remuneration gap between men and women. Nonetheless, availability of permanent positions dependent on block institutional funding allocated to university.  
• Lack of a post-doctoral community may deter from undertaking a career in research.  
• Limitations in RI.  
• Skills mis-matches in meeting needs of fast-growing economic sectors. | |
| 2 Increase public support for research | • Public budget for R&D increased by 4.4% in 2009 compared to 2008. | Overall, R&D expenditure, minimally affected by the economic crisis; structural funds share of R&D budget committed for 2007-2013 period; national funds budget increased in 2011. |
| 3 Increase European coordination and integration of research funding | • National R&I funding programme open to participation by foreign entities. | Currently ‘closed’ national research funding system that tends to favour research activity performed ‘at home’ rather than abroad with the aim of strengthening national capacity;  
• Foreign entities participate as non-beneficiary partners. |
| 4 Enhance research capacity across Europe | • Participation in FP7 contributes to building research capacity and extending research networks. | Participation and contribution in European research contingent on availability of adequate research infrastructures and facilities. |
| 5 Develop world-class research infrastructures (including e-infrastructures) and ensure access to them | • Investments in RIs have increased over the past five years, mainly for the upgrading of existing infrastructures setting up of new ones in areas such as engineering, life sciences, renewable energy, super computing, ICT and health biotech  
• In 2010, the government earmarked €250,000 for the setting up of a national biobank and €11m for a Life Sciences Centre. | The focus is very much on strengthening national infrastructures typically in areas in which the university already has competence (e.g. ICT, health). Whilst this is a strength because it will enable the university to be better placed to participate in international RI initiatives yet at the same time it may limit capacity in other emerging areas. |
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| 6 Strengthen research institutions, including notably universities | • University rector’s endorsement of the third mission in 2010;  
• Career progression linked to research and teaching output ensuring quality of research.  
• Larger budget allocation to the university in 2011 (€44.5m) compared to 2010 (€41m). | • A major strength is the fact that the government has over the past five years progressively increased the budget for higher education in general and the university in particular.  
• On the other hand, a weakness is the over-reliance on annual institutional funding streams restricting university’s financial and academic autonomy. |
| 7 Improve framework conditions for private investment in R&D | • First-time R&D incentive package for industry;  
• Promotion of eco-innovations (e.g. renewable energy) creating demand for innovation and research investment; | • Lack of own funds and low entrepreneurial culture amongst SMEs are likely to be stumbling blocks in the uptake of incentives made available.  
• R&I incentives are being tailored to address particular structural problems in the system, namely the targeting of financial schemes to support SMEs also in terms of promoting their innovation activity. |
| 8 Promote public-private cooperation and knowledge transfer | • Setting up the Corporate Research & Knowledge Transfer Office at university to facilitate industry-academia linkages and cooperation;  
• Tax exemption from royalties and similar revenue resulting from patents on inventions (2011 measure)  
• Research projects promoting public-private cooperation. | • These recent measures aim at creating enabling framework conditions for public-private cooperation and commercialisation of research. |
| 9 Enhance knowledge circulation across Europe and beyond | • Good level of participation of Maltese research entities in FP7 to date despite a slight decline in university participation;  
• The internationalisation strategy at university is serving to attract a growing population of foreign students (at 6.2% of the total in 2009). | • Malta has more outgoing students than it has incoming that may result in a brain drain.  
• Streamlining of the tertiary education system with the Bologna process and the presence of an English-speaking environment in the education/university system facilitate the circulation of international students promoting knowledge circulation. |
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<td>10 Strengthen international cooperation in science and technology and the role and attractiveness of European research in the world</td>
<td>• International Cooperation gained more prominence in the Policy &amp; Strategy Unit at MCST in 2010; • Strengthened FP7 Unit within MCST aimed to increase participation in FP and other EU programmes (e.g. COST).</td>
<td>• There is no follow-up of bilateral science and technology cooperation agreements that Malta maintains with countries within and outside the EU so that these offer limited value-added to strengthening international cooperation in practice.</td>
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<td>11 Jointly design and coordinate policies across policy levels and policy areas, notably within the knowledge triangle</td>
<td>• The national R&amp;I Strategy 2007-2010 serves as a reference guiding research and innovation policy and governance; • MCST coordinates an OMC-NET Project (ERAPRISM) defining policy challenges and responses for small MS.</td>
<td>• There is evidence of dovetailing of R&amp;I initiatives across strategies, sectors and policy measures thanks to enhanced coordination amongst the public entities with a remit to implement R&amp;I policy. This is a strength as it affords for greater synergy within the knowledge triangle.</td>
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<tr>
<td>12 Develop and sustain excellence and overall quality of European research</td>
<td>• This is a priority re-iterated in a number of policy documents including the Further &amp; Higher Education Strategy and the government's Vision 2015 document; the government is working to establish Malta as a regional centre of excellence in education and research with a focus on fields of national importance; • Internal quality assurance mechanism in place at university that increasingly benchmarks promotion of academic staff against performance; • External quality assurance framework needed to attract quality research.</td>
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<td>13 Promote structural change and specialisation towards a more knowledge-intensive economy</td>
<td>• Government's 2015 Vision document rests on building adequate knowledge base to establish excellence in given sectors of economic value (e.g. ICT, Health, Energy); • The reform in the further and higher education sector – strengthening vocational training; increasing opportunities for PhDs - are supporting the transition to a knowledge-based economy. • The structural characteristics of the system, namely a low population of R&amp;D performing firms and the fact that financial aid for R&amp;I activity is a recent phenomenon in the system, present specific challenges towards uptake of the R&amp;I measures put in place. • The fact that policy measures are targeting these particular problem areas should translate into enhanced absorptive capacity for R&amp;I.</td>
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| 14 Mobilise research to address major societal challenges and contribute to sustainable development | • Public funds are being channelled towards priority areas that cover societal challenges including Energy and Renewable Energy;  
• Other measures include the promotion of green technologies, platforms of strategic importance (e.g. Health). | • Sustainable development across policy areas (energy, tourism and environment) has gained a higher profile on the political agenda. There is more scope for coordination across ministries and public agencies. |
| 15 Build mutual trust between science and society and strengthen scientific evidence for policy making | • National science popularisation campaign bringing science closer to the community;  
• A 2011 measure to set up an interactive science centre.  
• Enhanced interactions amongst public agencies involved in S&T policy formulation and implementation (namely MCST) and other relevant ministries (e.g. Finance ministry, Contracts Department). | • Although a weak evaluation culture permeates in the system, there are indications that the formulation of research and innovation policy is increasingly relying on an evidence-based approach (e.g. for the formulation of R&D targets 2020). |
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References

List of Abbreviations
1 Introduction

The main objective of the ERAWATCH Analytical Country Reports 2010 is to characterise and assess the evolution of the national policy mixes in the perspective of the Lisbon goals and of the 2020, post-Lisbon Strategy. The assessment will focus on the national R&D investments targets, the efficiency and effectiveness of national policies and investments into R&D, the articulation between research, education and innovation, and on the realisation and better governance of ERA. In doing this, the 15 objectives of the ERA 2020 are articulated.

The report builds on the 2009 report streamlining the structure and updating the 2009 policy assessment in the domains of human resource mobilisation, knowledge demand, knowledge production and science-industry knowledge circulation. The information related to the four ERA pillars covered in the 2009 report is also updated and it is extended in order to cover all six ERA pillars and address the corresponding objectives derived from ERA 2020 Vision.

Given the latest developments, the 2010 Country Report has a stronger focus on the link between research and innovation, reflecting the increased focus of innovation in the policy agenda. The report is not aimed to cover innovation per se, but rather the 'interlinkage' between research and innovation, in terms of their wider governance and policy mix.

2 Performance of the national research and innovation system and assessment of recent policy changes

The aim of this chapter is to assess the performance of the national research system, the 'interlinkages' between research and innovation systems, in terms of their wider governance and policy and the changes that have occurred in 2009 and 2010 in national policy mixes in the perspective of the Lisbon goals. The analysis builds upon elements in the ERAWATCH Country Report 2009, by updating and extending the 2009 policy assessment in the domains of resource mobilisation, knowledge demand, knowledge production and science-industry knowledge circulation. Each section identifies the main societal challenges addressed by the national research and innovation system and assesses the policy measures that address these challenges. The relevant objectives derived from ERA 2020 Vision are articulated in the assessment.

2.1 Structure of the national research and innovation system and its governance

This section gives the main characteristics of the structure of the national research and innovation systems, in terms of their wider governance.
With a total population of 412,970 inhabitants in 2010\textsuperscript{9}, Malta is the smallest EU Member State accounting for a 0.1% share of the EU25 total population (Eurostat\textsuperscript{10}). The Gross Domestic Product (GDP) per capita at €13,400/inhabitant is well below the EU27 average of €25,000/inhabitant (Eurostat 2010).

Despite the economic downturn, in 2008-2009 Malta managed to maintain balanced growth compared to the other Eurozone countries\textsuperscript{11}, though this reflects a situation of uneven growth across sectors (with construction, manufacturing and hotels exhibiting growth in value added whilst communication, agriculture and fisheries experiencing a decline\textsuperscript{12}). Unemployment rate fell from 7.2\% in 2009 to 6.2\% in 2010 which is below the EU27 average of 9.6\%\textsuperscript{13}.

The total expenditure on research and development (GERD) decreased from 0.61\% of GDP in 2006 to 0.55\% in 2009 equivalent to €32m (Eurostat); this is well below the estimated EU27 average of 2.01\% GDP (2009 Eurostat estimate).

**Main actors and institutions in research governance**

Figure 1 provides a snapshot of Malta’s research system. In March 2010 the Prime Minister announced the shift of the research and innovation (R&I) portfolio from the Ministry of Environment back to his office to ensure better coordination amongst ministries on matters relating to R&D. He also announced the designation of a member of the parliament to serve as the council’s new chairman. These two measures imply that R&I have gained a higher profile on the national political agenda.

Within the Office of the Prime Minister (OPM), the Council for Science & Technology (MCST) is the principal entity responsible for implementing the National Research & Innovation (RI) Strategy; it also manages the national R&I Funding Programme and coordinates Malta’s participation in the EU’s FP14 Programme. MCST has undergone significant restructuring in 2010, receiving an unprecedented boost in human resources capacity building directed at strengthening its Policy and Strategy Unit, FP7 Unit and Science Popularisation activities and has benefited from a 28\% increase in its operational budget for 2011\textsuperscript{15}. It retains a strategic role as the key public agency driving science and technology policy and initiatives. The MCST’s Advisory Council draws expertise from the public and private sectors and serves as a platform for national players to submit recommendations on strategies and priorities to government through MCST.

Although R&I policy remains the remit of the OPM, implementation of measures directed at stimulating business sector R&I is the responsibility of the Ministry of Finance, Economy & Investment. Within this ministry, the national innovation agency (Malta Enterprise) manages research and innovation grant schemes for business enterprise, including small and medium sized enterprises.

In order to enhance the effectiveness of R&I governance structure, and bridge the gap between policy and implementation, collaborative initiatives are being implemented jointly between MCST, Malta Enterprise and the university on specific

\textsuperscript{9} National Statistics Office (2010): Demographic Review 2009, published 3\textsuperscript{rd} September 2010
\textsuperscript{10} Eurostat (2010): Main Demographic Indicators, accessed 1\textsuperscript{st} November 2010
\textsuperscript{11} Heise M. et al., (2010): The Euro Monitor: Indicators for Balanced Growth, Allianz
\textsuperscript{12} Times of Malta (2010): Multi-speed economic recovery published 18\textsuperscript{th} September 2010
\textsuperscript{13} Eurostat (2010): Euro area unemployment rate at 10.1\% News release No.162/2010, published 29\textsuperscript{th} October 2010
\textsuperscript{14} European Framework Programme for Research and Technology Development
\textsuperscript{15} Malta Ministry of Finance, Economy & Investment Budgetary Estimates 2011
projects. In 2010 the Digital Gaming and Biobanking projects were kick-started supported by a dedicated grant from national funds.

Since the introduction of a Knowledge & Innovation Axis in one of the Operational Programmes of Malta’s Cohesion Policy, the Planning & Priorities Coordination Department (PPCD) within OPM has acquired an important role in managing structural funds earmarked for R&I projects. Guiding R&I investments in terms of areas/actions that should receive priority attention are the recommendations of the National R&I Strategy. Thus critical synergies are emerging between the actions identified as priorities for the national R&I system and what is actually funded by the structural funding programme.

Education and human capacity building represent a priority area for the government. All the scholarship schemes, including national and EU part-funded schemes are coordinated by the National Commission for Higher Education (NCHE) within the Ministry of Education, Employment & Family; this entity also oversees the reform of the further and higher education sector.

Figure 1: Overview of Malta’s research system governance structure

Source: ERAWATCH Research Inventory

The institutional role of regions in research governance

Malta has been designated as one region at NUTS Levels I and II and two regions at NUTS Level II consisting of Malta and the two sister-islands of Gozo and Comino.

As with other policy areas, research and innovation policy development and implementation remain a centralized activity within the competence of the Office of the Prime Minister and relevant ministries. The regional dimension is not relevant for R&I governance in Malta’s case and there is no split of responsibilities between the national and regional level dimensions.
Main research performer groups

Business sector R&D (BERD) accounted for 0.34% of GDP in 2009, making it the main R&D performer. The dichotomy of Malta’s business sector has been amply described as being dominated by small and medium sized enterprises (SMEs) and micro-enterprises, in which R&D activity is low to minimal, and a group of large multinational firms specialising in electronics for manufacturing and generic pharmaceuticals. The contribution of the services sector (ICT, consultancy and financial services) is continually growing.

Trends for 2007-2009 indicate that the government and higher education sector (represented by the University of Malta) are performing more R&D as a share of total GERD. Government R&D expenditure increased from 0.01% in 2007 to 0.03% in 2009. The main public research performer is the University of Malta with an R&D expenditure of 0.18% of GDP (2009 Eurostat data). The university has historically played a strategic role in providing R&D support and services both to government and to industry through its own group of companies established in the 1980s.

2.2 Resource mobilisation

Since 2000, Europe has made evident progress towards ERA but at the same time it is clear that Europe’s overall position in research has not improved, especially regarding R&D intensity, which remains too low. The lower R&D spending in the EU is mainly a result of lower levels of private investment. Europe needs to focus on the impact and composition of research spending and to improve the conditions for private sector R&D investments.

This section assesses the progress towards national R&D targets, with particular focus on private R&D and of recent policy measures and governance changes and the status of key existing measures, taking into account recent government budget data. The need for adequate human resources for R&D has been identified as a key challenge since the launch of the Lisbon Strategy in 2000. Hence, the assessment includes also the human resources for R&D. Main assessment criteria are the degree of compliance with national targets and the coherence of policy objectives and policy instruments.

2.2.1 Resource provision for research activities

As outlined in the National Research & Innovation (R&I) Strategy 2007-2010, the vision is for research and innovation (R&I) to sustain economic growth in areas offering added value for Malta’s economy. This explains the rationale of channelling public investments in four broad areas identified through extensive stakeholder consultation and a SWOT of the national economy; these are Information Communication Technology (ICT), Health & Biotechnology, high value-added manufacturing and Energy and Environment.

Over the past six years, this vision has translated into a significant boost in the resources dedicated to strengthening research infrastructures and human capacity building in science and technology (mainly co-financed by structural funds). As shown in Table 1, in 2002-2006, gross expenditure on R&D (GERD) progressively increased; however Eurostat provisional data indicate a decrease for 2007-2009. Gross expenditure on R&D in 2009 was approximately €32m. Comparatively this is
well below the EU27 average of 2.01% GDP (2009) and below Malta’s 2010 Lisbon target of investing 0.75% GDP in R&I.

**Table 1: Gross Expenditure on R&D expressed as a percentage of Gross Domestic Product over 2002-2009 period**

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU27</td>
<td>1.87%</td>
<td>1.86%</td>
<td>1.82%</td>
<td>1.82%</td>
<td>1.85%</td>
<td>1.85%</td>
<td>1.92%</td>
<td>2.01%</td>
</tr>
<tr>
<td>Malta</td>
<td>0.26%</td>
<td>0.26%</td>
<td>0.53%</td>
<td>0.57%</td>
<td>0.61%</td>
<td>0.58%</td>
<td>0.57%</td>
<td>0.55%</td>
</tr>
</tbody>
</table>

Source: Eurostat, accessed February 2011; p=provisional value; s=Eurostat estimate

Eurostat data on GERD by source of funds show that in 2009 business sector contributed by far the largest share of total R&D funds (at 51.4% of GERD), followed by the government sector (with 31.3%) and funds from abroad (17.2%).

The government is funding more R&D, with government spend on R&D increasing from 26% in 2007 to 31.3% of GERD in 2009; whilst funds from the business sector and abroad have decreased in the same period (Eurostat). The bulk of public funds for R&I (around 80%) is allocated as institutional or block funding to the higher education sector, namely the state-owned university and secondly to the ministries and public research centres.

The **National R&I Funding Programme** is the only instrument that allocates national funds on a competitive basis for collaborative research projects between industry, academia and public sector. It operates on an annual budget that has been increased from €700,000 to €1.1m in 2011 (National Reform Programme, NRP Measure 3.2). To date this programme has funded 32 research projects worth €2.8m.

Another mode of public funding includes that dedicated to specific national initiatives targeting particular areas (e.g. Biobank and Digital Gaming) and actions (setting up of a Life Science Centre).

The only long-term commitment of public funds for research and innovation is the share committed through structural funds; in 2007-2013 approximately €89m have been secured to build infrastructures at the university and vocational college, boosting R&D in industry and education and human resources in science and technology.

The impacts of the economic downturn have been mixed. Whilst Malta was not hit by the collapse of the financial markets because of a strong domestic banking and financial sector, there were repercussions on employment which the government attempted to contain through re-training schemes. Overall, Malta managed to retain balanced growth. This economic environment did not impact on the allocations for R&I that were already earmarked for particular interventions outlined in one of the Operational Programmes of Malta’s Cohesion Policy.

Public funding for private R&D has seen an evolution in the type of instruments supported, from those based solely on loan guarantees to a wider mix of fiscal incentives and grants for innovative projects and research and development (see Section 2.2.2 below).

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17 Ministry of Finance, Economy & Investment Budgetary Estimates 2011
18 MCST Bulletin Issue 1 October 2010
Science and society

Bringing science closer to society and enticing students into a science career is at the core of a national science popularisation strategy drafted by the Malta Council for Science & Technology (MCST). The strategy is being brought to action through a series of ‘science in the community’ initiatives. Also in the Budget Speech 2011, the government announced the setting up of a national interactive science centre.

Societal challenges

The national strategy is currently being updated to cover a longer time horizon, with one of the issues under scrutiny being the sustainability of R&I funding. Research strategies are being formulated for the four broad areas that should serve to identify smart specialisations in which to concentrate research efforts and resources (e.g. the Manufacturing platform is the first of such initiatives).

Grand Challenges

Grand challenges including climate change and sustainable development, energy and the digital divide are indirectly addressed by the national R&I system through the government’s Vision document 2015 which prioritizes research related to socio-economic priorities.

2.2.2 Evolution of national policy mix geared towards the national R&D investment targets

This section focuses on the evolution of the national policy mix towards achieving R&D investment targets, with particular focus on private sector R&D.

Evolution of BERD

The business sector is the principal source of R&D funds and it is also the main R&D performer. Business expenditure on R&D rose sharply in 2002-2006 from 0.07% to 0.41% and decreased to 0.34% GDP (2009). This is still far below the EU27 average of 1.25% (Eurostat).

Although Malta’s innovation performance remains below the EU27 average, it experienced the fastest improvement in its group, moving from a ‘catching-up’ to a ‘moderate’ innovator (2009 European Innovation Scoreboard). Throughputs, including patents and community design, have been the main driver of innovation performance, together with economic effects; whilst the weaknesses are in human resources, linkages and entrepreneurship.

Policy Mixes towards increased private R&D investment

This sub-section provides an overview (at aggregate level) of the policies/instruments aimed at increasing private R&D investment and assesses the balance and efficiency of policy mix routes to stimulate R&D investment:

- **Route 1**: Stimulating greater R&D investment in R&D performing firms
- **Route 2**: Promoting the establishment of new indigenous R&D performing firms
- **Route 3**: Stimulating firms that do not perform R&D yet

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19 European Innovation Scoreboard 2009
20 “A registered Community design is an exclusive right for the outward appearance of a product or part of it, resulting from the features of, in particular, the lines, contours, colours, shape, texture and/or materials of the product itself and/or its ornamentation.” European Innovation Scoreboard Definition of Indicators 2005
• **Route 4**: Attracting R&D-performing firms from abroad

• **Route 5**: Increasing extramural R&D carried out in cooperation with the public sector

• **Route 6**: Increasing R&D in the public sector

The policy mix favours the provision of grants (direct funding) over competitive funding for research and innovation activity. The grant schemes offering financial assistance to enterprise are diverse; however they mainly target small and medium-sized enterprises (SMEs) that represent over 90% of the business sector in Malta. Generally, the assistance may go towards:

- supporting innovation activity in existing and new SMEs (e.g. InnovACT Scheme, Small Start-up Grant);
- promoting research and innovation development in industry - a package of R&D measures was launched in 2009; Malta also participates in Eureka (see Section 3.5.1);
- stimulating research in SMEs. The government voted €500,000 for participation in the EU’s Eurostars programme (2011 measure) and offers assistance to prepare technical feasibility studies for participation in research projects at international level (Technical Feasibility Scheme);
- There are also cross-cutting schemes offering business advisory services and assistance to implement innovative products and processes and the adoption of eco-innovations.

The aid schemes principally aim to promote R&D in existing firms and to establish new indigenous R&D performing firms (routes 1-3 of the policy mix). Academia-industry research collaboration occurs mainly through competitive funding offered by the national R&I funding programme. Also through the manufacturing platform initiative launched in 2009, targeted research projects on specific topics such as ICT and energy efficiency in manufacturing are being supported by national funding streams (routes 5 and 6 of policy mix, NRP Measure). The university Trust Fund (NRP Measure 2010) targets commercialisation of research and industrial applications.

Apart from direct funding, Malta has an **R&D Tax Credit Scheme** on eligible expenditure incurred in running industrial research and experimental development projects.

**Access to R&I Funding**

The grant schemes are managed by the innovation agency, Malta Enterprise (ME) which acts as a hub to access the grants. ME prepares tailored information on each scheme by issuing Guidelines for Applicants that are readily available on a dedicated website: [http://support.maltaenterprise.com](http://support.maltaenterprise.com). Since the launch of the grant schemes for innovation in 2008, there are indications that these have been successful both in terms of numbers of proposals submitted and also in terms of funded proposals. The first and second calls for ERDF – European Regional Development Fund - Grants (2008-2009) are supporting 392 projects and a total outlay of circa €20m. These are providing financial assistance for innovation, environmental preservation,

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21 Budget Speech 2011
internationalization, e-business as well as energy conservation and use of alternative energy technologies. A delay with regard to aid schemes generally has been found to be related to the lower capacity of beneficiaries to provide co-funding (Cirilli, 2010). However, there is no indication on the degree of bureaucracy and whether this could be affecting access to funding. In order to make the grant schemes more accessible to small and medium sized enterprises (SMEs), the Malta Enterprise Act established the principle of positive action towards SMEs by offering higher "intensity levels" i.e. the percentage of assistance that each member state can give. The intensity levels awarded to SMEs are higher than large companies. For example in Investment Aid whilst large companies obtain 30% tax credit on the investment total, SMEs benefit from up to 50%.

Innovation-oriented procurement policies

Through the OMC-NET ERAPRISM project, MCST is mapping the extent of innovative public procurement (PP) measures and initiatives adopted across ministries and public sector agencies. This survey showed that MITA – Malta Information Technology Agency – has implemented some examples of innovative PP procedures in tendering processes.

Malta has drafted a national action plan for green public procurement that aims to embed green criteria in public tendering procedures for products and services. The Environment Ministry has put in place a mechanism to promote environmental awareness at the very early stages of a procurement process, through the review of tender dossiers (for works, services and supply contracts) before they are issued for publication. Moreover sustainable development has been incorporated as one of the horizontal priorities that bear weight in the selection criteria of structural funds projects (PPCD). Projects must ensure that environmental issues (e.g. low carbon measures, environmental themes as part of training, green procurement measures) have been mainstreamed throughout the project’s aims and operation.

Other policies affecting R&D investment

In line with the Services Directive and the Small Business Act, the government is seeking to simplify administrative procedures for entities starting up and/or running a business. This involves setting up a point of single contact to access relevant information and procedures related to the business. SMEs also benefit from a tax credit on investments and new job creation through a MicroCredit scheme.

There are financial instruments to boost R&I demand in particular domains such as grants for the diffusion of eco-innovations and alternative energy technologies in industry, and e-business measures. Typically these cover the whole of the business spectrum from micro-enterprises through to SMEs and industry and some measures

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22 Times of Malta (2010): Businesses submit 620 proposals for EU funding published 8th April 2010
24 ERAPRISM – Policies for Research & Innovation in Small Member States is a project financed by DG Research under the FP7-RTD-OMC-NET call.
25 Office of the Prime Minister (2010): Malta’s National Action Plan for Green Public Procurement presentation delivered by the Director Tourism & Sustainable Development Unit 2nd July 2010
26 Prime Minister’s budget Speech 2009
target particular sectors that are important for Malta’s economy (such as a €10m ERDF grant scheme for sustainable tourism projects\textsuperscript{27}).

The draft intellectual property framework makes provisions for protecting IP arising from industry-academia research projects (see Section 3.4.1). A 2011 initiative sees a tax exemption from royalties and similar revenue resulting from patents on inventions\textsuperscript{28}.

### Barriers and Risks for attaining BERD target

The uptake of the grant schemes and R&I measures is highly contingent on the limited culture for research and innovation in business enterprise.

In view of the economic crisis, companies are limited by lack of own funds and often perceive innovation as an additional high cost to operation\textsuperscript{29}. This is especially the case with SMEs that tend to adopt a low risk-taking attitude.

#### 2.2.3 Providing qualified human resources

The government’s policy centres heavily on strengthening education to drive economic competitiveness. In the Budget Speech 2011, the Minister of Finance stated that “the success of our country will depend on how far we manage to achieve the highest level of talent in research and innovation\textsuperscript{30}.”

Human resources in science and technology (HRST) have increased over the past seven years bringing the national average of 32.3% HRST as a share of the labour force closer to that of the EU27 (40.1% in 2009\textsuperscript{31}).

Higher education institutions play a central role in providing qualified human resources. An important target is that of increasing the currently low number of PhD graduates, which was addressed through the institutionalization of various scholarships schemes, funded through national and structural funds; these include the Malta Government Scholarship Scheme for Post-Graduate Studies (MGSS-PG) and the Strategic Educational Pathways Scholarships (STEPS). In the past five years 1,092 scholarships were awarded to students undertaking MSc. and PhD studies tenable in Malta and abroad, equivalent to an investment of around €11.6m\textsuperscript{32}. The STEPS Scholarship scheme is a dedicated funding stream for science and technology studies.

At another level, the Ministry for Education, Employment & Family recognized the need to establish a community of post-doctoral researchers which is currently lacking at the university; this is being discussed within the frame of setting up research clusters at the university\textsuperscript{33}.

An impending challenge is that of matching industry’s demand for particular skills and areas of specialization with adequate human resources, especially in fast-growing

\begin{itemize}
  \item Department of Information (2010): Investment of €10m in sustainability, Innovation & Authenticity of the Local Tourism Product Press Release No. 2016 published 3\textsuperscript{rd} November 2010
  \item Minister of Finance Economy & Investment (2010): speech delivered at Research Symposium organised 29\textsuperscript{th} September 2010
  \item Minister of Finance Economy & Investment (2010): Budget Speech 2011
  \item HRST
  \item Minister of Education Employment & Family (2010): Speech delivered during the Scholarship Prize Award Ceremony 28\textsuperscript{th} September 2010
  \item Presentation delivered by the Pro-Rector of the University during Joint Research Centre Open Day in Malta 20\textsuperscript{th} November 2009
\end{itemize}
sectors. The National Commission for Higher Education\textsuperscript{34} (NCHE) that is spearheading the reform of further and higher education in Malta highlights the need to invest in new specialisations required by various industries whilst at the same time attempting to maintain a balance between specific and generic skills. Policy measures have led to the strengthening of the vocational training system; there has been considerable infrastructural investment in the Malta College for Arts, Science & Technology (MCAST) as well as the setting up of joint training programmes in areas such as alternative energy sources, electronics engineering and aviation maintenance.

Secondary education does provide some exposure to creativity and lateral thinking skills through specific programmes organised in public schools. New programmes have also been initiated that tackle aspects of creativity and innovation at undergraduate and post-graduate levels such as a creativity and entrepreneurship study module offered within a Bachelor of Computer Science, a Masters degree in Innovation and Creativity and the international Masters on Strategic Innovation & Future Creation\textsuperscript{35}. A new measure in 2010 was the new scholarship scheme supporting post-graduate studies in the creative industry.

Entrepreneurship training is not widely included in curricula per se but students can obtain hands-on training on how to set-up a business through the Young Enterprise Programme\textsuperscript{36}.

\subsection*{2.3 Knowledge demand}

This section focuses on the structure of knowledge demand drivers and analysis of recent policy changes.

\textbf{Business-driven knowledge demand}

Eurostat data on GERD by source of funds show that in 2009 business sector contributed by far the largest share of R&D funds (at 51.4\% of GERD), followed by the government sector (with 28\%) and funds from abroad (31.3\%). In turn, the business sector is the principal R&D performer, performing 61.8\% of total R&D spend in 2009. The breakdown of BERD by NACE code is provided in Table 2 below.

\begin{center}
\textbf{Table 2: Private R&D Expenditure by NACE Sector}\textsuperscript{37}
\end{center}

\begin{center}
\begin{tabular}{|l|c|}
\hline
\textbf{Sector} & \textbf{Amount (€)} \\
\hline
Manufacturing & 14,679,459 \\
Electricity, gas and water supply & 64,058 \\
Transport, storage and communication & 518,379 \\
Financial Intermediation & 162,269 \\
Real Estate, renting and business services & 5,478,029 \\
\hline
\end{tabular}
\end{center}

Source: Eurostat 2009

Malta has secured foreign direct investment (FDI) in a number of sectors in high value-added manufacturing such as electronics and generic pharmaceuticals. Historically these firms have relocated their product development processes to Malta; a further challenge is to attract R&D-type FDI to Malta.

\textsuperscript{34} National Commission for Higher Education (2009): Skills for the Future
\textsuperscript{35} http://www.strategicfutures.eu/
\textsuperscript{36} http://www.youngenterprise.org.mt/
\textsuperscript{37} National Reform Programme Progress Report 2009 p68
The incubation centre seems to be organizing around particular clusters namely mechanical/electrical design, renewable energies and biotechnology. This is where micro-enterprises and SMEs are likely to be more active. These clusters are receiving additional support for R&I through a 2009 scheme for setting up innovative clusters.

Government budget appropriations or outlays on research and development (GBAORD) increased from 0.40% to 0.42% of total government expenditure in 2004-2008 (Eurostat data). This was matched by an increase in actual government expenditure on R&D which according to national statistics, stood at €11.9m in 2009, up by 4.4% compared to 2008. The fact that a significant portion of this funding is being invested in the higher education sector is indicative of demand in particular domains (ICT and Health-Biotech being amongst the most prominent in terms of share of funds). It is also congruent with the government’s vision 2015 of attracting investments in areas with high potential for economic growth.

The manufacturing research projects (co-funded through ERDF) precisely address the need for growth of the high value added manufacturing sector; the setting up of research clusters at the university and the implementation of contracted research projects are aimed at addressing particular needs of the industry.

Although difficult to quantify in absolute terms, research and innovation measures and funds are being mobilized to address societal challenges including energy and climate change and health. In the case of energy, resources have been deployed to build a knowledge base in sustainable energy technologies (e.g. diploma and a new MSc. course on Sustainable Energy launched at the university in 2010). Also a number of financial incentives have been provided to stimulate adoption of energy efficient and renewable energy technologies in the private and residential sectors and a feed-in tariff scheme was launched in October 2010.

The national R&I funding programme prioritizes projects in the fields of Energy & Environment and Health-Biotech contributing to building a research-base in areas of particular relevance for Malta’s socio-ecological milieu.

### 2.4 Knowledge production

The production of scientific and technological knowledge is the core function that a research system must fulfil. While different aspects may be included in the analysis of this function, the assessment provided in this section focuses on the following dimensions: quality of the knowledge production, the exploitable of the knowledge creation and policy measures aiming to improve the knowledge creation.

#### 2.4.1 Quality and excellence of knowledge production

As indicated, the research system has received a boost in terms of funding of research infrastructures and increasing the human resource base in S&T (through funding for PhDs and skills training programmes). A large proportion of such funds has been channelled to the University of Malta which is the principal knowledge producer in the public research system. The university is not ranked among the top 500 universities listed in the Shanghai Rankings 2008; perhaps reflecting its

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orientation as a teaching university. Scientific publications are concentrated in the medical sciences followed by the social sciences and humanities.\textsuperscript{39}

There has been strong growth in European Patent Office (EPO) patents\textsuperscript{40} (by 16.2\%) over the past five years. These are principally held within the private sector (mainly by subsidiaries of multi-national corporations).\textsuperscript{41}

\subsection*{2.4.2 Policy aiming at improving the quality and excellence of knowledge production}

The most recent review of the R&I system was carried out in 2005 when the Office of the Prime Minister commissioned an audit of the Malta Council for Science & Technology. This audit recommended the articulation of a national R&I strategic plan that linked state R&I financing with areas that can act as economic growth drivers. The recommendations were then taken up in the National R&I strategy (Trendchart Report, 2006).

A number of targets for research and innovation were established ex-ante under the priority axis on Knowledge & Innovation (Operational Programme I) of the Structural Funds (SF) Programme 2007-2013; these relate to stimulating new RTD projects, such as in eco-technologies, stimulating innovation in industry and boosting the percentage of S&T graduates amongst others. These projects are subject to extensive monitoring and auditing by the Planning & Priorities Coordination Department within the Office of the Prime Minister that oversees the management and implementation of the SF Programme and ensures that the set targets are achieved.

The mechanisms of review and evaluation of projects operating at EU level such as within the EU's Framework Programme for Research & Technology (FP), also serve to benchmark research undertaken by local institutions against those undertaken by established centres in the European Union and this has surely had a positive impact on the quality of knowledge produced by Maltese research institutions.

An informal review of the R&I funding programme undertaken in 2009 by the Council for Science & Technology indicates that the programme is having an impact on training (PhDs), publications, patents and start-ups; in the absence of published data, it is difficult to extrapolate trends. The funding programme uses an international peer review process as part of the selection of project proposals to ensure quality of publicly-funded research.

The university put in place an internal quality assurance framework for career progression of academic staff that takes into account research output, the number of courses taught, course content, students' feedback, new course development and teaching effectiveness among other factors.

\section*{2.5 Knowledge circulation}

Tackling the challenges that European society faces in the 21st century will require a multi-disciplinary approach and coordinated efforts. Many debates and conferences, e.g. the Lund Declaration recognise that such complex issues cannot be solved by

\textsuperscript{39} Aggregate data of publications, ISI Web of Science accessed August 2009
\textsuperscript{40} European Innovation Scoreboard 2009
\textsuperscript{41} Random search of European Patent Office (EPO) database 2\textsuperscript{nd} November 2010
\textsuperscript{42} Malta Council for Science \\& Technology, personal communication
single institutions, technology sectors or MS acting alone. Hence strong interactions within the "knowledge triangle" (education, research and innovation) should be promoted at all levels. Moreover, in the context of increasing globalisation, cross-border flows of knowledge are becoming increasingly important. This section provides an assessment of the actions at national level aiming to allow an efficient flow of knowledge between different R&D actors and across borders.

2.5.1 Knowledge circulation between the universities, PROs and business sectors

Re-enforcing collaboration between university, the public sector and industry is one of the priorities identified in the National R&I Strategy and is being given higher priority as evidenced by the increased number of measures and disbursement of funds to support further opportunities for collaborative research.

The strategy for inter-sectoral collaboration runs along two axes. The first is a problem-driven top-down approach where specific research projects are funded in topics identified as being of national importance. In 2010, the government allocated €250,000 each for the Digital Gaming and Biobank initiatives that are being implemented jointly by MCST, Malta Enterprise and university in collaboration with industry. The projects are supported by existing and emerging competencies at the university. The university is also collaborating with industry on research problems addressing particular industrial needs (contracted research) – this has traditionally been an important role of the university.

The setting up of platforms of strategic importance is serving to define research needs in niche areas. For example the Manufacturing Research Platform has identified ICT and energy efficiency as promising areas for collaborative research; MCST has also commenced work on a health strategy. Collaborative projects have been running since the setting up of national R&I Funding Programme in 2006.

Another approach is that of supporting the emergence of clusters to encourage research and innovation activity in industry (Innovation Clusters & Collaboration Scheme). A 2010 measure is the setting up of a Life Sciences Centre (with an investment of €11m) that intends to stimulate collaborative projects between academia, professional staff at the state hospital and industry.

Inter-sectoral mobility occurs through fixed-term placements in industry (for example MCAST encourages placements of students in vocational training both locally and abroad); inter-sectoral researcher mobility is less common (see Section 3.4.2).

The effectiveness of these measures is expected to increase once the intellectual property framework for publicly funded research is put in place.

2.5.2 Cross-border knowledge circulation

The national R&I Strategy highlights the importance of fostering international collaboration and networking for a small island state with limited R&I capacity.

Since 2000, Malta has exploited the opportunities offered by the EU’s Framework Programme for Research & Technology (FP), exhibiting successful participation rates in FP6 and FP7 in areas of IST (Information Society Technologies), INCO (International Collaboration), R&I (Research & Innovation) policy and foresight and sustainable development, where it has particular research strengths.
The university has been particularly prominent in the FP programme whilst industry participation is lower possibly due to lack of own funds and limited expertise with preparing successful proposals. The Council for Science & Technology (MCST) has recently strengthened its FP7 Unit; a number of public agencies are involved in assisting entities (including SMEs and non-governmental organisations) in preparing proposals (e.g. Malta Enterprise Exploratory Award).

Malta signed a number of bilateral agreements on science and technology collaboration with countries within and outside the EU (See Section 3.6.1); it is currently re-assessing how to better exploit these agreements for the purpose of more effective cooperation in research infrastructures.

Student mobility also affords for cross-border knowledge circulation. The university has been attracting a progressively larger population of foreign students (at 6.2% of the total in 2009). Higher Education statistics reveal that Malta has more outgoing students than it has incoming (through EU programmes such as Erasmus and Leonardo da Vinci and various scholarship schemes)\(^43\).

### 2.5.3 Main societal challenges

As prescribed in the National R&I Strategy, public funds for research and innovation are concentrated around four broad areas: Information Communication Technology (ICT), Health-Biotech, Energy & Environment and high value-added Manufacturing. These areas are expected to attract more inter-sectoral collaboration through the various measures mentioned in Section 2.5.1 above. With regard to cross-border collaboration, this depends largely on the research strengths residing principally at the university; however there seems to be some clustering around particular areas (such as Life Sciences/Health-Biotechnology).

### 2.6 Overall assessment

The national R&I system is witnessing a significant boost both in R&D investments, including a substantial portion of EU Structural Funds, and in terms of a wider mix of demand-side and supply-side policies and measures. The key areas of intervention are strengthening capacity in research infrastructures and human resources, as well as addressing the low level of business R&D.

The top-down approach adopted by the government to identify specific initiatives (such as Digital Gaming, Biobank and the Life Sciences Centre) and the identification of sector specific policies and strategies is serving to channel public funds and create demand in particular areas/domains and projects that afford a return in terms of economic growth. On the other hand, there is a need to better articulate private sector demand for R&I for example through more effective use of contracted research projects. Another gap remains the lack of a venture capital (VC) fund; despite a number of attempts to introduce venture capital, this never took off.

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\(^43\) National Commission for Higher Education 'Further & Higher Education Statistics 2009'
### Table 3: Summary of main policy related opportunities and risks

<table>
<thead>
<tr>
<th>Domain</th>
<th>Main policy opportunities</th>
<th>Main policy-related risks</th>
</tr>
</thead>
</table>
| Resource mobilisation    | • R&I given prominence on political agenda with this portfolio returning under the responsibility of the Office of the Prime-Minister;  
                           | • Strengthening the Malta Council for Science & Technology in terms of human and financial resources;                                                            | • Limited infrastructure capacity to participate effectively in EU level programmes;                            |
|                          | • Allocation of a significant proportion of structural funding, estimated at €89m in 2007-2013, affords for long-term R&I investments in infrastructures;           | • Over-reliance on annual funding cycles limits the financial autonomy of research institutes, including the university;                      |
|                          | • R&D incentive package for industry aimed at boosting private sector R&D targets                                                                             | • Low absorptive capacity of industry to engage researchers because of limited demand.                           |
| Knowledge demand         | • Broad stakeholder engagement across public and private sector helps scope research priority areas;                                                            | • Belated implementation of R&D incentive package for industry (launched in 2009) affording for limited articulation of industry demand for research. |
|                          | • Sectoral research strategies to define niche specialisations (e.g. in manufacturing and health);                                                            |                                                                                                               |
|                          | • Targeting public research funding in priority areas in national R&I funding programme serves to focus resources.                                             |                                                                                                               |
| Knowledge production     | • International peer-review of the public research funding programme ensures quality of knowledge production and transparency;                                | • Lack of a systemic approach to evaluation and benchmarking of programmes and policies                         |
|                          | • Quality of research output given prominence in career progression of academic staff.                                                                           | • The re-orientation of the university’s mission from a teaching to a research-based institution presents several challenges towards achieving excellence at international level (e.g. entering university rankings). |
|                          | • New scholarship schemes investing in creative industry.                                                                                                       |                                                                                                               |
| Knowledge circulation    | • A good track record of participation in EU programmes (FP, COST);                                                                                                | • Migration of S&T graduates resulting in brain drain;                                                        |
|                          | • Internationalisation strategy of the university serving to attract a growing foreign student population in HE;                                                  | • Absence of targeted schemes promoting intersectoral mobility;                                                 |
|                          | • New measures to foster intersectoral collaboration (targeted projects, contracted research)                                                                       | though this is contingent on demand;                                                                          |
|                          | • Development of a draft IP framework                                                                                                                            |                                                                                                               |

Despite these efforts, Malta has fallen short of achieving its Lisbon 2010 target of investing 0.75% GDP in research and innovation; perhaps because the impacts of such measures will become evident in the medium to longer-term. The government is funding more R&D (with government spend on R&D increasing from 26% in 2007 to
31.3% in 2009); whilst funds from the business sector and abroad decreased. Thus, investments are skewed towards increasing R&D funds in the public sector, namely higher education (HE). In terms of R&D performers, business sector remains the major R&D performer; R&D in HE experienced a higher share of total GERD in 2009 since it benefited from a larger portion of public (institutional) funding.

Public-private sector R&D collaboration has gained more prominence in the policy mix; however will only gain momentum once the IPR framework is in place. Aid schemes for enterprise are increasingly being tailored towards Malta’s particular contextual requirements; hence there is more support for particular target groups (SMEs), areas (e.g. internationalization of markets), and actions (clustering, feasibility for R&D projects etc.).

The absorptive capacity of the R&I system is dependent on the availability of human resources in science and technology. In fact, the relatively low number of S&T graduates and researchers remains a weakness of the system, despite the regime of measures aimed at reducing skills mis-matches and increasing the number of PhDs. Other than being reactive to the emergence of new and fast-growing economic sectors the reform of the HE system is promoting a pro-active approach to future skills needs through the institutionalization of skills training programmes and life-long learning and instilling a culture for innovation and entrepreneurship.

Table 4: Main barriers to R&D investments and respective policy opportunities and risks

<table>
<thead>
<tr>
<th>Barriers to R&amp;D investment</th>
<th>Opportunities and Risks generated by the policy mix</th>
</tr>
</thead>
</table>
| Human resources in S&T     | • A small researcher population, coupled with skills shortages at other levels, restricts the capacity of the R&I system to effectively respond to the wider policy mix and measures put in place.  
  • An opportunity lies in better articulating industry’s skills demands, - this is being addressed through targeted programmes at vocational and tertiary levels. |
| Availability of R&I Infrastructures | • Opportunity to strengthen infrastructures in existing and new areas through substantial Structural Funds investment;  
  • Risk that in the shorter-term, limited infrastructures may influence capacity to undertake R&D. |
| Restricted R&I capacity in business sector | • Targeted policy measures have improved framework conditions to boost private sector R&D;  
  • Low level of R&D and innovative activity amongst indigenous SMEs may influence absorptive capacity of such measures; |
| Limited Science-industry linkages | • Collaborative research higher on policy agenda and given prominence in policy mix (sector-specific research projects and initiatives).  
  • Draft IPR framework seen as an opportunity for commercialization of research and improved linkages; |
3 Interactions between national policies and the European Research Area

3.1 Towards a European labour market for researchers

The Communication Better careers and more mobility: A European Partnership for Researchers proposed by EC in May 2008 aims to accelerate progress in four key areas:

- Open recruitment and portability of grants;
- Meeting the social security and supplementary pension needs of mobile researchers;
- Providing attractive employment and working conditions;
- Enhancing the training, skills and experience of researchers

The Commission has also launched concrete initiatives, such as dedicated information services for researchers, in particular through the activities grouped under the name of EURAXESS – Researchers in Motion. Based on the assessment of the national situation in the four key dimensions detailed above, this section will conclude if national policy efforts are supporting a balanced ‘brain circulation’, with outward mobility levels matching inward mobility levels. High levels of outward mobility coupled with low levels of inward mobility often signal an unattractive national labour market for researchers and unsuitable research infrastructures. This may trigger, despite the policy efforts supporting the mobility the ‘brain drain’ rather than brain circulation.

3.1.1 Stocks and mobility flows of researchers

Malta has a small stock of researchers, with just fewer than 1,000 researchers (by headcount) equivalent to 3 researchers (in full time equivalents, FTE) per 1,000 active population in 2007 \(^{44}\) (compared to the EU27 average of 6 per 1,000 active population).

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\(^{44}\) Number of researchers (FTEs) per 1,000 active population (15-74yrs old) as quoted in IDEA Consult (2010) Study on Mobility Patterns and Career Paths of EU Researchers – Final Report p50
Figure 2: Total Number of Researchers by Headcount (2002-2007 period)

As seen in Figure 1 above, the stock of researchers lies principally in the higher education sector (HES), namely the University of Malta. Trends indicate that the population of doctoral students is increasing (from 0.02% in 2005 to 0.04% in 2007\textsuperscript{45}); this may be an important contributing factor to a rise in the researcher stock in the HE sector. Statistics released by the National Statistics Office (NSO) indicate that within the Higher Education Sector (HES), the vast majority of researchers hold a PhD.

There are no reliable data on the inward and outward flows of researchers (see Eurostat). Higher education statistics indicate that Malta has more outgoing students than it has incoming\textsuperscript{46}, though it is difficult to extrapolate to PhD and research mobility.

With regard to the mobility of Maltese academic staff, only senior researchers that have been working for at least 5 yrs at the university can take a sabbatical of one year and the approval for this is at the discretion of the Senate.

3.1.2 Providing attractive employment and working conditions

The government is aware of the need to support a growing number of post-graduates and researchers in specific areas\textsuperscript{47,48}. This was one of the rationales driving the revised collective agreement for academic staff 2009-2013 that provides for improved salary scales and resources for researchers.

As indicated in Section 3.1.1 above, the university attracts the highest proportion of researchers. It endeavours to engage permanent over temporary academic staff for which salaries are governed by fixed scales defined in the agreement. These range from €30,000 for early career researchers/lecturers (holding a PhD) to €47,000 for a

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\textsuperscript{45} Expressed as a percentage of the population aged between 20-29, Eurostat
\textsuperscript{46} NCHE (2010): Further & Higher Education Statistics 2009
\textsuperscript{47} NRP Progress Report 2009
\textsuperscript{48} Minister of Education, Employment & Family (2010): Speech delivered at the Research Symposium 29th September 2010
full professorship\(^{49}\). Temporary posts are based on definite contracts and on hourly rates defined by the collective agreement.

Academic salaries tend to be above those offered in the public sector for similar occupations and years of service though comparable to salaries in certain public agencies and definitely lower than in the private sector.

A comparison at European level shows that the average annual gross salary of a Maltese researcher\(^{50}\) (€40,340 in PPS\(^{51}\)) is slightly higher than the EU25 average of €40,126 and considered a medium remuneration level amongst the EU25 and associated countries\(^{52}\). It is the second highest salary, after Cyprus, of the ten countries that joined the European Union in 2004.

The implementation of Third Country researcher Mobility legislation implies there is now a legal and administrative framework in place to attract researchers from outside the EU; this is expected to facilitate the recruitment of researchers and the relocation of their family members in Malta for the duration of a contracted research project.

The public service agreement tends to promote equal gender opportunities for career progression including in professional and managerial grades\(^{53}\). It has also introduced greater flexibility for shared parental leave, tele-working opportunities, a 14-week paid maternity leave and accreditation of social security contributions of the parents for the first two years of parental leave\(^{54}\). The gender pay gap is amongst the lowest in the EU27 (>15%)\(^{55}\).

Career breaks are not penalized at least on paper since the law guarantees that a public servant returns to the same type of work or equivalent\(^{56}\), however it does not guarantee return to the exact responsibilities/duties. Moreover, a national study on ‘Women at Work’ (2005) seems to indicate that graduate women taking a career break may have reduced chances of obtaining a promotion\(^{57}\).

Despite the above, trends indicate that women including graduates, still tend to leave employment for a career break or complete abandonment, generally due to family commitments\(^{58}\), and because they lack the necessary support structures such as childcare services to remain in employment\(^{59}\). This means that women participation in the labour market remains low despite a higher female: male population at the university and a higher number of female graduates. The HE sector and government tend to have lower proportions of female researchers compared to male

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\(^{49}\) University of Malta Collective Agreement for Academic Staff 2009-2013

\(^{50}\) In this study a researcher is defined as an individual who devotes at least 50% of his/her time to carry out research activities”, ibid p18

\(^{51}\) Remuneration values expressed as PPS (Purchasing Power Standard). These take into account differences in salaries due to cost of living, thus reducing differences among countries and highlighting the “attractiveness” in terms of remuneration of each country for the researcher, ibid p20.


\(^{55}\) European Commission (2007): Remuneration of Researchers in the Private and Public Sectors

\(^{56}\) The Employment & Industrial Relations Act of 2002 that governs the provisions for private and public sector employment stipulates, in Article 19 (p23 of the Act), that women who take career breaks (for parental leave) be entitled to resume the post occupied upon commencement of maternity leave or an analogous post.


(approximately 22% in 2003)\textsuperscript{60} and only just over 20% of employees in top management in Malta were female in 2007\textsuperscript{61}.

The Charter for Researchers was endorsed by the Office of the Prime Minister in 2005. With regard to the Code of Conduct for the Recruitment of Researchers, Malta voiced its concern over the practical implications of implementing the charter specifically with respect to the involvement of experts from other Member States on recruitment panels in view of the financial costs involved.

3.1.3 Open recruitment and portability of grants

Most vacancies for academic/researcher posts occur via an open call for applications and the selection procedure is fairly straightforward occurring in two stages: a pre-screening of qualifications and experience (based on \textit{curriculum vitae}) and the decision of a selection board following interview. This approach offers quite an open and transparent procedure that is open to both nationals and non-nationals. Job adverts are accessible on the university website and also advertised on the government’s department of information website. Positions at professor-level may also be more widely advertised in international media.

Malta participates in the Europass framework which helps to improve transparency of qualifications and competences to facilitate mobility throughout Europe. The Malta Qualifications Recognition Information Centre (MQRIC) awards recognition statements on comparability of qualifications for those degrees/qualifications awarded by foreign Universities/tertiary education institutions. This process of certification of foreign degrees is mandatory for both nationals and non-nationals applying for jobs with the public service and the higher education sector. The Malta Qualifications Council\textsuperscript{62} certifies and accredits professional and vocational qualifications (other than degree qualifications).

The portability of grants remains a limiting factor in the sense that the National R&I funding programme is not open to funding foreign entities; and also tends to favour a situation where research grants remain with the grant holder and are typically non-transferable to other research institutions (both national and foreign).

3.1.4 Meeting the social security and supplementary pension needs of mobile researchers

The terms of employment of foreign researchers is in accordance with those of the academic staff in general. This means that all employees are subject to the same conditions of social security benefits and the pension offered is that of a civil servant i.e. it is based on thirty years of service and calculated as two thirds of the salary capped at €12,000/year. There is no supplementary pension scheme for researchers.

According to the EURAXESS\textsuperscript{63} portal that provides dedicated information to researchers on administrative and legal issues when moving country, Malta participates in the ‘Scientific Visa’ package for long-term admissions.

The Social Security Department is preparing to fully integrate Malta into the EESSI (Electronic Exchange of Social Security Information) system within two years to

\textsuperscript{60} European Commission ‘She Figures 2006’ p42
\textsuperscript{62} http://www.mqc.gov.mt/
\textsuperscript{63} EURAXESS http://ec.europa.eu/euraxess/index.cfm/general/index accessed 31st October 2010
guarantee the easy exchange of information on social security amongst Member States. However there has been no tailoring of regulation 1408/71\textsuperscript{64} for researchers.

3.1.5 Enhancing the training, skills and experience of European researchers

Opportunities for outward mobility of PhD students may arise through formal programmes, namely scholarship schemes, that sponsor three-year PhD programmes abroad or through informal agreements that departments at the university maintain with foreign universities for the exchange of researchers/PhDs for part of their programme.

The PhD programme at the university is conducted by supervised independent research and offers an English-speaking environment to accommodate a growing population of foreign students that reached 6.2\% of the total higher education population in 2007\textsuperscript{65}; in fact all assessments and study units are delivered in the English language across all degree levels\textsuperscript{66}. The university has also established a number of joint degrees with foreign universities where part of the programme is offered in Malta and part in the overseas university; these are normally at Master’s degree level.

There could be more opportunities for researchers to work with industry as the university begins to implement contracted research projects. At another level, the Corporate Research & Knowledge Transfer Office (CORTO) is building capacity in business-related aspects, to provide skills in technology and entrepreneurship and encourage the formation of spin-offs and start-ups.

3.2 Research infrastructures

Research infrastructures (RIs) are a key instrument in the creation of new knowledge and, by implication, innovation, in bringing together a wide diversity of stakeholders, helping to create a new research environment in which researchers have shared access to scientific facilities. Recently, most EU countries have begun to identify their future national RI needs, budgets and priorities in the so called National Roadmaps for Research Infrastructures. These strategic documents also set out a strategic view on how to guarantee and maintain access to research facilities. Although some countries invest heavily in RIs, none can provide all the required state-of-the-art facilities on a national basis. Several large RIs have already been created in Europe. While optimising the use and development of existing RIs remains important, new infrastructures are needed to respond to the latest research needs and challenges. European Strategic Forum for Research Infrastructures (ESFRI) was established in April 2002 to support a coherent approach to policy-making on RIs in Europe and to act as an incubator for international negotiations on concrete initiatives. This section assesses the research infrastructures national landscape, focusing on the national RI roadmap and national participation in ESFRI.

\textsuperscript{64} Council Regulation EC No. 1408/71
\textsuperscript{65} NCHE Further and Higher Education Statistics 2009
\textsuperscript{66} Times of Malta (2010): Minister explains why university exams have to be in English published on 17\textsuperscript{th} March 2010
3.2.1 National Research Infrastructures roadmap

The National Research & Innovation Strategy 2010 published in 2006 serves as a reference to guide 1) the areas of specialisation and 2) the roadmap for building national research infrastructures (RIs). The rationale guiding investments is that Malta strengthens its existing research base as well as build capacity in new areas of strategic importance so that it is better placed to participate in research activities and programmes at European Level.

Investments in RIs have increased over the past five years, mainly for the upgrading of existing infrastructures at the university and vocational college for arts, science and technology (MCAST) and investment in new ones. The principal areas include ICT (information communication technology), engineering and biotechnology. As noted in the NRP Progress Report 2009, €34m have been allocated for upgrading R&D facilities in engineering, natural sciences, renewable energy, super computing and health biotech and a new ICT faculty at the university and an €11m investment in a Life Sciences Centre. The bulk of these investments are co-financed by structural funds (period 2007-2013).

3.2.2 National participation in the ESFRI roadmap. Updates 2009-2010

In 2010, the government earmarked €250,000 for the setting up of a bio-bank as a partnership between the Council for Science & Technology, Malta Enterprise and the university; this is a promising cluster in which the university has acquired significant expertise and data. Once the bio-bank is up and running, there is interest to join the Biobanking and Biomolecular Resources Research Infrastructure (BBMRI) initiative and currently the partners are investigating the feasibility of joining this RI.

The national ESFRI roadmap needs updating and the government has not set aside a reserve budget for the second phase of implementation of the ESFRI infrastructures; this process will be streamlined with the updating of the National R&I Strategy 2010 that is currently underway.

3.3 Strengthening research organizations

The ERA green paper highlights the importance of excellent research institutions engaged in effective public-private cooperation and partnerships, forming the core of research and innovation 'clusters', mostly specialised in interdisciplinary areas and attracting a critical mass of human and financial resources. The Universities/research institutions should be embedded in the social and economic life where they are based, while competing and cooperating across Europe and beyond. This section gives an overview of the main features of the national higher education system, assessing its research performance, the level of academic autonomy achieved so far, dominant governing and funding models.

3.3.1 Quality of National Higher Education System

Size and Composition of the Higher Education (HE) sector

Higher education in Malta is mainly that provided by the state and comprises one publicly-funded university, with a centre on the sister island of Gozo and two

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vocational colleges - College for Arts, Science & Technology (MCAST) and the Institute for Tourism Studies (ITS). MCAST groups almost all of the state vocational institutes and has started offering ‘top-up’ degree programmes as from October 2009. The HE sector is governed by a traditional hierarchical governance model regulated by national legislation (Education Act Chapter 327).

The three principal governing bodies of the University are the Council, Senate and Faculty Boards. The Council represents the supreme governing body and is responsible for the general administration of the University, and for the appointment of new staff members, both local and foreign, to the various academic posts. It works closely with the Senate that is largely responsible for the academic matters of the University primarily regulating studies, research, documentation and examinations at the University. The University runs a limited liability company – Malta University Holding Company (MUHC) - since 1985 that offers training and consultancy services to industry and the government, especially in engineering and science disciplines.

There are no private universities but a number of private institutes offering degree programmes (at Bachelors, Masters and PhD level) with accreditation from foreign universities and having a 5% share of students enrolled in tertiary level programmes compared to the 95% covered by the public HE institutions.

In 2009, the number of students enrolled in higher education amounted to 23,597 students (out of a total population of 412,970 inhabitants).

The largest proportion of enrolments (in Bachelors, Masters and Doctoral programmes) are in the field of ‘Social Science, Business & Law’ which accounted for 35% of all students at these levels in 2009; whilst students enrolled in science-related fields accounted for just over 18% of all students. Notwithstanding, the interest in science and technology domains is steadily growing, primarily in computing and ICT, also thanks to incentives provided by the government (in the form of higher student maintenance grants) to attract a higher student population in S&T domains. In terms of student migration, 9.9% Maltese students were studying abroad in 2007, mostly in the United Kingdom. Overall, Malta has more outgoing students than it has incoming through various scholarship schemes and participation in European programmes (Erasmus, Leonardo da Vinci etc.).

The Maltese HE system boasts a relatively high proportion of foreign students which in 2007 represented 6.2% of the total population; most of these come from outside the EU. The university maintains a number of cooperation agreements with universities abroad in designing and implementing postgraduate degree programmes as part of its internationalisation strategy.

The number of PhD students at the University of Malta has increased in the past decade, going up from 32 students in 2001 to 178 students in 2009, thanks to the various scholarship schemes offered by the government (postgraduate scholarship scheme and strategic educational pathways scholarships for science and technology studies). 26% of the PhD cohort is undertaking research in science and technology.

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72 Over 80% of foreign students come from outside the EU. The number of students from India and China grew six fold in the 2000-2007 period, NCHE Further & Higher Education Statistics 2009 p28
Generally, females outnumber males in higher education (0.75 male: female participation ratio); however, this trend is domain-oriented with engineering, maths and computing remaining traditionally “male-dominated” domains and education, humanities and social sciences attracting a higher number of females.

As shown in Table 5, although higher education expenditure on R&D (HERD) rose gradually in 2002-2008, this is still well below the EU27 average. National statistics indicate that the business sector (local and/or foreign) contributes minimally to funding research in higher education that is principally supported by public funds73.

### Table 5: Higher Education Expenditure on R&D (HERD) expressed as a percentage of Gross Domestic Product over 2002-2009 period

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EU27</td>
<td>0.41%</td>
<td>0.41%</td>
<td>0.40%</td>
<td>0.40%</td>
<td>0.41%</td>
<td>0.41%</td>
<td>0.43%</td>
<td>0.48%</td>
</tr>
<tr>
<td>Malta</td>
<td>0.16%</td>
<td>0.16%</td>
<td>0.17%</td>
<td>0.16%</td>
<td>0.18%</td>
<td>0.18%</td>
<td>0.17%</td>
<td>0.18%</td>
</tr>
</tbody>
</table>

Source: Eurostat, accessed February 2011; p=Eurostat provisional value; s= Eurostat estimate

### Mission of Higher Education Institutions

Historically, the university’s principle mission has been that of a teaching university offering degree courses in a wide range of disciplines; this mission is being re-oriented in order to give research more visibility. The rector is also endorsing a third mission which is that of contributing to the economy and to addressing societal challenges74 for example through setting up research clusters in priority areas that are aligned with the areas of economic growth targeted in the government Vision 2015 document. It has been government’s priority to provide access to higher education to all, based on a national matriculation certification system obtained following completion of post-secondary education; except in medicine and dental surgery were special selection criteria apply (including a *numerus clausus* for Dentistry).

### Research Performance

The university is not ranked amongst the top 250 universities in the *Shanghai Rankings 2008*. It exhibited a very good performance in FP6 and in FP7 in terms of the number of funded projects and funds attracted (approximately 40% of total funding that Malta attracted from FP6). These programmes have served both to build research capacity in specific areas such as ICT and aeronautics and also have expanded the networks of collaboration with institutions abroad. However, the university’s research infrastructure may be acting as a limiting factor for participation in international programmes – this is being addressed by €34m in ERDF75 - funds that have been allocated for infrastructural capacity building.

There is only an internal quality assurance mechanism; and the need to establish an external quality assurance framework that assures quality of research and recognition of qualifications has been recognized.

### 3.3.2 Academic autonomy

Since the university is totally dependent on state funds to support its teaching and research activities, its research budget and recruitment processes are tied to the

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74 Times of Malta (2010): University Rector introduces himself in opening speech published 22nd October 2010
75 ERDF European Regional Development Fund
block funds received annually through a vote from the Education Ministry. This has a
number of implications on the design of research agendas that are thus linked to
annual funding cycles and hiring of personnel for which provisions must be made in
the university’s budget proposal presented to the Ministry of Education.

Thus an emerging priority is the need for the university to break from annual
budgetary cycles and shift towards operating a multi-annual budget that would
increase its financial and managerial autonomy; and simultaneously seek more
business and EU programme funding to complement state support.

With regard to salaries of academic staff, these are governed by a new collective
agreement for 2009-2013 and fall into a number of streams: resident academic,
research and visiting teaching streams each with its own pre-defined salary scales.
Appointments for resident and research academic posts must be approved by the
Council of the university.

In terms of governing structures, Malta follows a ‘managerial’ model characterized by
a hierarchical decision-making system. Thus the rector of the university is elected
by the university council which is the supreme governing body of the university,
subject to approval by the Education Ministry. The Council consists of both
academics and members external to the university which are appointed by the prime
minister’s office from within the public and private sectors. Election of the heads of
department and faculty deans is internal to the university system and must be
approved by the university council.

3.3.3 Academic funding
The higher education sector receives its core institutional funding through a vote of
the Ministry of Education, Employment & Family (MEEF). In 2010 the university
benefited from €41m to cover its recurrent activities that include teaching,
administration and research. In the absence of specific data, it is difficult to quantify
the proportion of core funding dedicated to research activities alone. As shown in
Table 6 below, this has been increased to €44.5m in 2011. The allocation follows
the increasing student population and the number of courses offered. Apart from
sustaining the university’s running costs, the government also provides the students
with maintenance grants/stipends (equivalent to an expenditure of €21m in 2009).

Table 6: Institutional funding allocated to the University of Malta over the
period 2006-2010 (figures exclude structural funding contributions)

<table>
<thead>
<tr>
<th>Description</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrent expenditure</td>
<td>€24.7m actual</td>
<td>€24.84m actual</td>
<td>€27.49 actual</td>
<td>€30.05 actual</td>
<td>€39.6m actual</td>
<td>€41m actual</td>
<td>€44.5m estimate</td>
</tr>
</tbody>
</table>

Source: Ministry of Finance, Economy & Investment

With regard to the allocation of research resources, this follows a procedure whereby
proposals are submitted by the various faculties and departments to the research
funding committee appointed by the university Council. The committee is guided by
the National Strategic R&I Plan in terms of prioritization of areas for research; however, it retains flexibility to fund other upcoming areas of interest. Only annual

76 Bartolo E – Labour MP for Education ‘Creating a Better University’ in Times of Malta 28th January 2009
77 IDEA Consult (2010): Study on Mobility Patterns and Career Paths of EU Researchers (MORE) – Final Report
79 Times of Malta ‘Education Ministry defends grants despite critical report by Brussels’ 19th February 2009
grants can be allocated for research as the university relies on block funding that it receives from the Ministry on an annual basis; this is a major drawback in ensuring continuity of research endeavours.

Apart from institutional funding, the university taps public funding through competing with private sector and other public research entities in open calls for proposals of the National R&I funding programme; the funding goes to consortia consisting of public-private research entities; here the funds target four areas – ICT, Health & Biotechnology, high value added Manufacturing and Energy and Environment.

The university and MCAST have also successfully tapped funding opportunities offered by various European programmes to boost their research budgets.

3.4 Knowledge transfer

The importance of knowledge dissemination and exploitation in boosting competitiveness and contributing to the effectiveness of public research has been increasingly recognised by EC and EU Member States. Following the publication of the ERA Green Paper in April 2007, the EC Communication "Improving knowledge transfer between research institutions and industry across Europe" was issued, highlighting the importance of the effective knowledge transfer between those who do research, particularly HEIs and PROs, and those who transform it into products and services, namely the industry/SMEs.

Several Member States have taken initiatives to promote and facilitate knowledge transfer (for instance new laws, IPR regimes, guidelines or model contracts) and many others are planning to intensify their efforts in this direction. However, these initiatives are often designed with a national perspective, and fail to address the transnational dimension of knowledge transfer. This section will assess the national policy efforts aimed to promote the national and trans-national public-private knowledge transfer.

3.4.1 Intellectual Property Policies

The importance of establishing an intellectual property (IP) framework for publicly funded research was flagged in the National Research & Innovation Strategy and received momentum in 2010 with the setting up of the Corporate Research & Knowledge Transfer Office (CORTO) within the University of Malta. One of CORTO's responsibilities is the formulation of an IP policy that creates incentives for academic staff to commercialize research.

A basic tenet of the draft policy is that IP arising from academic research rests within the university whilst the researcher is entitled to 50% of net profits derived from commercial exploitation. The policy will make provisions for inventions arising from the research undertaken by students and third parties and address issues of IP sharing in the case of multiple inventors.

CORTO is involved in identifying, evaluating and protecting intellectual property arising from within the university; it offers support services to researchers in the commercialisation process, including on legal aspects of patenting that may arise during contract negotiation and maintains links with the university’s legal services.

81 The intellectual property policy is being formulated in line with the guidelines laid out in the Collective Agreement for Academic Staff of the University of Malta 2009-2013
office for this purpose. It is building an outreach programme aimed at disseminating information on IP through a seminar series for academics and industry stakeholders and intends to establish a capacity at the university in technology and entrepreneurship.\(^{82}\)

Another mission of CORTO is to facilitate collaborative research initiatives in specific areas of socio-economic importance for Malta, including contracted research with industry. Such activities could also provide fertile ground for the development of IP.

### 3.4.2 Other policy measures aiming to promote public-private knowledge transfer

The [National R&I Funding programme](#) is the principal instrument promoting knowledge transfer and cross-sectoral synergies; this programme encourages the formation of public-private research consortia addressing problem-driven research projects in four strategic areas of Energy and Environment, ICT, Health and high value-added manufacturing. Other opportunities for knowledge transfer arise through research projects in niche areas and more generally through measures that facilitate the access to businesses of expertise and resources to develop innovative products and services thus generating knowledge and know-how.

#### Spin-offs

There are no official data on the number and type of spin-offs arising from research institutions. The university is aware of the interest in this area; however it currently lacks the physical infrastructure and services for such spin-offs to operate and thus the need has been identified to set up a technology incubator space that will initially provide administrative support and liaise with the Corporate Research & Knowledge Transfer Office on technology transfer and IP issues.

#### Inter-sectoral mobility

Inter-sectoral mobility is contingent on the structure of Malta’s industrial sector: this is mainly composed of small and medium-sized enterprises (SMEs) where the level of R&D is relatively low and a group of large multinational firms that focus primarily on development over research. Thus the capacity of the private sector to engage researchers is limited by actual demand. An avenue being explored is that of targeting particular projects that the industry is interested in and for which the university already has a research capacity and promote two-way staff mobility within the context and timeframe of the project.

#### Promoting research institutions - SME interactions

Many of the companies partaking in research projects funded under the National R&I Funding Programme are in fact small and medium sized enterprises (SMEs). Collaboration with research institutions proceeds on a project-by-project basis through open competitive calls.

Other specific measures target either collaborative undertakings such as the setting up of technology clusters (Innovative Clusters & Collaboration Scheme) or support SMEs to develop competencies in implementing R&I projects by part-financing the services of business advisors and otherwise qualified personnel (Business Advisory Services, ERDF Innovation Action Grant Scheme and the [Loan of Qualified Experts Scheme managed by Malta Enterprise](#)).

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\(^{82}\) Director Corporate Research & Knowledge Transfer Office, personal communication
EU cohesion policy

A number of potential interventions under Priority Axis 1 of Malta's Operational Programme (financed by the ERDF) support public-private knowledge transfer. These include the expansion of incubation and innovation facilities and the development of research plans for designated platforms of strategic importance (manufacturing platform and research projects being launched in 2009); as well as investment in studies and pilot projects in strategic areas.

Involvement of the private sector in the governance bodies of HEIs and PROs

Although the private sector is represented on the university's governing bodies (principally the University Council), its role in promoting knowledge transfer is limited by the lack of enabling structures such as a university incubator, venture capital (attempts at setting this up over the past five years failed so far) etc.

3.5 Cooperation, coordination and opening up national research programmes within ERA

The articulation between the R&D Framework Programmes, the Structural Funds and the Competitiveness and Innovation Programme is still underdeveloped in terms of coordination, synergies, efficiency and simplification. The policy fragmentation at EU and national level and between EU and national policies can hinder the build of critical masses of research excellence, leads to the duplication of efforts, sub-optimal impacts of the different instruments and unnecessary administrative overheads. Differences between research selection procedures and criteria can also be an obstacle to the overall spread of excellence. This section assesses the effectiveness of national policy efforts aiming to improve the coordination of policies and policy instruments across the EU, all part of the drive to create an integrated ERA.

3.5.1 National participation in intergovernmental organisations and schemes

One of the most important instruments for internationalisation of research, both in terms of breadth (types and number of participating organizations) and scope (networking, collaboration, mobility) of participation is the European Framework Programme for Research & Development (FP).

An evaluation of Malta's participation in FP6 undertaken by MCST showed that although the number of funded projects was low in absolute terms (total of 126 projects), when expressed on a per capita basis Malta performed very well, ranking second just after Poland. In financial terms, Malta secured €10m in FP6 and so far around €5m in FP7. By June 2010, 80 Maltese teams were participating in 72 contracts signed as a result of FP7 calls for proposals launched in 2007, 2008 and 2009.

The FP programme has contributed to building research capacity through international collaboration and networking at the university of Malta, which had the highest participation rate in FP6; whilst industry participation and involvement of small and medium sized enterprises is low and experienced a downturn in FP7 (2007-2009). The university has also been less prominent thus far in FP7 which has seen a larger participation of public sector agencies and ministries.

83 Referring to the 2007-2009 period
The domains attracting the largest number of participants and funds include Information Communication Technologies (ICTs), sustainable development and ecosystems, health and in FP7 research for the benefit of SMEs. These areas are amongst the strategic domains in which the government aims to build research strength, and for which a high proportion of structural funds has been channelled for infrastructural capacity building (for example ICT infrastructure at the university).

In order to assist industry’s participation in international R&D projects, Malta joined the Eureka programme in 2006. Industrial R&D is supported through participation in Eureka; Malta Enterprise committed €350,000 to leverage over €1.2m worth of local research and development in enterprise (2008). In addition, companies are offered financial and technical support to prepare a feasibility plan in preparation for participation in a Eureka project. A 2011 measure sees allocation of €500,000 for participation in Eurostars which is a research programme dedicated to SMEs.

Participation in COST – European Cooperation in Science & Technology - was given more prominence through the appointment in 2010 of contact points in each of the technical domains, in an effort to strengthen participation in research networks across scientific areas.

International cooperation is also supported through formal agreements between the Maltese government and European institutions and organisations. The memorandum of Understanding signed by the government with CERN (European Centre for Nuclear Research) spurred some interest in establishing collaborative links with industry in Malta. Also, in 2009 a collaborative agreement with the Board of Governors of the EC’s Joint Research Centre intends to set the pace for creating more training opportunities for young researchers in European institutions.

There are also a number of European-led RI initiatives in which the University of Malta participates including GEANT (Gigabit Pan-European Research and Education Network) and EUMEDGRID, SEADATANET (Ocean and Marine Data Management) and GOOS (Global Ocean Observing System).

3.5.2 Bi- and multilateral agreements with other ERA countries

As at 2010, Malta had signed eleven bi-lateral science and technology agreements with EU Member States; these typically do not specify the research fields and budgets allocated and are open-ended and aimed mainly at stimulating educational and cultural activities amongst the countries (see also Section 3.6.1 below).

3.5.3 Other instruments of cooperation and coordination between national R&D programmes

From a small country perspective, cooperation and coordination of national R&D Programmes, presents particular challenges and raises issues of concentration of resources in particular areas of strength, sustainability of the funding system and prioritization. These issues are being analysed in the frame of the ERAPRISM OMC-NET project, coordinated by the Malta Council for Science & Technology, that

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85 Malta Enterprise (2009): Technical Feasibility Scheme
86 Times of Malta (2009): 'CERN Scientists explore collaboration opportunities', in press 7th July 2009
brings together small Member States to define policy responses to emerging R&I challenges.

The absorptive capacity of small countries in terms of level of effective participation in European level programmes is limited and can impact on attention to purely national and local priorities. In light of the above constraints, Malta’s position is to identify potential areas of cooperation based on their strategic economic importance for the country. Specifically Malta joined a Joint Programming Initiative on transport – URBAN Europe. It is also participating in four ERA-NETS: SEAS-ERA, BS-ERA.NET, NET-HERITAGE and ICT-AGRI.

3.5.4 Opening up of national R&D programmes
Firstly, the National R&I Funding Programme favours research activity performed ‘at home’ rather than abroad with the aim of strengthening national capacity. Research grants remain with the Maltese entity and cannot be transferred if the researcher working on the project moves to another position outside the country. Secondly, although the programme is designed for participation of non-nationals working either abroad or in Malta, these can only participate as non-beneficiary partners.

The principal limitation to opening up the national research programme relates to funding restrictions. The strategic way forward for Malta is to become more actively involved in ERANETS and ERANET plus initiatives in priority areas in line with the National R&I Strategy and through this participation identify at least one joint research programme of national importance.

3.6 International science and technology cooperation
In 2008, the European Commission proposed the Strategic European Framework for International Science and Technology Cooperation to strengthen science and technology cooperation with non-EU countries. The strategy identifies general principles which should underpin European cooperation with the rest of the world and proposed specific orientations for action to: 1) strengthen the international dimension of ERA through FPs and to foster strategic cooperation with key third countries through geographic and thematic targeting; 2) improve the framework conditions for international cooperation in S&T and for the promotion of European technologies worldwide. Having in view these aspects, the following section analyses how national policy measures reflect the need to strengthen the international cooperation in S&T.

3.6.1 International cooperation
Malta signed twenty nine bi-lateral agreements for cooperation in science and technology (September 2010, Ministry of Foreign Affairs). As seen in Figure 2, the agreements are with ERA countries - Member States (37%) and Associated States (21%) - and also non-ERA countries (“Other” in Figure 2).

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88 National Reform Programme Progress Report 2009
89 The countries with which Malta signed a bilateral S&T cooperation agreement include: Albania, Algeria, Angola, Austria, Bosnia, China, Croatia, Cyprus, Czech Republic, DPR Korea, Greece, Egypt, Georgia, Hungary, India, Israel, Italy, Libya, Morocco, Poland, Portugal, Romania, Russian Federation, Saudi Arabia, Serbia, Slovenia, Spain, Tunisia, Turkey
Many of the agreements do not cover particular thematic areas or domains but relate principally to building cooperation in educational aspects; some are awaiting ratification for entry into force whilst others have not been pursued. In terms of multi-lateral agreements, Malta is signatory to a number of conventions and agreements some dating back to the early 1970s (for example the Convention on the International Maritime Satellite Organization and the International Telecommunications Convention).

The Malta Council for Science & Technology is currently assessing how best to exploit and revitalize these agreements through identifying activities and areas that could prove strategic for Malta such as exploring cooperation for strengthening research infrastructures.

3.6.2 Mobility schemes for researchers from third countries

The legal framework for the inward mobility of third country researchers, in place since 2008, outlines the procedural and administrative requirements for admittance of PhD researchers from non-EU countries. As such, there are no specific mobility schemes aimed at attracting third country researchers who can only benefit from the provisions laid out in the legislation, namely a residence permit and tax and social security benefits, if they hold a research contract with a Maltese research institution.
4 Conclusions

4.1 Effectiveness of the knowledge triangle

Table 7: Effectiveness of knowledge triangle policies

<table>
<thead>
<tr>
<th>Research policy</th>
<th>Innovation policy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recent policy changes</strong></td>
<td><strong>Assessment of strengths and weaknesses</strong></td>
</tr>
<tr>
<td>• Science and research portfolio re-located within Office of the Prime Minister giving them a higher profile on national political agenda;</td>
<td>• Enhanced coordination of public entities engaged in implementing national R&amp;D projects is a strength as it allows to dovetail research initiatives underway at different levels (strategic/policy, implementation);</td>
</tr>
<tr>
<td>• National R&amp;D funding increasingly channelled towards specific projects and initiatives in priority economic areas;</td>
<td>• The issue of the sustainability of national R&amp;I funding is an emerging challenge;</td>
</tr>
<tr>
<td>• New R&amp;D incentive package to stimulate research and development in industry;</td>
<td>• Despite a new incentive package to boost private sector R&amp;D, BERD remains below the Lisbon target; this is influenced by the inherently low level of R&amp;D performed amongst indigenous SMEs.</td>
</tr>
<tr>
<td>• Assistance to participate in EU's Eurostars programme for R&amp;D in SMEs.</td>
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<tr>
<td>• Platforms of strategic importance in manufacturing and health to identify research niche specialisations;</td>
<td></td>
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<tr>
<td>• A budget increase allocated to the national R&amp;I funding programme (from €700,000 in 2010 to €1.1m in 2011);</td>
<td></td>
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<tr>
<td>• Corporate Research &amp; Knowledge Transfer Office set up at the university to draft IP strategy and facilitate collaborative research with industry.</td>
<td></td>
</tr>
<tr>
<td><strong>Innovation policy</strong></td>
<td></td>
</tr>
<tr>
<td>• Enhanced support for initiatives stimulating academia-industry linkages, beyond those offered through the national R&amp;I funding programme;</td>
<td>• Indigenous enterprises exhibiting low innovation performance and risk-taking attitude, influences their ability to effectively absorb incentives made available through the policy mix.</td>
</tr>
<tr>
<td>• Further financial incentives for enterprise targeted at supporting innovation in SMEs, development of e-business, and provision of advisory services.</td>
<td>• The absence of a stand-alone innovation policy may result in a 'dilution' of initiatives.</td>
</tr>
<tr>
<td></td>
<td>• A strength countering the above weakness is the recent targeting of policy initiatives towards overcoming structural problems in the system (such as focussing on SMEs and stimulating their innovative performance).</td>
</tr>
</tbody>
</table>
### Recent policy changes

**Education policy**
- Number of students enrolled in tertiary and vocational education increasing (30% increase of students enrolled at university in 2010 intake);
- New university and vocational course offerings reflecting industry/market demand (e.g. MSc. Sustainable Energy Technology, diploma in Aviation Maintenance);
- The government to set up an interactive science centre as part of a nation-wide campaign to popularize science (2010 NRP Measure).

**Other policies**
- Financial incentives (€10m) for industry and households to implement eco-innovations namely energy efficiency, renewable energies, green production processes;
- Establishment of the EU Small Enterprise Charter in last quarter of 2010.

### Assessment of strengths and weaknesses

**Education policy**
- Low levels of S&T graduates and researchers may limit absorptive capacity of R&I system.
- Demand for R&D personnel contingent on structural features, namely the prevalence of low-tech SMEs and large production-oriented MNCs.
- Mismatches between skills output and industry demand may stall growth in particular economic areas; a strength is the fact that the vocational education sector is quickly responding to emerging skills needs and trying to re-dress courses that are relevant to the economy.

**Other policies**
- Green procurement action plan not yet implemented, limiting demand for innovative eco-solutions;
- Bureaucratic and administrative burdens for start-ups and SMEs, are expected to be alleviated once the Small Enterprise Charter starts to be implemented.

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90 MNC: multi-national corporation
## 4.2 ERA 2020 objectives - a summary

Table 8: Assessment of the national policies/measures supporting the strategic ERA objectives (derived from ERA 2020 Vision)

<table>
<thead>
<tr>
<th>ERA objectives</th>
<th>Main policy changes</th>
<th>Assessment of national strengths and weaknesses with regard to the specific ERA objective</th>
</tr>
</thead>
</table>
| 1 Ensure an adequate supply of human resources for research and an open, attractive and competitive single European labour market for male and female researchers | • Malta has put in place a legal framework for the admittance of third country researchers.  
• the university giving greater visibility to research and researcher status;  
• boosting the number of PhDs in science and technology;                                                                                                    | • Attractive working conditions for researchers including improved salaries, small remuneration gap between men and women. Nonetheless, availability of permanent positions dependent on block institutional funding allocated to university.  
• Lack of a post-doctoral community may deter from undertaking a career in research.  
• Limitations in RI infrastructures.  
• Skills mis-matches in meeting needs of fast-growing economic sectors.                                                                                   |
| 2 Increase public support for research                                         | • Public budget for R&D increased by 4.4% in 2009 compared to 2008.                                                                                                                                                      | • Overall, R&D expenditure, minimally affected by the economic crisis; structural funds share of R&D budget committed for 2007-2013 period; national funds budget increased in 2011.                                                                                     |
| 3 Increase European coordination and integration of research funding           | • National R&I funding programme open to participation by foreign entities.                                                                                                                                            | • Currently ‘closed’ national research funding system that tends to favour research activity performed ‘at home’ rather than abroad with the aim of strengthening national capacity;  
• Foreign entities participate as non-beneficiary partners.                                                                                                |
| 4 Enhance research capacity across Europe                                      | • participation in FP7 contributes to building research capacity and extending research networks.                                                                                                                       | • Participation and contribution in European research contingent on availability of adequate research infrastructures and facilities.                                                                                                                                                    |
| 5 Develop world-class research infrastructures (including einfrastructures) and ensure access to them | • Investments in RIs have increased over the past five years, mainly for the upgrading of existing infrastructures setting up of new ones in areas such as engineering, life sciences, renewable energy, super computing, ICT and health biotech  
• In 2010, the government earmarked €250,000 for the setting up of a national bio-bank and €11m for a Life Sciences Centre.                                                                                       | • The focus is very much on strengthening national infrastructures typically in areas in which the university already has competence (e.g. ICT, health). Whilst this is a strength because it will enable the university to be better placed to participate in international RI initiatives yet at the same time it may limit capacity in other emerging areas. |
<table>
<thead>
<tr>
<th>ERA objectives</th>
<th>Main policy changes</th>
<th>Assessment of national strengths and weaknesses with regard to the specific ERA objective</th>
</tr>
</thead>
</table>
| 6 Strengthen research institutions, including notably universities | • University rector's endorsement of the third mission in 2010;  
• Career progression linked to research and teaching output ensuring quality of research.  
• Larger budget allocation to the university in 2011 (€44.5m) compared to 2010 (€41m). | • A major strength is the fact that the government has over the past five years progressively increased the budget for higher education in general and the university in particular.  
• On the other hand, a weakness is the over-reliance on annual institutional funding streams restricting university's financial and academic autonomy. |
| 7 Improve framework conditions for private investment in R&D | • First-time R&D incentive package for industry;  
• Promotion of eco-innovations (e.g. renewable energy) creating demand for innovation and research investment; | • Lack of own funds and low entrepreneurial culture amongst SMEs are likely to be stumbling blocks in the uptake of incentives made available.  
• R&I incentives are being tailored to address particular structural problems in the system, namely the targeting of financial schemes to support SMEs also in terms of promoting their innovation activity. |
| 8 Promote public-private cooperation and knowledge transfer | • Setting up the Corporate Research & Knowledge Transfer Office at university to facilitate industry-academia linkages and cooperation;  
• Tax exemption from royalties and similar revenue resulting from patents on inventions (2011 measure)  
• Research projects promoting public-private cooperation. | • These recent measures aim at creating the right framework conditions for public-private cooperation and commercialisation of research. |
| 9 Enhance knowledge circulation across Europe and beyond  | • Good level of participation of Maltese research entities in FP7 to date despite a slight decline in university participation;  
• The internationalisation strategy at university is serving to attract a growing population of foreign students (at 6.2% of the total in 2009). | • Malta has more outgoing students than it has incoming that may result in a brain drain.  
• Streamlining of the tertiary education system with the Bologna process and the presence of an English-speaking environment in the education/university system facilitate the circulation of international students promoting knowledge circulation. |
<table>
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<tr>
<th>ERA objectives</th>
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</table>
| 10 Strengthen international cooperation in science and technology and the role and attractiveness of European research in the world | • International Cooperation gained more prominence in the Policy & Strategy Unit at MCST in 2010;  
• strengthened FP7 Unit within MCST aimed to increase participation in FP and other EU programmes (e.g. COST). | • There is no follow-up of bilateral science and technology cooperation agreements that Malta maintains with countries within and outside the EU so that these offer limited added-value to strengthening international cooperation in practice. |
| 11 Jointly design and coordinate policies across policy levels and policy areas, notably within the knowledge triangle | • The national R&I Strategy 2007-2010 serves as a reference guiding research and innovation policy and governance;  
• MCST coordinates an OMC-NET Project (ERAPRISM) defining policy challenges and responses for small MS. | • There is evidence of dovetailing of R&I initiatives across strategies, sectors and policy measures thanks to enhanced coordination amongst the public entities with a remit to implement R&I policy. This is a strength as it affords for greater synergy within the knowledge triangle. |
| 12 Develop and sustain excellence and overall quality of European research | • This is a priority re-iterated in a number of policy documents including the Further & Higher Education Strategy and the government’s Vision 2015 document; the government is working to establish Malta as a regional centre of excellence in education and research with a focus on fields of national importance;  
• Internal quality assurance mechanism in place at university that increasingly benchmarks promotion of academic staff against performance;  
• External quality assurance framework needed to attract quality research. | |
| 13 Promote structural change and specialisation towards a more knowledge-intensive economy | • Government’s 2015 Vision document rests on building adequate knowledge base to establish excellence in given sectors of economic value (e.g. ICT, Health, Energy);  
• The reform in the further and higher education sector – strengthening vocational training; increasing opportunities for PhDs - are supporting the transition to a knowledge-based economy. | • The structural characteristics of the system, namely a low population of R&D performing firms and the fact that financial aid for R&I activity is a recent phenomenon in the system, present specific challenges towards uptake of the R&I measures put in place.  
• The fact that policy measures are targeting these particular problem areas should translate into enhanced absorptive capacity for R&I. |
<table>
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<tr>
<th>ERA objectives</th>
<th>Main policy changes</th>
<th>Assessment of national strengths and weaknesses with regard to the specific ERA objective</th>
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<tbody>
<tr>
<td>14 Mobilise research to address major societal challenges and contribute to sustainable development</td>
<td>• Public funds are being channelled towards priority areas that cover societal challenges including Energy and Renewable Energy; • Other measures include the promotion of green technologies, platforms of strategic importance (e.g. Health).</td>
<td>• Sustainable development across policy areas (energy, tourism and environment) has gained a higher profile on the political agenda. There is more scope for coordination across ministries and public agencies.</td>
</tr>
<tr>
<td>15 Build mutual trust between science and society and strengthen scientific evidence for policy making</td>
<td>• National science popularisation campaign bringing science closer to the community; • A 2011 measure to set up an interactive science centre. • enhanced interactions amongst public agencies involved in S&amp;T policy formulation and implementation (namely MCST) and other relevant ministries (e.g. Finance ministry, Contracts Department).</td>
<td>• Although a weak evaluation culture permeates in the system, there are indications that the formulation of research and innovation policy is increasingly relying on an evidence-based approach (e.g. for the formulation of R&amp;D targets 2020).</td>
</tr>
</tbody>
</table>
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Director Policy Unit, Malta Council for Science & Technology, May 2010.
Director European Affairs, Ministry of Foreign Affairs (for information on bilateral agreements, September 2010).
Global Issues Directorate, Ministry of Foreign Affairs (for information on multi-lateral agreements, September 2010).

List of Abbreviations

<table>
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>BBMRI</td>
<td>Biobanking and Biomolecular Resources Research Infrastructure</td>
</tr>
<tr>
<td>BERD</td>
<td>Business Expenditures for Research and Development</td>
</tr>
<tr>
<td>CERN</td>
<td>European Organisation for Nuclear Research</td>
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<tr>
<td>CORTO</td>
<td>Corporate Research &amp; Knowledge Transfer Office</td>
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<tr>
<td>COST</td>
<td>European Cooperation in Science and Technology</td>
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<tr>
<td>EESSI</td>
<td>Electronic Exchange of Social Security Information</td>
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<td>EPO</td>
<td>European Patent Office</td>
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<td>ERA</td>
<td>European Research Area</td>
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<td>ERA-NET</td>
<td>European Research Area Network</td>
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<tr>
<td>ERA-PRISM</td>
<td>Policies for Research and Innovation in Small Member States</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>ERDF</td>
<td>European Regional Development Fund</td>
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<td>ERP Fund</td>
<td>European Recovery Programme Fund</td>
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<td>ESA</td>
<td>European Space Agency</td>
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<tr>
<td>ESFRI</td>
<td>European Strategy Forum on Research Infrastructures</td>
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<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>EU-27</td>
<td>European Union including 27 Member States</td>
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<tr>
<td>FDI</td>
<td>Foreign Direct Investments</td>
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<tr>
<td>FP</td>
<td>European Framework Programme for Research and Technology Development</td>
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<tr>
<td>FP7</td>
<td>7th Framework Programme</td>
</tr>
<tr>
<td>FTE</td>
<td>Full Time Equivalent</td>
</tr>
<tr>
<td>GBAORD</td>
<td>Government Budget Appropriations or Outlays on R&amp;D</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GERD</td>
<td>Gross Domestic Expenditure on R&amp;D</td>
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<tr>
<td>GOVERD</td>
<td>Government Intramural Expenditure on R&amp;D</td>
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<tr>
<td>HEI</td>
<td>Higher education institutions</td>
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<tr>
<td>HERD</td>
<td>Higher Education Expenditure on R&amp;D</td>
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<tr>
<td>HES</td>
<td>Higher education sector</td>
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<tr>
<td>HRST</td>
<td>Human Resources in Science &amp; Technology</td>
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<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
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<tr>
<td>IP</td>
<td>Intellectual Property</td>
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<td>IST</td>
<td>Information Society Technologies</td>
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<td>ITS</td>
<td>Institute for Tourism Studies</td>
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<td>MCAST</td>
<td>Malta College of Arts, Science &amp; Technology</td>
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<td>MCST</td>
<td>Malta Council for Science &amp; Technology</td>
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<td>ME</td>
<td>Malta Enterprise</td>
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<tr>
<td>MGSS</td>
<td>Malta Government Scholarship Scheme</td>
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<td>MITA</td>
<td>Malta Information Technology Agency</td>
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<tr>
<td>MNC</td>
<td>Multi-national Company</td>
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<td>MQRIC</td>
<td>Malta Qualifications Recognition Information Centre</td>
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<td>MUHC</td>
<td>Malta University Holding Company</td>
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<tr>
<td>NACE</td>
<td>Nomenclature des Activites Economiques</td>
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<tr>
<td>NCHE</td>
<td>National Commission for Higher Education</td>
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<td>NRP</td>
<td>National Reform Programme</td>
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<tr>
<td>NSO</td>
<td>National Statistics Office</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>OP</td>
<td>Operational Programme</td>
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<tr>
<td>OPM</td>
<td>Office of Prime Minister</td>
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<tr>
<td>PP</td>
<td>Public Procurement</td>
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<tr>
<td>PPCD</td>
<td>Planning &amp; Priorities Coordination Department</td>
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<tr>
<td>PPS</td>
<td>Purchasing Power Standard</td>
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<tr>
<td>PRO</td>
<td>Public Research Organisations</td>
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<tr>
<td>R&amp;D</td>
<td>Research and development</td>
</tr>
<tr>
<td>RI</td>
<td>Research Infrastructures</td>
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<tr>
<td>RTDI</td>
<td>Research Technological Development and Innovation</td>
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<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>S&amp;T</td>
<td>Science and technology</td>
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<tr>
<td>SF</td>
<td>Structural Funds</td>
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<td>SME</td>
<td>Small and Medium Sized Enterprise</td>
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<tr>
<td>STEPS</td>
<td>Strategic Educational Pathways Scholarships</td>
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<tr>
<td>SWOT</td>
<td>Strengths Weaknesses Opportunities &amp; Threats</td>
</tr>
<tr>
<td>VC</td>
<td>Venture Capital</td>
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