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The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context.

The first draft of this report was produced in December 2012 and was focused on developments taking place in the previous twelve months. In particular, it has benefitted from the comments and suggestions of Alessandro Rainoldi from JRC-IPTS. The contributions and comments from Malta Council for Science and Technology, in consultation with the Planning and Priorities Coordination Department at the Office of the Prime Minister, the Permanent Representation of Malta to the EU, Malta Enterprise, as well as the University of Malta are also gratefully acknowledged.

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

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EXECUTIVE SUMMARY

With preparations for Malta's accession to the EU in 2004, research policy in Malta gained substantial momentum. The first Maltese national strategy for R&I was developed in 2007, with its main thrust being the development of a research framework and building research capacity in the areas of human resources and infrastructure. Malta's vision was and still is to place R&I at the heart of the Maltese economy in order to spur knowledge-driven and value-added growth and to sustain improvements in the overall quality of life. The strategy had a strong business orientation, emphasising the importance of collaboration between industry and academia as well as the exploitation of research results for economic benefit. The strategy also identified four priority sectors where the country's limited human and financial resources were to be channelled.

In December 2011, a draft National R&I Strategy 2020 was issued for public consultation. This builds upon the previous strategic plan, introducing a number of new elements whilst retaining the same underpinning vision, principles and established priority sectors. This overarching strategy is being complemented through the development of thematic research strategies for the individual priority sectors. It should be noted that as at March 2013 this plan is being finalised and will also include Malta's R&I Smart Specialisation Strategy which is in the process of development. Malta has recently joined the S3 Platform and a number of meetings have been held with various entities within the public sector, to be followed by meetings with representatives of the private sector and academia. Work is underway with the objective of identifying particular niches with a focus on interdisciplinary through an entrepreneurial process of discovery. It is envisaged that the smart specialisation strategy will be completed in the third quarter of 2013.

Due to Malta's small population, all policy and administrative matters are addressed at a national level and the regional dimension is generally lacking. The key entities involved in research governance are the Malta Council for Science and Technology which is responsible for policy development and management of the National R&I Funding Programme and the commercialisation programme, while Malta Enterprise develops and manages a number of funding schemes targeted at industry.

The year 2004 also marked the establishment of a funding programme for local research after much lobbying by the local research community. This provided a much-needed impetus for the growth of research activity in Malta. Furthermore in 2012, a new Commercialisation Programme was launched. This aims at bridging any missing links in the development chain; assist research in reaching the market; and complement the funding programme launched in 2004.

R&D expenditure in 2011 was only 0.73% of GDP compared to an EU average of 2.01%. Nevertheless, this is a major improvement over the 2009 figure which stood at 0.54%. The significant increases in R&D expenditures in 2010 and 2011 translated into levels of expenditures which did not follow the trends of the previous years. This resulted in a situation where in percentage terms Malta has reached its stipulated target of 0.67% of GDP by 2020.

Industry in Malta consists of a small number of large foreign-owned manufacturing enterprises and a large number of indigenous SMEs which undertake little R&D. In spite of this, most research in Malta is conducted by the business enterprise sector which in 2011 accounted for 67% of R&D expenditure. Most of this research is undertaken in the area of Engineering and Technology, with Natural Science a close second and Medical Sciences a distant third, to some extent reflecting the industry structure in Malta.

Malta has one public university, the University of Malta, which has an old pedigree and traces its origins back to the 16th century. It is the main research performer in the academic sector, which in 2011 accounted for 34% of expenditure on R&D. Malta is weakest in terms of public research centres, with public research accounting for just over 3% of research expenditure on the island.

Malta's has consistently been one of the moderate innovators in the EU's Innovation Union Scoreboard. Research inputs tend to be below the EU average but on the other hand, output indicators are mixed and surprisingly good compared to input and firm indicators. In particular, Malta scored above average for employment in knowledge-intensive activities, high-tech exports and sales of new innovations.

In recent years the R&I system has witnessed significant progress through the implementation of a suite of initiatives addressing different facets of the system and tapping different sources of funding. The availability of EU structural funds paved the way for increased funding for R&I. Human resources, infrastructure, research funding and innovation have all been targeted through dedicated measures which were well designed, efficiently implemented and welcomed by the research community. Public funding for research has also increased, with the allocation for the National R&I Programme more than doubling between 2009 and 2012. However, the absence of a formal and rigorous evaluation of these initiatives and measures makes an assessment of their impact somewhat subjective.

Despite the great strides that have been made in recent years, a number of challenges prevail of which the most significant are listed below:

- Capitalising on recent investments and achievements by developing opportunities for researchers in the public sector;
- Smart specialisation;
- Increasing funding for research and innovation;
- Broadening the base of enterprises undertaking R&I activities;
- Closing the loop by bringing research to market.

These structural challenges have been identified on the basis of the achievements in the R&I ecosystem in recent years, on the current state of play and on the perceived requirements for further progress. Recent improvements have addressed a number of earlier weaknesses leading to a new set of challenges (e.g. increased number of PhD graduates leading to the requirement for developing opportunities for such researchers). In other cases earlier weaknesses have been addressed to some extent but further measures are necessary to maintain momentum (e.g. funding for research and innovation).

In most cases the identified challenges are already being addressed through existing initiatives, or have been identified in the draft National R&I Strategy 2020 and appropriate recommendations have been put forward. A persistent weakness is the lack of impact assessments which would shed light on the effectiveness of initiatives and measures.

The national R&I system is in tune with many of the principles underpinning the ERA vision, although policies and measures specifically addressing broader integration into the ERA may be lacking. This probably arises from the fact that Malta's research ecosystem is still in its infancy, and in view of current limitations it may be considered premature to aspire to fuller participation in the ERA. Efforts for the immediate future are mainly focused on building and strengthening



internal capacity, hopefully leading to improvements which would enable shifting focus to fuller integration in the ERA in the near future.

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1 INTRODUCTION

With a GDP of €6.5 billion and a total population of almost 418,000 inhabitants in 2011¹, Malta is the smallest EU Member State accounting for a 0.1% share of the EU-27 total population. The GDP per capita at €15,600 is well below the EU27 average of €25,200. Real GDP growth was -3.7% in 2009 but this increased to 1.6% in 2010 and 1.0% in 2011.

R&D expenditure (GERD) in 2011 stood at 0.73% of GDP compared to an EU average of 2.03%. Spending on R&D remained almost flat in absolute terms over the period 2006 – 2009, while experiencing an annual decline when expressed as a percentage of GDP from 0.62% in 2006 to 0.54% in 2009. This negative trend was reversed in 2010 with a sudden 32% jump in spending from €32.8 million in 2009 to €42.0 million in 2010, to reach 0.67% of GDP. Eurostat provisional estimates for 2011 indicate that the trend is expected to continue, with GERD projected to increase to 0.73% of GDP in 2011.

Most research in Malta is conducted by the business sector which in 2011 accounted for 67% of R&D expenditure, followed by higher educational institutions at 30% with public research institutions contributing just over 3%. Corresponding figures for the EU-27 in 2011 are 62%, 24% and 13% respectively.

R&I policy is guided by a multi-annual strategy which embraces the concept of smart specialisation and the draft R&I Strategic Plan has identified a number of broad thematic areas where resources are to be concentrated.² In 2010, the GERD dedicated to engineering represented 40% of total R&D funding; whilst that for natural sciences was 28% and 13% for medical sciences³. (Eurostat figures for 2011 not yet available).

In recent years considerable capital investment has been made in upgrading and building new research infrastructures at the University of Malta in the fields of engineering, science and ICT. These projects, valued over €30 million between 2007 and 2013 are co-financed through the European Regional Development Fund (ERDF). The €38 million that is being invested in a Life Sciences Centre is another step in building capacity investment in biotechnology and pharmaceuticals. Also, participation in European research infrastructure projects such as the Biobanking and Biomolecular Resources Research Infrastructure (BBMRI) and the Common Language Resources and Technology Infrastructure (CLARIN) and the signing of bilateral agreements with international organisations (e.g. CERN and the European Space Agency) are intended to improve access for Maltese researchers to international infrastructures.

Research inputs tend to be below the EU average. The number of PhD graduates (per 1,000 population aged 25-34) in 2011 stood at just 0.3 compared to the EU-27 average of 1.5% in 2011, which is one of the lowest scores in the EU. However, grant schemes introduced in recent years are having the desired effect and Malta now has the highest growth rate (over 30% when compared to the previous year) of any EU country with respect to this indicator⁴. The workforce

¹ Eurostat Main Demographic Indicators accessed December 2012

² Malta Council for Science & Technology (2011) Malta's National Strategic Plan for R&I 2011-2020 Draft Consultation Document published 5th December 2011

³ NSO News Release 149/2012, R&D in Malta, 2 August 2012

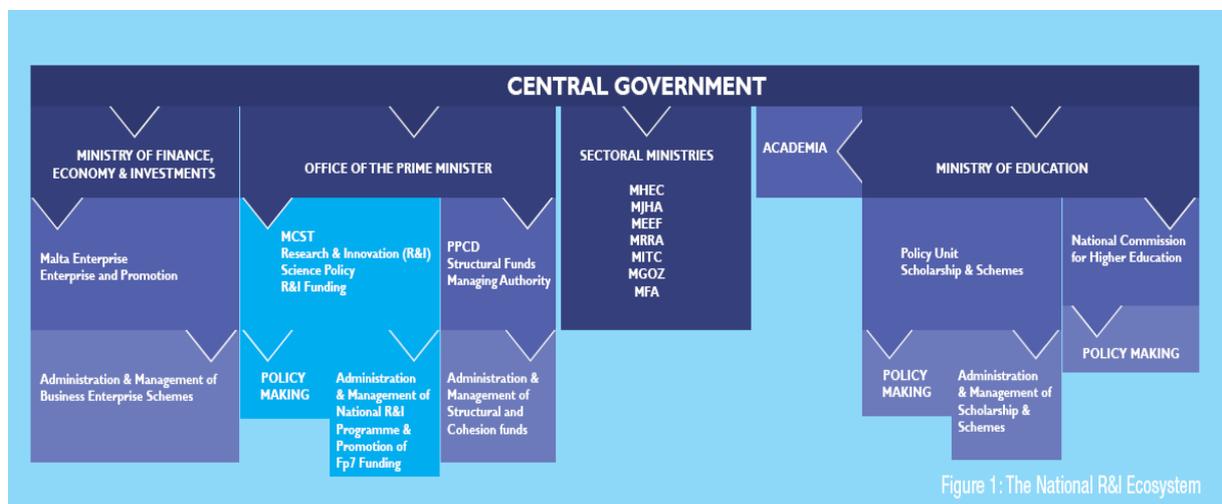
⁴ Innovation Union Scoreboard 2011, European Union 2012

engaged in scientific work (Human Resources in Science and Technology, HRST) stood at 34.8% of the labour force, compared to 42.3% in the EU-27 in 2011⁵.

Research output indicators for Malta are mixed and surprisingly good compared to input and firm indicators. While several indicators are below the EU average, Malta scored above average for employment in knowledge-intensive activities, high-tech exports and sales of new innovations⁶. Overall Malta has been identified as one of the growth leaders within the Moderate innovators group.⁷

The figure below gives a snap shot of the Maltese R&I system that integrates facets of both research and innovation governance.

Figure 1: The Maltese R&I system



Source: [Malta's National Strategic R&I Plan 2011-2020 Draft Consultation Document](#) published 5th December 2011

Due to Malta's small size, in common with other policy areas research and innovation policy development and implementation are addressed at a national level. The regional dimension is not relevant and there is no split of responsibilities between the national and regional level dimensions.

There exist two public bodies entities with responsibility for promoting research in Malta. The first is the Malta Council for Science and Technology (MCST) which previously reported to the Office of the Prime Minister, but since the general election of March 2013 has been reassigned to the Ministry for Education and Employment. A Parliamentary Secretary (junior minister) within this Ministry has responsibility for Research, Innovation, Youth and Sport. The recent restructuring and the appointment of a junior minister to champion research should lead to a more concerted effort and greater political visibility.

The MCST has four key areas of responsibility. It is responsible for research and innovation policy and strategy, it acts as a central point for all science popularisation activities in Malta, it is the contact point for the EU research framework programme, and it is responsible for managing

⁵ Eurostat accessed December 2012
⁶ Innovation Union Scoreboard 2011, European Union 2012
⁷ Innovation Union Scoreboard 2011, European Union 2012

the national research and innovation (R&I) funding programme and the commercialisation programme launched in 2012.

There is a second public body which has a very prominent role in the national R&I ecosystem, Malta Enterprise, which forms part of the Ministry of Finance, Economy & Investment. Malta Enterprise is the national development agency and is responsible for the growth and development of Maltese enterprise, as well as for promoting and facilitating overseas investment in Malta. It operates a number of schemes including R&D and innovation grant schemes for business enterprise.

Through their respective policies and the funding that they administer, the Planning and Priorities Coordination Division within the Office of the Prime Minister as well as the Ministry for Finance, the Economy and Investment influence the unlocking of resources for R&I.

The business sector is the largest R&D performer, performing 66.7% of total R&D (GERD) equivalent to €31.6 million in 2011⁸. This has increased significantly in the last two years and represents an increase of 57% over 2009. R&D activity is clustered around a few sectors (Engineering and Technology, Natural Science and Medical Sciences).

The University of Malta is the main research performer in the higher education sector, with an expenditure of €14.2 million representing 30.1% of GERD in 2011. Most of the research is conducted in the field of Social Sciences followed by Medical Sciences, Engineering, Humanities and Natural Sciences in that order.

R&D expenditure by public research organisations at just over 3% of GERD is almost insignificant and is the component which is the lowest compared to the EU average. This is not surprising considering that Malta has only one public research organisation, the Malta Aquaculture Research Centre. A number of government departments may be involved in research activities to a small degree, but do not have a dedicated research budget.

⁸ Eurostat accessed December 2012

2 RECENT DEVELOPMENTS OF THE RESEARCH AND INNOVATION POLICY AND SYSTEM

2.1 National economic and political context

Malta's research culture is relatively young and only while preparing to access the EU in 2004 research policy in Malta gained substantial momentum. That same year saw the establishment of the first funding programme for local research after much lobbying by the local research community. This provided a much-needed impetus for the growth of research activity in Malta.

In 2007 the first national strategy was developed to guide research policy over the subsequent four years. The main thrusts of this strategy were the development of a research framework and building research capacity in terms of human resources and infrastructure. Malta's vision was, and still is, to place R&I at the heart of the Maltese economy in order to spur knowledge-driven and value-added growth and to sustain improvements in the overall quality of life. The strategy had a strong business orientation, emphasising the importance of collaboration between industry and academia as well as the exploitation of research results for economic benefit. The strategy also identified four priority sectors where the country's limited human and financial resources were to be channelled. The draft national R&I strategy, issued for consultation in December 2011, builds upon the previous strategic plan, introducing a number of new elements whilst retaining the same vision, underpinning principals and established priority sectors. This overarching strategy is being complemented through the development of thematic research strategies for the individual priority sectors. To this end a research manufacturing strategy and a health research and innovation strategy, were finalised during 2012. In addition a digital games strategy was launched in 2012 and while this is not primarily an R&D strategy it does address this topic to some degree.

Due to Malta's small population, the regional dimension is lacking and all policy and administrative matters are addressed at a national level. The principle entities involved in research governance are the Malta Council for Science and Technology which is responsible for policy development and management of the National R&I Funding Programme and the commercialisation programme, while Malta Enterprise develops and manages a number of funding schemes targeted at industry.

The availability of EU structural funds paved the way for significant investments in a number of areas, with such funds being directed into research infrastructures, PhD fellowship schemes and R&I funding schemes for industry. Public funding for research has also increased, with the allocation for the National R&I Programme more than doubling between 2009 and 2012.

Malta has few natural resources and an insignificant primary sector, and its economy centres around manufacturing and services. While tourism and electronics have been important pillars of the local economy for a number of years, other sectors have recently emerged such as aircraft maintenance, financial services, on-line gaming and pharmaceuticals, indicating a shift in the economy towards higher value-added sectors and areas which are more knowledge intensive. Over the last decade, the Maltese economy underwent a gradual change from manufacturing towards services. Whereas in 2000, manufacturing accounted for 22.4% of Gross Value Added

(GVA), in 2010 it only accounted for 13.6%. On the other hand, the services sector contributed to 59% of GVA in 2010, up from 53% in 2000.⁹

Maltese enterprise consists predominantly of microenterprises (97%) and SMEs (2.9%), with around 81 large companies (0.1%), many of which are subsidiaries of overseas enterprises and corporations.¹⁰ Enterprise contributes about 60% of gross value added, and about 88% of total employment¹¹.

Malta has weathered the recent economic downturn well, and did not suffer a collapse of its financial markets largely because it has a strong and conservative domestic banking and financial sector. Unemployment is low at 6.5% compared to an EU average of 9.7% in 2011¹². The economic environment did not impact on the allocations for R&I that were already earmarked for particular interventions outlined in the Operational Programmes of Malta's Cohesion Policy.

2.2 Funding trends

R&D expenditure (GERD) in 2011 stood at €47.4 million equivalent to 0.73% of GDP compared to an EU average of 2.01%. GERD remained almost flat in absolute terms over the period 2006 – 2009, while experiencing an annual decline when expressed as a percentage of GDP from 0.62% in 2006 to 0.54% in 2009. This negative trend was reversed in 2010 with a sudden 32% jump in GERD from €32.8 million in 2009 to €42.0 million in 2010, and provisional estimates indicate that there is going to be a further 13% increase in 2011 to reach a figure of €47.4 million.¹³

R&D expenditure by business accounts for approximately two-thirds of GERD, standing at €31.6 million in 2011. The remainder is largely accounted for by higher educational institutions, principally the University of Malta, with an expenditure of €14.2 million in 2011. R&D expenditure by public research organisations is just over 3% of GERD.

By far the biggest component of R&D expenditure relates to the cost of personnel, accounting for 59% of expenditure in higher educational institutions and 67% of expenditure in business in 2010.

The increased spending on R&D in 2010 and 2011 resulted from increases in both educational and business spending. In the case of higher educational institutions, expenditure increased from €10.1 million in 2009 to €14.2 million in 2011¹⁴, with significant increases in expenditure on salaries, buildings and instrumentation where a number of infrastructure projects funded through ERDF for new laboratories at the University of Malta got underway. It is expected that the level of expenditure will taper off in 2012 and subsequent years following the completion of the current ERDF projects. While it is expected that there will be further investment in infrastructure funded through the next ERDF programming period, it is also likely that there will be some delay until these get underway due to the time required for the issuing of calls, selection of projects, and the mobilisation process. This could well lead to a temporary dip in R&D expenditure in the higher educational area.

⁹ Malta's National Strategic Plan for Research & Innovation 2011-2020: A Vision for Knowledge-Driven Growth, draft for consultation published 5th December 2011

¹⁰ NSO News Release 089/2012, Business Demographics, 8 May 2012

¹¹ <https://opm.gov.mt/vizjoni-2015?l=1>

¹² Eurostat accessed December 2012

¹³ Eurostat accessed December 2012

¹⁴ NSO News Release 149/2012, R&D in Malta, 2 August 2012

In the case of business R&D, expenditure increased from €20.1 million in 2009 to €31.6 million in 2011 with most of the increase attributable to increased expenditure on salaries. Statistics on the number of employees in R&D follow the same trends as salary costs. It is not clear what has driven this increase in spending by business, although these might be attributable to the Malta Enterprise schemes (see section 2.3 below).

	2009	2010	2011	EU27
GDP growth rate	-2.4%	2.7%	1.6%p	-0.3 (2012)
GERD (% of GDP)	0.54	0.67	0.73p	2.03s (2011)
GERD (euro per capita)	76.8	101.4	113.4p	510.5s (2011)
GBAORD – total R&D appropriations (€ million)	9,475	14,637	14,595p	91,277.1 (EU27 total 2011)
R&D funded by Business Enterprise Sector (% of GDP)	0.34%	0.42%	0.49%p	1.26% (2011)
R&D performed by HEIs (% of GERD)	31.91%	34.03%	30.07%p	24% (2011)
R&D performed by government sector (% of GERD)	4.73%	3.69%	3.24%p	12.7% (2011)
R&D performed by Business Enterprise sector (% of GERD)	63.36%	62.28%	66.70%p	62.4% (2011)
Share of competitive vs institutional public funding for R&D	12 / 88	29 / 71	n/a	n/a

p – provisional

s - EUROSTAT estimate

Data Source: EUROSTAT March 2013

In business, most of the expenditure relates to Engineering and Technology, with Natural Science a close second and Medical Sciences a distant third. Other areas are almost insignificant, together accounting for only 3% of total business expenditure on R&D.

In the case of higher educational institutions there is a more even spread of expenditure, with most of the expenditure taking place in the field of Social Sciences followed by Medical Sciences, Engineering, Humanities and Natural Sciences in that order.

Malta had originally set itself a target R&D intensity of 0.75% of GDP by 2010. This was later revised downwards and Malta's National Reform Programme (NRP) 2011-2020 has set the target of achieving a total R&D expenditure of 0.67% of GDP by 2020, presumably since statistics available at the time showed a negative trend. The significant increases in R&D expenditures in 2010 and 2011 translated into levels of expenditures which did not follow the trends of the previous years. This resulted in a situation where in percentage terms Malta has reached its stipulated target of 0.67% of GDP by 2020.

With reference to sources of funding, in 2010 almost 90% of funding came from local sources

with the balance coming from overseas¹⁵. Cross-funding between sectors is very low, with businesses largely funding their own research and central government providing funding for public research and higher educational institutions¹⁶.

Precise figures for institutional vs competitive funding are not available, but it is estimated that approximately 70% of public funding can be considered institutional since it is allocated directly to higher educational institutions and to government departments and research organisations. The remainder is allocated on a competitive basis, and includes the R&I Funding Programme as well as structural funds which are secured following a call for proposals.

The University of Malta accounts for most of the higher education related research on the island, estimated at €14.2 million in 2011. Nevertheless its discretionary budget dedicated to research support was only in the order of €600,000 in 2010 which imposes severe constraints on the research initiatives it is able to fund internally.¹⁷

The main permanent source of competitive funding from central government is the National R&I Funding Programme, which provides grants for collaborative research projects by consortia involving both industry and academia. This Programme funds projects in the four thematic areas prioritised in the national R&I strategy. The funding for this Programme increased from €0.7 million in 2010 to €1.1 million in 2011 and to €1.6 million in 2012¹⁸. Malta's NRP indicates that the financial allocation for this Programme is projected to increase to €3.8 million in 2013 and to €4.0 million in 2015¹⁹. However, the actual allocation in the 2013 budget remained unchanged at €1.6 million²⁰.

A significant portion of Malta's Structural Funds allocation 2007 – 2013 (ERDF & European Social Fund (ESF)) were earmarked for research and innovation, and 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.

Looking at the broader context of the R&I system, participation in the EU's Framework Programme for Research and Technology Development (FP) has served to leverage financing for R&I activity across public and private sector actors. In financial terms, Malta secured €10 million in FP6 and by July 2011, 108 FP7 projects were approved for funding equivalent to around €11 million²¹.

2.3 New policy measures

One of the most important policy measures to promote research was the establishment of the National R&I Funding Programme in 2004, which provides grants for collaborative research projects by consortia involving both industry and academia. The funding for this programme has seen significant increases from €0.7 million in 2010 to €1.1 million in 2011 and to €1.6

¹⁵ NSO News Release 149/2012, R&D in Malta, 2 August 2012

¹⁶ Ibid.

¹⁷ 2020 Vision or Optical Illusion?, Prof. Juanito Camilleri Rector University of Malta, 17 September 2010

¹⁸ Ministry of Finance, Economy & Investment, Budget Speech 2012 published 14th November 2011

¹⁹ Malta's National Reform Programme under the Europe 2020 Strategy pp 136, published April 2012

²⁰ Ministry of Finance, Economy & Investment, Budget Speech 2013 published 28th November 2012

²¹ Malta's National Strategic Plan for Research & Innovation 2011-2020: A Vision for Knowledge-Driven Growth, draft for consultation published 5th December 2011

million in 2012. This increase is a testament to the success of the programme which is heavily oversubscribed, with the 2012 programme attracting 46 proposals requesting a total of €8.3 million in funding²². Malta's NRP had indicated that the financial allocation for this programme was projected to increase to €3.8 m in 2013 and to €4.0 m in 2015²³, but the actual allocation for 2013 has remained static at €1.6 million.

Another important measure aimed at developing a pool of researchers involved two separate programmes, the Strategic Educational Pathways Scholarships (STEPS) scheme (€10 million ESF project launched in 2009) and the Malta Government Scholarship Scheme (MGSS) schemes (approximately €466,000 annually through national funds launched in 2008) for the funding of Masters and Doctorate studies undertaken both locally and abroad. On average, MGSS supports 36 scholarships annually. Until the end of 2010, STEPS had funded 554 scholarships (18% of which were PhD scholarships).²⁴ These schemes are managed by the Ministry responsible for education.

A Knowledge Transfer Office was set up within the University of Malta in September 2009. The aim of this office is to drive the corporate research agenda of the University in harmony with and in response to national, social and economic requirements; the needs of local industry; emerging expertise and intellectual property as well as funding opportunities. In addition it assists the University and academic members of staff to define and protect intellectual property and commercially exploit research results, to participate in externally funded and collaborative research projects and to seek financing for corporate research initiatives²⁵.

In 2010 the University of Malta set up a Trust Fund for Research, Innovation and Development, with an initial government vote of €500,000. Through this mechanism, individuals and organisations will be able to make donations which are tax-deductible. The aim of the Trust Fund is to encourage research and its utilisation for commercial and industrial needs.²⁶ This is a new concept in Malta and may be the reason why the success of this initiative has been somewhat limited, with only two contributions having been reported to date.²⁷ The total financial contribution by industry has not been revealed.

In 2009 Malta Enterprise launched a number of schemes aimed at encouraging R&I in industry. These include the following:

- the ERDF R&D Grant Scheme by Malta Enterprise in 2009 which provides cash grants for R&D in the private sector. In the first two calls (2009 and 2010) a total of 24 R&D projects were approved with a total grant value of €2.81 million providing co-financing, (EU funds, national funds and private funds) for R&D projects with a projected value of €5.80 million. The beneficiaries included both SMEs and large enterprises. A third call was published in 2012 and as at March 2013 these applications are in the process of being evaluated²⁸.

²² MCST website <http://mcst.gov.mt/national-funding/ri-programme/current-ri-programme>

²³ Malta's National Reform Programme under the Europe 2020 Strategy pp 136, published April 2012

²⁴ Malta Council for Science & Technology (2011) Malta's National Strategic Plan for R&I 2011-2020 Draft Consultation Document published 5th December 2011

²⁵ University of Malta website <http://www.um.edu.mt/about/services/infocom/corporateresearch>

²⁶ University of Malta website <http://www.um.edu.mt/trustfund>

²⁷ University of Malta RIDT website <http://www.fidt.org.mt/news/archive>

²⁸ Malta Enterprise website, <http://20millionforindustry.com/Default.aspx?tabid=119> accessed January 2013

- the Loan of Highly Qualified Personnel Scheme, which provides cash grants to SMEs to engage specialised personnel to work on R&I projects. There is no information available on the uptake of this scheme.
- the Innovative Clusters scheme, which provides cash grants to finance innovation clusters consisting of a mixture of SMEs and large undertakings, with the aim of carrying out or promoting industrial research and experimental development. The scheme finances both capital investment and recurrent costs. There is no information available on the uptake of this scheme.
- the Innovation Actions Grant Scheme, part-funded by the ERDF programme. Through this scheme SMEs are eligible for cash grants of up to €125,000 to finance product, service, process or organisational innovation. To date this scheme has provided assistance to 80 SMEs on projects valued at €6.7 million²⁹.

In 2010, Malta Enterprise committed an annual budget of €0.5 million to fund projects approved through the Eurostars initiative targeted at R&D performing SMEs³⁰. Since Malta started participating in Eurostars in 2010, there have been two calls for project submissions, with one local project being selected in each call. Evaluation of the projects in the first call led to an approval of €114,492 in funds for the local company. Also, by the end of the third quarter of 2011, two Maltese companies were awarded funds for project implementation and received the EUREKA technical status. These projects were approved a total of €208,159 in government funds, which potentially served to leverage a further €138,772 from the private sector³¹.

In 2012 the Malta Council for Science and Technology launched a Commercialisation Programme, which offers funding in the form of grants to assist researchers and innovative companies to access specialist advice and services in order to prepare a viable business plan for the commercialisation of technology. The Programme is targeted at Maltese companies, public and private research organisations and non-governmental organisations (NGOs) and has a financial allocation of €200,000. Six applications were received during 2012 out of which three were selected. The awardees had previously been developing their technologies under previous the National R&I Funding Programme administered by MCST. Discussions are underway in order to seamlessly move from the R&I remit to the commercialisation effort.

In 2012 it was reported that the Government will be contributing €1.75 million to a three-year industrial project called Lab4MEMS under the ENIAC Joint Undertaking initiative, a co-ordinated project between Microelectrins of Italy and the Department of Micro and Nano electronics in the University of Malta³². This initiative is important in that it should strengthen the microelectronics industry in Malta, which is one of the most important and well-established manufacturing sectors on the island.

In 2011 work got underway on the development of the Life Sciences Centre, a state-of-the-art industrial park dedicated to the life sciences sector estimated to cost around €38 million. The initiative will include the BioMalta campus, which will be a knowledge cluster between the University of Malta, Mater Dei Hospital and the Life Sciences industry. It is expected that a significant amount of R&D work will be conducted at the Life Sciences Centre in coming

²⁹ Malta Enterprise website, <http://20millionforindustry.com/Default.aspx?tabid=115> accessed January 2013

³⁰ Ministry of Finance, Economy & Investment, Malta Economic Survey published 14th November 2011

³¹ *ibid*

³² Ministry of Finance, Economy & Investment, Budget Speech 2012 published 28th November 2012

years.

During 2012 Malta also was involved in COST, a programme on European Cooperation in Science and Technology, providing excellent networking opportunities at EU level. Malta began to participate in 38 new COST Actions with the new involvement of 56 researchers, bringing a total of 82 new Malta participations in COST Actions since 2010. These covered all the 10 domains, identified by the COST programme. Researchers from Malta have also contributed to COST publications and to the organization of training schools and conferences. In terms of participation, there has been an exponential increase in 2012, when one considers that only two researchers benefitted from these funds in 2008.

2.4 Recent policy documents

The key document guiding the development of research policy in Malta is the National Strategic Plan for R&I 2007-2010. This first document was developed in 2006 and as at March 2013 this is undergoing a process of revision. A draft updated strategy was released for public consultation in December 2011 and it is expected that this will be finalised before the end of 2013.

The National R&I Strategic Plan 2007-2010 identified four priority sectors and put forward a recommendation that a dedicated research strategy should be developed for each of these four areas. The areas of specialisation are the following:

- environment and energy
- ICT
- High value added manufacturing and services
- health and biotechnology.

The first thematic strategy to be developed was the Manufacturing Research Strategy³³, with a draft document published for public consultation in October 2011. This Strategy involved an in-depth analysis of the current landscape and areas of opportunity, identified a number of industry sectors for future specialisation, and proposed a roadmap and plan of action for the short, medium and long term. However, it is not clear whether this Strategy was eventually formally adopted and there is no evidence that any of the recommendations were acted upon.

In 2011 the MCST commissioned the development of a dedicated strategy for health research and innovation with the aim of identifying areas and opportunities for undertaking health research in processes, diagnosis, treatments and delivery of health care services. The objective is to improve the effectiveness and efficiency in these areas, attracting investment and of achieving long-term sustainability. The draft National Strategy for Health Research and Innovation³⁴ was launched for public consultation during a press conference on October 24th 2012. It puts forward ten recommendations which address a number of areas including governance, capacity-building, capitalisation of results and economic benefit. Although it proposes a number of metrics and indicators for measuring progress, it stops short of making firm recommendations for funding figures or setting any specific targets.

³³ National Research Strategy for Manufacturing in Malta, draft, 28 February 2011

³⁴ National Strategy for Health Research & Innovation, not dated.

The national ICT strategy 2008-2010 includes fleeting references to research but does not address the research element in any depth.³⁵ To this end an R&I ICT strategy is currently being drafted in collaboration with the Malta Information Technology Agency. A Digital Gaming Strategy³⁶ was also published in early 2012 with the aim of putting in place the foundations for the development of a gaming industry in Malta. This is not a research strategy *per se* but nevertheless does include some references to research. In addition the Ministry for Resources and Rural affairs (MRRA) in 2012 launched the National Energy Policy for the Maltese Islands. Although this is not a dedicated R&I Energy policy, reference is made to this sector..

2.5 Research and innovation system changes

Many of the changes to the research and innovation system in recent years relate to the availability of funding, with the introduction by Malta Enterprise of a number of schemes in 2009 and 2010. Concurrently, national funding for the R&I programme more than doubled over the last three years. Funding schemes for PhD grants were also introduced utilising both national and EU finance.

ERDF funding was also leveraged to strengthen the research infrastructure at the University of Malta with significant funds allocated to the development of a number of laboratories.

In recognition of the valuable research work undertaken by the Malta Centre for Fisheries Sciences on breeding of various marine species, its research mandate was strengthened and it was renamed the Malta Aquaculture Research Centre (MARC). This is the only public research centre in Malta and its work focuses on the diversification of species to be produced for Mari culture. It work was instrumental to the development of the fish farming industry in Malta.

A second public research organisation is being set up in Gozo by the Ministry for Gozo in collaboration with the University of Malta. The new facility will be known as the Centre for Innovation in Rural Sciences and Environmental Management (CIRSEM).

With regard to governance structures, the biggest change has been strengthening of the Malta Council for Science and Technology complement, with its workforce increasing from 8 employees in 2009 to 30 employees in 2012³⁷. This included the creation of the science popularisation unit with a team of around 11 individuals whose tasks include overseeing the development of the new interactive science centre.

2.6 Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3)

Malta first introduced the concept of thematic prioritisation and specialisation in the national R&I strategy published in 2006³⁸, which identified four thematic sectors where resources dedicated to research were to be focused. The updated national strategy released for consultation

³⁵ TheSmartIsland, The National ICT Strategy for Malta 2008 - 2010

³⁶ A Digital Gaming Strategy for Malta, 1st February 2012

³⁷ MCST Annual Report 2011

³⁸ National Strategic Plan for Research and Innovation 2007 – 2010, August 2006

in December 2011³⁹ reaffirmed both the specialisation approach as well as the prioritised sectoral areas.

Malta is now moving towards the development of a Smart Specialisation Strategy and has recently joined the S3 Platform. A number of meetings have been held with various entities within the public sector, to be followed by meetings with representatives of the private sector and academia. Work is underway with the objective of identifying particular niches with a focus on interdisciplinary through an entrepreneurial process of discovery. It is envisaged that the smart specialisation strategy will be completed in the third quarter of 2013.

The national research strategy of 2006 was followed by two research strategies dedicated to manufacturing⁴⁰ and health⁴¹, which addressed the principle of specialisation at a more detailed level. These thematic strategies carried out an in-depth analysis of their area, identifying areas of local expertise, looking at future developments, assessing the growth potential in local terms, and identifying more specific topics for specialisation.

Because of Malta's small size, the regional element is not relevant and all policy, initiatives and action operate at a national level. What is relevant; however, are the links and coordination mechanisms between the various players in the research arena.

2.7 Evaluations, consultations

The culture of consultation in the development of research policy documents is now firmly engrained in the Maltese psyche. The process which is followed generally includes the establishment of a consultation group composed of stakeholders who provide input during the process of strategy development. Once a draft strategy is documented, this is published for public consultation to enable any interested stakeholders to give their feedback. Whilst the approach is based on consultation, it does not follow the quadruple helix model since civil society is not normally included in the formal consultation group. However, civil society is welcome to provide feedback during the public consultation phase.

Initiatives which have adopted this approach in recent years include the national R&I strategy, the manufacturing research strategy, the health R&I strategy and the digital gaming strategy.

Although there exists no formal evaluation of the impact of research policy initiatives, the draft national R&I strategy document⁴² acknowledges the importance of such an exercise and makes the following recommendations:

- Carry out benchmarking studies comparing Malta's R&I policies and performance with other countries, in particular with small countries.
- Audit, evaluate and undertake impact assessment studies to measure the effectiveness of policies and measures.

³⁹ Malta's National Strategic Plan for Research & Innovation 2011-2020: A Vision for Knowledge-Driven Growth, draft for consultation published 5th December 2011

⁴⁰ National Research Strategy for Manufacturing in Malta, draft, 28 February 2011

⁴¹ National Strategy for Health Research & Innovation, not dated.

⁴² Malta's National Strategic Plan for Research & Innovation 2011-2020: A Vision for Knowledge-Driven Growth, draft for consultation published 5th December 2011 (pp29)

The draft strategy also includes a self-assessment of the achievements in the field of R&I in recent years. The most important of these are highlighted below:

- Boosting human resources in S&T and increasing researcher numbers (MGSS and STEPS schemes) for the funding of Masters and Doctorate studies undertaken both locally and abroad.
- Over €30 million in new or improved research infrastructures at the University of Malta, funded through ERDF.
- Science popularisation campaigns through a €0.58 million ESF project over a 2 year-period. Two science and technology festivals as well as other events targeting science in the community were organised through this project.
- First steps towards specialisation in ICT with the development of a digital games production strategy and related capacity-building actions.
- ERDF project in support of R&D in manufacturing, including the preparation of a dedicated research strategy, the setting up of a platform and funding for three research projects of relevance to the manufacturing sector.
- Incentives package for industry, managed by Malta Enterprise, including R&D Tax Credits, ERDF R&D Grants, support for participation in EUREKA, Grants for Innovative Start-Ups and the ERDF Innovation Action Grant Scheme.
- University Trust Fund for R&D and Innovation set up with a budget of €500,000.
- Work towards establishing bilateral agreements and collaborative initiatives with international scientific organisations including CERN, the European Space Agency and the European Molecular Biology Laboratory, including possible access to research infrastructures.
- Financial support for researchers to participate in brokerage events in the identified priority areas of research.

2.8 Policy developments related to Council Country Specific Recommendations

n/a.

3 STRUCTURAL CHALLENGES FACED BY THE NATIONAL SYSTEM

HUMAN RESOURCES	
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	20 / 0.3
Percentage population aged 25-64 having completed tertiary education	55 / 18.6
Open, excellent and attractive research systems	
International scientific co-publications per million population	88 / 265
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	43 / 4.66
Finance and support	
R&D expenditure in the public sector as % of GDP	33 / 0.25
FIRM ACTIVITIES	
R&D expenditure in the business sector as % of GDP	30 / 0.37
Linkages & entrepreneurship	
Public-private co-publications per million population	3 / 1.2
Intellectual assets	
PCT patents applications per billion GDP (in PPS€)	25 / 0.94
PCT patents applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	30 / 0.19
OUTPUTS	
Economic effects	
Medium and high-tech product exports as % total product exports	148 / 71.35
Knowledge-intensive services exports as % total service exports	70 / 22.65
License and patent revenues from abroad as % of GDP	81 / 0.42

Malta experienced fast growth in research and innovation performance in recent years and when considering its performance in the Innovation Union Scoreboard (IUS) the country has moved up from being a modest innovator to becoming a moderate innovator, with its score increasing from 0.292 in 2007 to 0.383 in 2010, before dropping to 0.34 in 2011. In addition, Malta has been identified as one of the growth leaders within the Moderate innovators group⁴³.

The IUS 2011 identifies relative strengths for Malta as intellectual assets and economic effects, with relative weaknesses in most other areas including human resources, open excellent and

⁴³ Innovation Union Scoreboard 2011, European Union 2012

attractive research systems, finance and support, linkages & entrepreneurship and innovators. Notwithstanding, high growth performance was observed in new doctorate graduates, international scientific co-publications, community trademarks, SMEs introducing innovations and knowledge-intensive services exports. In particular, growth performance in new doctoral graduates is outstanding at 31.6%.

Despite generally low scores on the IUS input metrics, Malta achieves good scores for most of the output indicators and in particular is top of the list for medium and high-tech exports as well as for sales of new to market innovations. This apparent discrepancy arises from the presence of a number of large foreign-owned high-tech companies which have their manufacturing base in Malta, leading to a distorted picture.

The principal system challenges that Malta faces are outlined below:

Capitalising on recent investments and achievements by developing opportunities for researchers in the public sector

The National R&I Strategy 2007 – 2010 in its title summarised its key objective as follows: Building and Sustaining the R&I Enabling Framework. In several respects the ‘building’ component has been achieved, with significant investments in higher education infrastructure and in human resources. Malta’s poor rating on the HR index in the IUS is now countered by the highest growth rate for new doctorate graduates within the EU.

However infrastructure and human resources are useless without a mechanism to capitalise on the investment through the establishment of permanent research teams. With a growing supply of qualified researchers, there is a marked lack of opportunities for them to exercise their profession. Opportunities in the private sector are largely restricted to a few sectoral areas - Engineering and Technology, Natural Science and Medical Sciences. In the public sector, there is only one research organisation which operates in the area of fisheries sciences. In the higher education sector, the University of Malta has very limited funding allocated for research.

Doctoral graduates are often unable to find employment as researchers and are thus prevented from honing their skills. This inhibits the development of a pool of experienced researchers, which in turn serves as a disincentive to FDI industry which might be interested in establishing R&D facilities in Malta. The lack of research opportunities for doctoral graduates also contributes to a brain drain and to the loss of important talent.

The University of Malta has as of March 2013 a small number of research teams in niche areas, and these would be better served by having in place postdoctoral positions with five year Fellowships. This situation has very significant consequences, such as failure to retain expertise as doctoral candidates move on after completing their PhD. Moreover, it is very difficult for the University to participate in the FP7 Ideas Programme, thus losing out on a potential source of additional funding.

In order to maintain and build upon recent achievements, mechanisms must be put in place to enable the establishment of permanent research teams at the University of Malta.

Smart specialisation

In a small country context characterised by limited resources, the strategy for R&I adopted by the government is one of resource concentration and specialisation within four sectors identified in the National Strategic R&I Plan 2007-2010. In addition currently the draft consultation

document which was published in December 2011 is being finalised in order to become Malta's National R&I Strategic Plan 2020, which would also include Malta's Smart Specialisation Strategy. To this end work has been undertaken to re-confirm or otherwise the four sectors identified in the National Strategic R&I Plan 2007-2010 as well as niche areas within them, as well as identify any new areas. During the past years sector-specific research strategies have been developed in the areas of manufacturing, health and digital gaming, to provide clear guidance for policymakers, funding agencies and researchers.

Increasing funding for research and innovation

The level of expenditure by public research organisations and higher educational institutions in Malta is still very low, and increasing the level of funding for research in this area is a major challenge. Over the past five years, the R&I system has benefited from an injection of Structural Funds (ERDF and ESF), and it is crucial that in the future this source of funding is fully exploited to provide financing for various components of the R&I ecosystem.

With reference to central government funding (for the National R&I Programme), recent years have seen a significant increase in budgetary allocation but a shift from annual budgetary cycles to multi-annual funding programmes would aid in the planning of longer term research strategies and programmes. Funding commitments made in public documents such as the NRP need to be honoured.

In order to increase the funding for research, efforts to tap alternative sources of funding from the private sector need to be stepped up. The establishment of the University Trust Fund was a step in the right direction and further efforts are needed to encourage the private sector to contribute to this fund.

Broadening the base of enterprises undertaking R&I activities

R&I activity in industry is largely attributable to a small number of firms including large multinational manufacturing operations in the pharmaceuticals and electronics sectors as well as service-oriented sectors such as consultancy and information programming activities⁴⁴. Of the (mainly indigenous) SMEs that represent the majority of the enterprise sector in Malta, only 35% reported carrying out R&I activities, compared to 72% of large enterprises in 2010. Overall, only 36% of enterprises employing 10 persons or more undertook innovation activity.

Indigenous Maltese industry is traditionally more focused on manufacturing or provision of services, since this is easier to accomplish as well as being less risky and capital intensive than research and innovation. Also, the smaller enterprises often lack the personnel and expertise to develop ideas and undertake R&I projects. In fact, the main reasons cited for not undertaking innovation included the high costs of innovation, lack of funding (both within the enterprise as well as external funding), and the risks associated with developing innovative products and services⁴⁵.

A number of schemes introduced in recent years such as the R&D Grant Scheme, the Innovation Actions Grant Scheme and the Loan of Highly Qualified Personnel Scheme seek to address these barriers and their full impact may not have been captured in the latest available statistics which relate to 2010. Nevertheless, broadening the industry base involved in R&I to include SMEs clearly remains a challenge for Malta.

⁴⁴ NSO News Release 216/2012, Business Innovation, 6 November 2012

⁴⁵ *ibid.*

Closing the loop by bringing research to market

Despite Malta's excellent score with respect to IUS output indicators, there does exist a challenge in capitalising on the investment in research through the development of marketable products and services. Applied research conducted by industry is generally undertaken with this objective in mind, but marketing a new product or service still presents a challenge and demands a different set of skills to the technical skills involved in developing the product. SMEs in particular could well be lacking such skills, or the finance to buy in the required expertise.

In the case of research conducted by academia, results which have the potential for commercialisation may be achieved but there are no documented cases of such activity or of the creation of spinoffs. The Knowledge Transfer Office set up in the University in recent years may help in this respect.

The Commercialisation Programme launched in 2012 seeks to address this lacuna by providing funding focused on activities related to the final stage of the research and innovation cycle.

4 ASSESSMENT OF THE NATIONAL INNOVATION STRATEGY

4.1 National research and innovation priorities

The National Strategic Plan for Research & Innovation 2007-2010 has inspired and guided research and innovation interventions over the four-year period covered by the strategy. This was developed on the basis of seven strategic principles, and identified four thematic priorities where funding and resources for R&I were to be concentrated. The strategy had a strong business orientation, emphasising the importance of collaboration between industry and academia as well as the exploitation of research results for economic benefit.

The draft Strategic Plan which was released for public consultation some time ago shows an evolution of the previous strategy rather than marking any significant change in direction, and reiterates the same vision and guiding principles. It maintains a strong business focus and emphasis on applied research and innovation.

The draft strategy was prepared following an extensive review and analysis of the research and innovation landscape, stock-taking of achievements and impacts of R&I interventions of recent years, as well as the identification of persistent challenges that need to be addressed by the new strategy. However, it lacks the rigour of an in-depth evaluation or impact assessment of recent policy actions, and in fact makes a number of recommendations for such future exercises in this regard. In addition, the strategy is being directed to be Malta's R&I Smart Specialisation Strategy and thus be based on a process of 'entrepreneurial discovery' based on close collaboration with the business sector in addition to academia and social partners.

The draft strategy makes 74 recommendations based on the following six pillars aimed at sustaining the concept of an R&I ecosystem:

- Policy design to action
- Building Human Capital
- Research Infrastructures
- Local to International
- Ideas to Innovation
- Funding.

The strategy first addresses the topic of policy and governance, putting forward a number of valid recommendations including the need for conducting an impact assessment of existing policy measures. It advocates the development and implementation of specific strategies for the four thematic priority areas identified in the previous National strategic plan, two of which have been drafted and will be launched in 2013. The document would have benefitted from a more extensive discussion on this important topic, including outlining plans for the formal adoption of existing draft strategies and the establishment of timeframes for the preparation of the remaining strategies.

The strategy aims to build on existing efforts to sustain human resource development and capacity-building in research infrastructures in the priority areas. Various interventions aimed at developing human capacity have targeted different levels of the education chain ranging from the

creative thinking programmes in primary and secondary schools to scholarship schemes (MGSS, STEPS) supporting post-graduate studies in Malta and abroad. A science outreach programme has been initiated, and plans to set up a new science interactive centre are also underway.

A new initiative relates to the introduction of actions aimed at promoting international cooperation, with an entire chapter dedicated to this topic. Another chapter is dedicated to innovation, and aims to address and support innovation whether this is based on research or otherwise, by identifying key issues and opportunities and recommending appropriate actions.

One weakness of the draft national strategy is that it takes a rather broad approach, proposing 74 recommendations and identifying a number of them which should be completed in the short term. However, the recommendations are open-ended and are not bound by specific timeframes. The earlier strategy included a number of timeframes, and where these were not present the 4-year timeframe and implicit understanding that actions would be taken within the lifetime of the strategy presented an implied target date. The new strategy which should serve as a roadmap up to 2020 would surely benefit from the introduction of some target dates.

4.2 Evolution and analysis of the policy mix

Over the past three years, the policy mix in Malta has undergone a tremendous change from only three measures which were in place in 2009 to a comprehensive suite of policy measures currently in force as detailed earlier in this report. The measures in existence in 2009 are as follows:

- The National R&I Funding Programme (launched in 2004)
- The MGSS fellowship scheme which included funding for pursuing a PhD
- The R&D tax credit scheme for industry.

These measures were all financed through national funds, whereas most measures introduced in the last three years relied heavily on EU structural funds. While this approach yields a substantial increase in available funding, it creates a weakness in the funding system due to the possible disruption of funding during the changeover from one programming period to the next.

Malta Enterprise is eligible to make use of structural funds to develop funding schemes, and has made good use of this opportunity through the '20 million for industry' initiative which includes various funding schemes promoting research and innovation. The Malta Council for Science and Technology, on the other hand, is not eligible and therefore relies on national government funding for the National R&I Programme which funds both academia and industry. This has created an imbalance in the use of structural funds, with constraints in utilisation of such funding to promote research in academia.

The centralised governance of the R&I system, the absence of a regional element and the clear boundaries in responsibility between the main actors (the MCST and Malta Enterprise) simplifies the governance perspective and virtually eliminates the possibility of duplication. It also makes it easier to identify policy gaps and to avoid unintended interaction between policies.

The centralised approach also makes it possible to achieve joined up policy approaches and coordination for R&I amongst the broader public sector, and in 2006 an Intra-governmental Committee on Research and Innovation was set up with this aim in mind⁴⁶. It is not clear

⁴⁶ The Policy Mix Project, Country Review Malta, Jennifer Harper, January 2007

whether this committee is still active or what alternative coordination mechanism may now be in place. However, in the past three years we have seen the involvement of broad stakeholder consultation approaches in the drafting of the national as well as sectoral research strategies.

One possible negative interaction between funding schemes targeted towards industry is that several of these operate under the *de minimis* state aid regime. This places a limit of €200,000 in aid that a beneficiary may receive over a 3-year period, and may result in constraints when an enterprise attempts to make use of more than one scheme. Such interaction may arise either within the R&I domain or between R&I schemes and other non-R&I schemes (such as, for example, funding schemes for energy efficiency or marketing measures).

The government initiative to develop a Life Sciences Park endeavours to promote industrial restructuring in favour of high value added activity. Although primarily this is aimed at attracting foreign companies, it will hopefully lead to collaborative R&D efforts amongst university, industry and hospital staff, and encourage the formation of spin-outs⁴⁷.

The national R&I strategy has a strong business focus aimed at promoting applied R&I activity over basic research, which is a trend observed in small country contexts with limited resources⁴⁸. The strategy has focused on innovation as an R&D driven process and also given some attention to other related activities such as business advisory support services. In line with developments at EU level, the new draft R&I strategy is adopting a broader concept of innovation and therefore an ‘ideas-to-market’ approach that looks at the whole of the innovation cycle⁴⁹. For this purpose a new commercialisation programme was launched in 2012 in order to assist commercialisation of research ideas.

Aid schemes for enterprises are increasingly being tailored towards Malta’s particular contextual requirements; hence there is more support for particular target groups (e.g. SMEs, start-ups), areas of focus (e.g. internationalisation of markets), and actions (e.g. clustering, technical feasibility projects). Academia-industry research collaboration occurs mainly through competitive funding offered by the National R&I Programme and through an ERDF grant scheme for industrial research and experimental development. However this is expected to gain more momentum with the development of an intellectual property framework by the corporate research and technology office at the University of Malta. Also the knowledge transfer office set up at the University in 2009 is facilitating implementation of contracted research projects undertaken between university and industry supporting commercialisation of innovative ideas. As described earlier, Malta’s participation in the EU’s Eureka and Eurostars programmes is offering more opportunities for collaborative research projects.

In 2011 Malta launched the ‘Business First’⁵⁰ initiative, a single point of contact for businesses to obtain information and support when setting up a business in Malta (NRP 2008-2010 measure) and reduce the bureaucracy and red tape for business accessing the various aid schemes.

The R&I system has experienced an evolution in the policy mix in terms of types of instruments moving from a system dominated by supply-side policies to the inclusion of demand side policies. For example, the government is driving the introduction of innovation through public

⁴⁷ Malta’s National R&I Strategy 2011-2020 Draft Consultation Document published 5th December 2011

⁴⁸ FP7 OMC-NET ERA-PRISM (2011) Funding Frameworks, Comparative Analysis and Identification of Best Practice, Deliverable D5.4 published 2011.

⁴⁹ Malta’s National Reform Programme 2011-2020

⁵⁰ Times of Malta (2011) ‘One Business Office, 50 different Services, published 12th November 2011

procurement for ICT-related investments and has institutionalised a green public procurement policy in the public sector⁵¹.

There is some evidence that the knowledge triangle policies (education, research and innovation) are becoming more embedded in strategic policy thinking with some emphasis on education and human resources. The education system is responding to up-coming market demands and the emergence of new economic sectors by investing in particular skills. The national curriculum framework 2011 consultation document makes reference to the need to equip learners with the necessary entrepreneurial skills and encourage innovation in schools in order to enable youth to anticipate and cope with a changing environment⁵².

A perceived weakness in the system is the lack of a systematic evaluation of policy measures and interventions which is only partially being addressed through the review and monitoring of Structural Funds projects by the national managing authority and the targets set for R&I in Operational Programme I and those established in the National Reform Programme.

Societal challenges are being addressed through the drafting and development of thematic research strategies for example in the health sector; the new draft R&I strategy addresses thematic societal issues such as climate change more strongly in line with the EU Grand Challenges approach.

4.3 Assessment of the Policy Mix

In recent years the R&I system has witnessed significant progress through the implementation of a suite of initiatives addressing different facets of the system and tapping different sources of funding. Human resources, infrastructure, research funding and innovation have all been targeted through dedicated measures which were well designed, efficiently implemented and welcomed by the research community. However, the absence of a formal and rigorous evaluation of these initiatives and measures makes an assessment of their impact is somewhat subjective. Nevertheless, an assessment of the policy mix in the context of the five structural challenges identified earlier is given below.

With respect to human resources, two schemes utilising both national and EU structural funds were introduced to boost the numbers of doctoral candidates, addressing a fundamental weakness in local capacity and achieving excellent results. Nevertheless, there remains a missing link with respect to human resources insofar as the development of funding for postdoctoral research at the University of Malta has not been addressed.⁵³ Besides the existing fellowship schemes, what is required is funding for the establishment of multi-annual research teams in the spirit of the FP7 Ideas programme, rather than funding for individual researchers.

With regard to development of sectoral research strategies, some progress has been registered with the development of draft strategies for manufacturing and health, whilst work in other areas has yet to get underway. Such sectoral strategies provide clear guidance for policymakers, funding agencies and researchers.

⁵¹ TrendChart (2011) Mini Country Report Malta

⁵² Ministry of Education, Employment & Family (2011) National Curriculum Framework 2011 Consultation Document III

⁵³ 2020 Vision or Optical Illusion?, Prof. Juanito Camilleri Rector University of Malta, 17 September 2010

Availability of public funding for R&I was and continues to be a bottleneck since the absorptive capacity of industry and academia greatly exceeds the available funding. Evidence of this is the continued oversubscription of the National R&I Funding Programme administered by the MCST, despite the fact that the financial allocation in 2012 was more than double that of 2010. With recent improvements in the number of doctoral graduates and research infrastructure, this problem can only get worse. Recent policy efforts to make use of different funding sources have been on the right track, successfully leveraging both government funds and EU structural funds. The establishment of the University Trust Fund was another step in the right direction and further efforts are needed to encourage the private sector to contribute to this fund.

A number of schemes introduced in recent years such as the R&D Grant Scheme, the Innovation Actions Grant Scheme and the Loan of Highly Qualified Personnel Scheme seek to encourage R&I across industry including in the under-represented SME sector. The first two schemes were eagerly taken up by private enterprise, including a good number of SMEs, while information on the third is not available. The National R&I Programme is also designed to encourage industry participation by funding projects involving both academic and industrial partners.

Policy efforts aimed at commercialisation of research results have been limited, and it was only in 2012 that a Commercialisation Programme was established focusing on this challenge. The scheme appears to be well-designed for this purpose, but due to the very recent launch of the programme any opinion on its effectiveness would be purely speculative.

Challenges	Policy measures/actions	Assessment in terms of appropriateness, efficiency and effectiveness
<p>Capitalising on recent investments and achievements by developing opportunities for researchers in the public sector</p>	<ul style="list-style-type: none"> • There are currently no specific measures aimed at developing opportunities for postdoctoral researchers in public research organisations or higher educational institutions; • The national R&I strategy 2007 - 2010 included a recommendation for setting up a postdoctoral fellowship scheme but to date this has not been implemented. This recommendation is reiterated in the draft national R&I strategy 2011 – 2020. 	<p>The requirement to develop a pool of researchers has been addressed to some degree through the MGSS and STEPS scholarship schemes. However, employment opportunities for researchers are limited and to date there are no initiatives aimed specifically at addressing this issue.</p> <p>The proposed postdoctoral scheme referred to in the National Reform Programme 2012 should help but needs to be carefully designed and adequately funded.</p> <p>Another possible measure would be allocation of additional Government funding to the University of Malta to enable the establishment of proper research teams.</p>
<p>Smart specialisation of R&I</p>	<ul style="list-style-type: none"> • Both the current and the draft new national R&I strategies recommend the development of dedicated research strategies in the identified priority areas. 	<p>Draft sectoral research strategies for manufacturing and for health have been published for public consultation and should be launched some time in 2013. There has been limited progress on the preparation of strategies in the other priority areas.</p> <p>A draft Digital Gaming Strategy has been published but this addresses a niche ICT</p>

Challenges	Policy measures/actions	Assessment in terms of appropriateness, efficiency and effectiveness
		area and a broad ICT research strategy is currently underway. The National Energy policy for the Maltese Island issued in 2012 also makes reference to R&I.
Increasing funding for research and innovation	<ul style="list-style-type: none"> • Various initiatives co-financed by ERDF funds for new research infrastructures in higher educational institutions; • Various schemes co-financed by ERDF funds to finance R&I in industry; • In recent years the central government contribution to the National R&I Funding Programme has increased drastically, and further significant increases are projected in the NRP document; • Establishment of the University Trust Fund (2010). 	<p>There have been major achievements in the use of ERDF funds for developing research laboratories in higher educational institutions and in developing R&I grant schemes for industry. Similarly ESF funds have been used to develop schemes for doctoral candidates.</p> <p>Central government funding for the crucial National R&I Funding Programme has more than doubled in recent years and is projected to continue growing.</p> <p>The establishment of the university RIDT trust fund is a positive initiative aimed at tapping private sector financing for research..</p>
Broadening the base of enterprises undertaking R&I activities	<ul style="list-style-type: none"> • A variety of incentives to stimulate R&I in industry including the R&D Grant Scheme, R&D Tax Credit, Innovative Actions Grant Scheme, and support for participation in Eureka and EUROSTARS; • In particular the Loan of Highly Qualified Experts Scheme supports SMEs with a cash grant to temporarily buy in highly qualified personnel to work on Industrial Research or Experimental Development projects. 	<p>There exist a variety of schemes aimed at encouraging and assisting industry to undertake R&I work. However, although data is available relating to some of the schemes, there is no accompanying evaluation or impact assessment and it is not possible to assess their effectiveness.</p>
Closing the loop by bringing research to market	<ul style="list-style-type: none"> • Setting up of the technology transfer office at the university of Malta in 2009; • The Commercialisation Programme launched by MCST in 2012. 	<p>The Commercialisation Programme launched by MCST in 2012 is seen as a very useful measure but it is still too early to assess its effectiveness.</p>

5 NATIONAL POLICY AND THE EUROPEAN PERSPECTIVE

As an overall assessment, the national R&I system is in tune with many of the principles underpinning the ERA vision, although policies and measures specifically addressing broader integration into the ERA are somewhat lacking. The presumed rationale is that Malta's research ecosystem is still in its infancy, and in view of current limitations it may be premature to aspire to fuller participation in the ERA. The policy imperative for the immediate future is building and strengthening internal capacity, hopefully leading to improvements which would enable shifting focus to fuller integration in the ERA in the near future. An analysis of local policy in the context of the five ERA objectives is undertaken below.

More effective national research systems

The national research system favours and complies with the approach promoted in the ERA vision document. Public funding (including the National R&I Programme, Commercialisation Programme, various funding schemes operated by Malta Enterprise, and the MGSS and STEPS scholarships) is allocated on a competitive basis through open calls. However, impact assessments and peer reviews of the funding systems have not as yet been undertaken.

The University of Malta is also the recipient of central government funds for research purposes. Once again these funds are allocated through a system of internal assessment of departmental requests for finance.

With reference to institutional funding for public research organisations, as at March 2013 there exists only one such organisation in Malta (the Malta Aquaculture Research Centre) although one or two other government departments may be involved in some research activity. Allocation of funding on the basis of performance is therefore not a practical proposition.

Optimal transnational cooperation and competition

The National R&I Funding Programme allows the participation of foreign partners but does not provide funding for such partners. Neither does it provide funding for local institutions participating in projects coordinated by overseas institutions. Such funding is, however, available for participation by local enterprises in the Eureka and Eurostars initiatives through the Cross-border Collaborative Grant Scheme.

The draft national R&I strategy document identifies transnational cooperation as one of the six pillars underpinning the strategy and addresses the topic in some detail. Nevertheless, it is not closely aligned with the ERA approach and there is no mention of joint research agendas, allocation of funding for joint research or mutual recognition of evaluations.

Cooperation and coordination of research programmes with other member states may be a desirable objective, but would place a strain on the limited financial and human resources arising from the small size of the country. Whilst it should be possible to leverage EU structural funds for the purpose of transnational cooperation, there have not been any such initiatives to date.

Open labour market for researchers

The process for recruitment of researchers both at the University of Malta and in the public sector is open, transparent and based on merit. University positions are publicised on the Euraxess portal through a link to the University website, although individual positions are not uploaded onto the portal and are thus not captured by the Euraxess search functionality.

There are no Maltese organisations which have formally endorsed the Charter and Code, although most of the principles enshrined in these documents are in fact observed. The draft national R&I strategy recommends that public employers should be encouraged to formally endorse the Charter and Code, but stops short of detailing how such encouragement should be achieved.

Portability of national grants is observed to some extent in the local PhD fellowship schemes, where beneficiaries are free to pursue their studies at their University of choice. Other grant schemes primarily target organisations rather than individuals, and portability is not an option in this case.

The principles of innovative doctoral training have not yet been incorporated into the University's approach.

Gender equality and gender mainstreaming in research

The issue of gender equality is not specifically addressed in the new draft national R&I strategy. However, at a national level the gender equality action plan⁵⁴ proposes a number of measures with the aim of achieving a more equitable gender situation, and includes a number of economic measures aimed at encouraging females to either retain their current employment or to return to work following a break to take care of their family.

Recent legislative and other incentives aimed at encouraging women to continue working include an extension of maternity leave allowance (planned to increase to 18 weeks in 2013), public childcare centres, tax credits for those using private childcare centres, and tax credits for women returning to work after an absence of five years or more. The public service employment conditions promote teleworking opportunities and accreditation of social security contributions of the parents for the first two years of parental leave⁵⁵.

Gender figures for 2009 published by the European Commission⁵⁶ indicate that female researchers in Malta are in the minority, accounting for less than 30% of the researcher population in the Higher Education Sector and less than 50% in the government sector. Furthermore, 35% of women employed in R&D are performing supporting tasks. However, the situation is improving and Malta experienced a compound annual growth rate of female researchers of 14% between 2002 and 2006, the highest of any EU country, and has a gender pay gap which is amongst the lowest in the EU-27 (14%).

⁵⁴ Gender Equality Action Plan 2009/2010, Employment and Training Corporation

⁵⁵ Malta Employment Training Corporation (2007) 'Women at work: Findings from a study on the work aspirations of Maltese Women p39

⁵⁶ European Commission (2009) She Figures 2009

Optimal circulation, access to and transfer of scientific knowledge

Despite support in principle on the subject of open access to scientific results arising from public funding, the reality on the ground is rather different, hampered by the absence of any local repositories. The draft national strategy touches upon the subject and recommends that local academic institutions should adopt a policy in favour of open access and set up their own open access repository. The National R&I Programme also promotes the open access concept by requiring that research results are published in open access mode, although it is not clear to what extent this requirement is enforced.

Interaction between industry and academia is strongly promoted through the National R&I Programme, since the programme requires consortia to include partners from both camps. The University of Malta also strongly favours interaction with industry, and the Knowledge Transfer Office set up in recent years was established with this in mind. The University Trust Fund also works towards this objective and has resulted in a number of collaborative activities between the University and local industry.

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7 LIST OF ABBREVIATIONS

BBMRI	Biobanking and Biomolecular Resources Research Infrastructure
BERD	Business Expenditures for Research and Development
CERN	European Organisation for Nuclear Research
CLARIN	Common Language Resources and Technology Infrastructure
CORTO	Corporate Research & Knowledge Transfer Office
COST	European Cooperation in Science and Technology
EIS	European Innovation Scoreboard
EMBL	European Molecular Biology Laboratory
ERA	European Research Area
ERA-NET	European Research Area Network
ERA-PRISM	Policies for Research and Innovation in Small Member States
ERP Fund	European Recovery Programme Fund
ESA	European Space Agency
ESF	European Social Fund
ESFRI	European Strategy Forum on Research Infrastructures
EPO	European Patent Office
ERDF	European Regional Development Fund
EU	European Union
EU-27	European Union including 27 Member States
EU2020	European Union 2020 Strategy
FDI	Foreign Direct Investments
FP	European Framework Programme for Research and Technology Development
FP7	7th Framework Programme
FTE	Full Time Equivalent
GBAORD	Government Budget Appropriations or Outlays on R&D
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
GOVERD	Government Intramural Expenditure on R&D
HEI	Higher education institutions
HERD	Higher Education Expenditure on R&D
HES	Higher education sector
HRST	Human Resources in Science & Technology
ICT	Information Communication Technology
IP	Intellectual Property
MCAST	Malta College of Arts, Science & Technology
MCST	Malta Council for Science & Technology
ME	Malta Enterprise
MGSS	Malta Government Scholarship Scheme
MNC	Multi-national Company
MQRIC	Malta Qualifications Recognition Information Centre

NCHE	National Commission for Higher Education
NRP	National Reform Programme
NSO	National Statistics Office
OECD	Organisation for Economic Co-operation and Development
OMC-NET	Open Method of Coordination Network
OP	Operational Programme
OPM	Office of Prime Minister
PP	Public Procurement
PPCD	Planning & Priorities Coordination Department
PPS	Purchasing Power Standard
PRO	Public Research Organisations
R&D	Research and development
R&I	Research and Innovation
RTDI	Research Technological Development and Innovation
SME	Small and Medium Sized Enterprise
STEM	Science, Technology, Engineering and Mathematics
STEPS	Strategic Educational Pathways Scholarships
SWOT	Strengths Weaknesses Opportunities & Threats
S&T	Science and technology
VC	Venture Capital

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Abstract

This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). The main objective of the ERAWATCH Annual Country Reports is to characterise and assess the performance of national research systems and related policies in a structured manner that is comparable across countries.

The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context. They further analyse and assess the ability of the policy mix in place to consistently and efficiently tackle these challenges. These reports were originally produced in December 2012, focusing on policy developments over the previous twelve months.

The reports were produced by independent experts under direct contract with IPTS. 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) and Directorate General for Research and Innovation with contributions from external experts.

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.

