



Specific Support to Malta

Monitoring the Maltese National Research and Innovation Strategy

Horizon 2020 Policy Support Facility



Research and
Innovation

EUROPEAN COMMISSION

Directorate-General for Research and Innovation
Directorate A — Policy development and coordination
Unit A.4 — Analysis and monitoring of national research programmes

Contact (H2020 PSF specific support to Malta):

Diana Ivanova-Van Beers (Diana.Ivanova-Van-Beers@ec.europa.eu)
Román Arjona (Roman.Arjona-Gracia@ec.europa.eu)

Contact (H2020 PSF):

Román Arjona (Roman.Arjona-Gracia@ec.europa.eu)
Stéphane Vankalck (Stéphane.Vankalck@ec.europa.eu)
Diana Senczyszyn (Diana.Senczyszyn@ec.euopra.eu)

RTD-PUBLICATIONS@ec.europa.eu

*European Commission
B-1049 Brussels*

Specific Support to Malta

Monitoring the Maltese National Research and Innovation Strategy

Horizon 2020 Policy Support Facility

Claire Nauwelaers

Independent expert, Belgium

and

Clara Eugenia García

*Expert on national policy development and monitoring
Ministry of Economy and Competitiveness, Spain
(acting on a personal capacity)*

***EUROPE DIRECT is a service to help you find answers
to your questions about the European Union***

Freephone number (*):
00 800 6 7 8 9 10 11

(*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you)

LEGAL NOTICE

This document has been prepared for the European Commission however it reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

More information on the European Union is available on the internet (<http://europa.eu>).

Luxembourg: Publications Office of the European Union, 2016.

PDF

ISBN 978-92-79-59354-3

doi:10.2777/168476

KI-AX-16-003-EN-N

© European Union, 2016.

Reproduction is authorised provided the source is acknowledged.

Cover images: © Lonely, # 46246900, 2011. © ag visuell #16440826, 2011. © Sean Gladwell #6018533, 2011. © LwRedStorm, #3348265. 2011. © kras99, #43746830, 2012. Source: Fotolia.com

Table of contents

LIST OF ACRONYMS.....	4
THE PSF PANEL	5
AIM, FOCUS AND METHODOLOGY.....	5
EXECUTIVE SUMMARY.....	6
INTRODUCTION	8
CHAPTER 1: SCOPE OF THE SYSTEM PROPOSED BY THE PSF EXPERTS TO MONITOR THE MALTESE NATIONAL RESEARCH AND INNOVATION STRATEGY	10
1.1. The target of the monitoring system	10
1.2. The analytical components of the monitoring system.....	10
CHAPTER 2: GOAL AND KEY PRINCIPLES GUIDING THE PROPOSED MONITORING SYSTEM ..	12
2.1. Goal of the proposed monitoring system	12
2.2. Key principles of the proposed monitoring system	12
CHAPTER 3: GOVERNANCE AND PRACTICAL STEPS FOR THE SETTING UP OF THE PROPOSED MONITORING SYSTEM	14
3.1. Governance of the monitoring system.....	14
3.2. Practical steps for setting up the proposed monitoring system	16
CHAPTER 4: KEY INDICATORS FOR THE PROPOSED MONITORING SYSTEM	18
4.1. Criteria for the definition of indicators for the monitoring system.....	18
4.2. Proposal for key indicators for the monitoring system	19
CONCLUSION AND RECOMMENDATIONS	22
ANNEX 1: STAKEHOLDERS MEETINGS	35
ANNEX 2: REFERENCES.....	37
ANNEX 3: CORRESPONDENCE BETWEEN ACTION LINES AND SPECIFIC MEASURES IN THE ACTION PLAN	39
ANNEX 4. CONTRIBUTION OF SPECIFIC MEASURES TO ACTION LINES	44

List of acronyms

CCMID: Competence Centre for Manufacturing and Integrated Design

CCPT: Competence Centre for Pharmaceutical Technology

CVP: Commercial Voucher Programme

EEN: European Enterprise Network

ESFRI: European Strategy Forum on Research Infrastructures

FDI: Foreign Direct Investment

FP: Framework Programme

FTE: Full-Time Equivalent

GDP: Gross Domestic Product

ICE-BTC: Innovation Centre for Blood, Tissue and Cell Banking

MARC: Malta Aquaculture Research Centre

MCAST: Malta College of Arts, Science and Technology

MCST: Malta Council for Science and Technology

NAC: National Aerospace Center

NIS: National Innovation System

NISC: National Interactive Science Centre

NSO: National Statistical Office

PPCD: Planning and Priorities Coordination Division (Ministry of European Affairs)

PRO: Public Research Organisation

PSF: Policy Support Facility

R&D: Research and Development

R&I: Research and Innovation

SLC: Sustainable Living Complex

SME: Small or Medium Enterprise

S3: Smart Specialisation Strategy

TDP: Technology Development Programme

TRL: Technology Readiness Level

UoM: University of Malta

VDC: Valetta Design Cluster

The PSF panel

The PSF specific support was carried out by two experts, appointed by the Commission:

- **Claire Nauwelaers (Belgium):** independent expert in R&I policy development and analyses, acting as *coordinator*.
- **Clara Eugenia Garcia (Spain):** expert on national policy development and monitoring, Ministry of Economy and Competitiveness, acting on a personal capacity.

Aim, focus and methodology

To support countries in reforming their research and innovation systems, DG Research & Innovation set up a 'Policy Support Facility' (PSF) under Horizon 2020, aimed at "*improving the design, implementation and evaluation of R&I policies*". The PSF provides best practice, leading expertise and guidance to Member States and Associated Countries on a voluntary basis, through a broad range of services to address their specific needs.

One of the services provided by the Horizon 2020 PSF is "specific support" to countries, providing concrete operational recommendations on how to tackle specific R&I policy issues or reforms.

Aim and focus

The Maltese authorities expressed their interest in receiving such specific support to provide them with external assistance in developing a monitoring system for the Action Plan implementing the Maltese National Research and Innovation Strategy, of which the Smart Specialization Strategy (S3) is an important part.

The Malta National Research and Innovation Action Plan 2015-2020 includes 26 Action lines and 52 specific measures which correspond to the implementation of the Maltese National Research and Innovation Strategy and its goals. Both Action lines and specific measures cover the full *policy mix* which requires adequate monitoring.

This report presents the architecture, principles, governance arrangements, operational steps and indicators for such a monitoring system.

Methodology

The experts undertook a first field visit in Malta from 26 to 27 January 2016. Preliminary findings were then presented and discussed during a second field visit to Malta on 17 and 18 March 2016 (list of stakeholders in [Annex 1](#)).

The report is based on a comprehensive analysis of the set of policy documents available and the institutional organization in which R&I information is produced in Malta, presented in [Annex 2](#).

It is the result of independent experts' knowledge; in-depth discussions with specialists involved in the design and implementation of R&I policy making and monitoring in Malta, and with a wide range of national stakeholders. Main recommendations rest upon valuable comments and inputs received during the two field visits.

The experts thank all the stakeholders in Malta, and especially those responsible of this project at the Malta Council of Science and Technology, for their leadership and constructive participation in this PSF specific support exercise.

EXECUTIVE SUMMARY

The **monitoring system proposed in this report** is a relevant component of the policy cycle. It will contribute to determining the need for further action and improvements in Maltese R&I policy-making and to the implementation and fine-tuning of policy actions. Clearly, the definition, development and use of such a monitoring system is a complex task by nature.

This report concentrates on the **four focus areas** that underpin the proposed monitoring system:

1. The system's main **goals** to be agreed upon by key actors of the national R&I system;
2. The key **principles** for its efficient design and functioning.
3. The **governance** of the monitoring system and the institutional framework in which it will provide policy guidance and reinforce horizontal and vertical coordination.
4. The definition and consistent collection of key input, output and result **indicators** to trigger the continuous review and reporting cycle.

First, in order to improve the quality of research and innovation policies in Malta the **main goals** of the proposed monitoring system are:

- Creating **shared expectations** and understanding, based on stakeholders' engagement;
- Contributing to the **accountability** of public actions;
- **Tracking progress** and obtaining early warning on the implementation of actions in view of adjusting policies over time;
- Gathering the **evidence** about the evolution of Maltese R&I policy;
- Providing a springboard for the **evaluation** of the Maltese National Research and Innovation Strategy and the Action Plan which rolls it out.

Second, to ensure the efficient functioning of the proposed system a number of **general principles** have been identified:

- **Robustness and reliability**: evidence and information for decision-making has to be reliable and lead to real improvements;
- **Measurability** ;
- **Feasibility** and **cost-effectiveness** ;
- **Sense-making** and **stakeholders' participation**;
- **Stability over time**, combined with flexibility to adjust to changing circumstances.

Third, the proposed monitoring system requires an effective **governance structure** that provides policy guidance, and reinforced horizontal and vertical coordination. This includes:

- The identification of the **main policy users** of the monitoring system, namely the "Core Group" and the "Steering Group" tasked by the Maltese authorities with the implementation of the Maltese National R&I Strategy. The former meets at Permanent Secretary level and is responsible for deciding on priorities for action as well as timeframes, resources and budgets on the basis of recommendations made by the Steering Group. The latter meets at the level of Heads of Public Entities and Organisations or their high-level delegates. These instances ensure the political endorsement of the system. Close partnership with Managing Authorities of EU Structural Funds is required.
- The allocation of **clear responsibilities** for building and implementing the system to the Malta Council for Science and Technology (MCST). MCST is expected to provide methodologies, support and coordination with the units responsible of producing the data and information; it shall also aggregate data and provide overall analysis and evidence-based conclusions.
- The establishment of a **technical body/unit to provide the tools for the roll out of the monitoring system**, including the development of an IT-based platform that is integrated -or at least is in close coordination- with MCST.

- The **involvement of key stakeholders** via stable, robust and regular communication channels as well as institutionalised information exchanges under the auspices of MCST.

Finally, the **indicators** proposed for the Malta monitoring system were identified by experts after discussion with a number of Maltese stakeholders during the two country visits. The discussions intended to ensure that these indicators were relevant, coherent with clear intended effects for each Action line and specific measure (see Figure 1 below), and available without adding excessive burden or generating duplication with ongoing or planned activities. Three types of indicators are included in the proposed monitoring system:

- **Input indicators** (collected for each measure) to understand how resources for R&I are allocated to the various components of Malta's policy mix.
- **Output indicators** (collected for each measure) to depict the direct effects of R&I investments and to highlight how policy implementation proceeds.
- **Result indicators** (collected both at the level of each Action line and for each measure) to assess whether the pursued goals evolve in the right direction.

Specific indicators are provided in Table 2 (result indicators for each Pillar and Action line) and Table 3 (input, output and result indicators for a sample of 8 measures included in the Malta Research and Innovation Action Plan). They also include the identification of the data source and frequency of data collection.

* * *

On the basis of the above considerations, the PSF panel put forward **five recommendations** to establish an effective monitoring system for the Maltese National R&I Strategy:

Recommendation 1: Securing the commitment from all stakeholders and organisations in charge of the measures in the Action Plan, and their direct engagement and contribution to the monitoring system. This implies mutual alignment between monitoring practices existing at many national organisations and the needs of the overall monitoring system. This will contribute to the validation and completion of indicators proposed in this report.

Recommendation 2: Refining the correspondence between the Action lines and the specific measures underpinning the Maltese National Research and Innovation Strategy and the Action Plan, as the work carried out by experts to identify the correspondence between specific measures definition, policy goals and output and result indicators revealed a number of inconsistencies.

Recommendation 3: Providing MCST, as the organization in charge of the development and implementation of the monitoring system, with adequate resources and skills to carry out this important task for the success of Malta's R&I policy goals.

Recommendation 4: Reinforcing collaboration on monitoring that took place during the Horizon 2020 PSF work in particular between MCST, the National Statistical Office, the Malta Chamber of Commerce and the Managing Authorities of Structural Funds – all key stakeholders and data providers- for the monitoring system.

Recommendation 5: Preparing for evaluation. The monitoring system will provide the evidence base for evaluating the effectiveness of the Maltese National Research and Innovation Strategy and to improve the quality and adaptation of R&I policies.

INTRODUCTION

In June 2014, the Maltese authorities adopted the Maltese National Research and Innovation Strategy, of which the Smart Specialization Strategy (S3) is an important component.

The Malta National Research and Innovation Action Plan 2015-2020 rolls out the Maltese National Research and Innovation Strategy into a large set of concrete measures, structured according to the strategy's objectives and Action Lines. The Plan thus provides the "policy mix" that serves the Maltese National Research and Innovation Strategy's goals.

Both the Maltese National Research and Innovation Strategy and the Malta National Research and Innovation Action Plan 2015-2020 are seen by the national authorities as evolving policy documents, which will be reviewed and updated regularly in order to match the evolving reality of the Maltese research and innovation performance.

This review work will require a solid, consistent and focused information system that captures:

1. The evolution of the national research and innovation system.
2. The progress with regards to the implementation of the national strategy.

Goal number 1 has been translated by the Maltese National Research and Innovation Strategy into a set of indicators and targets, which are guiding it and which are expected to be further developed over time (Table 1). Goal number 2 is however at this stage not yet translated into an operational monitoring system to assess progress and the contribution of each of the measures to strategic goals in the Maltese National Research and Innovation Strategy.

Table 1. Context indicators and targets - key features of the Malta National R&I Strategy

Context Indicator – Maltese National R&I Strategy	Figures in Strategy	Latest available data	Current 2020 Target
Gross R&D expenditure as a % of GDP (R&D intensity)	0.72% (2011)	0.85%p (2014)	2.0%
Number of PhD holders as % of active population	0.47% (2012)	0.43% (2013)	0.60%
Number of researchers (expressed in FTE)	755 (2011)	891p (2014)	900
Innovation expenditure as a % of GDP	1.46% (2010)	2.17% (2012)	2.5%
Employment in knowledge-intensive activities as % of total	40.8% (2011)	42.3% (2013)	55%
Enterprises with innovation activity as % of total	36.0% (2010)	47.8% (2012)	50%
Enterprises with innovation activity in Core NACE Codes as % of total	41.5% (2010)	51.1% (2012)	60%

Source: MCST

The Maltese authorities expressed to the European Commission their interest in receiving independent expert assistance to develop key indicators to monitor the implementation of the Action Plan that rolls out the National R&I Strategy. A Specific Support exercise under the European Commission's Horizon 2020 Policy Support Facility (PSF) was set up for that purpose.

The present report represents the contribution of the two experts entrusted by the Commission, under the Horizon 2020 Policy Support Facility, to support the Maltese national authorities in developing such monitoring system, including a set of key indicators.

The detailed discussion, adoption and endorsement of the features and governance of the system as well as the engagement of stakeholders are, in view of the PSF experts, as relevant as the content of this report in terms of specific indicators.

The report is based on the extensive analysis of the Maltese National Research and Innovation Strategy, the Action Plan and its Action lines and measures, and on information and views collected from experts and key stakeholders during the two field visits which took place in Malta on 26 and 27 January 2016 and on 17 and 18 March 2016. The detailed agendas and list of meetings are included in [Annex 1](#) of this report and the documents consulted and references are appended in [Annex 2](#).

This report is organized in four main chapters:

- Chapter 1: Scope of the proposed monitoring system;
- Chapter 2: Goals and key underlying principles;
- Chapter 3: Governance and practical steps for its setting up;
- Chapter 4: Key indicators included therein.

The report ends with conclusions and recommendations for the Maltese authorities in view of the establishment of a monitoring system for the Maltese National Research and Innovation Strategy.

CHAPTER 1: SCOPE OF THE SYSTEM PROPOSED BY THE PSF EXPERTS TO MONITOR THE MALTESE NATIONAL RESEARCH AND INNOVATION STRATEGY

1.1. The target of the monitoring system

The proposed monitoring system covers the full range of actions foreseen under the Maltese National Research and Innovation Strategy, which builds on 3 pillars representing its three overarching goals (Figure 1):

- PILLAR 1. Achieving a comprehensive R&I support ecosystem.
- PILLAR 2. Achieving a stronger knowledge base.
- PILLAR 3. Achieving smart and flexible specialization. This pillar includes the Smart Specialization Strategy for Malta.

Each pillar is divided into Actions (8 in total), which are themselves divided into Action lines (26 in total). While the third pillar is acknowledged as the one posing the greatest challenges for monitoring and as the one needing immediate priority attention, the monitoring system nevertheless encompasses the whole Strategy.

The Action Plan provides details on the policy mix supporting the Maltese National Research and Innovation Strategy. It includes:

- The 26 Action lines, labelled from A to Z in Figure 1;
- 52 elements (labelled “measures” or “projects”) which form the policy mix.

The Maltese authorities established a correspondence in the Action Plan between each of the 52 specific measures and the 26 Action lines, with most specific measures contributing to multiple Action lines, within or across Pillars (the correspondence table is in [Annex 3](#)).

1.2. The analytical components of the monitoring system

The monitoring system proposed in this report is considered as a relevant component of the policy cycle. It will contribute to determine the need for further action and improvement in policy/ policies or in the implementation of actions. Clearly, the definition, development and use of the monitoring system is a complex task.

The aim of the monitoring system proposed by the PSF panel is to get consolidated as a common and standard reference framework in support of the main achievements of national R&I policies, facilitating thus policy evaluation and adaptation (Technopolis and MioR 2012, Edler et al. 2013, Cunningham et al. 2015).

This report proposes four analytical components for the monitoring system:

1. The system’ main goals, to be agreed upon by key actors of the R&I system (section 2.1);
2. The key principles for efficient design and functioning (section 2.2);
3. The governance of the monitoring system and the institutional framework in which it will provide policy guidance and reinforce horizontal and vertical coordination (chapter 3);
4. The definition and consistent collection of key input, output and result indicators to trigger a continuous review and reporting cycle (chapter 4 and Table 2 and Table 3).

Figure 1. Key elements of the Maltese National R&I Strategy and Action Plan



A: Up-scaling, extending and coordinating the level of support provided to business; B: Monitoring and evaluation; C: Embedding a culture for innovation, creativity, risk-taking and entrepreneurship; D: Using inward investment to leverage indigenous R&I; E: Improved access to knowledge; F: Improved transfer of knowledge; G: Open access to publications; H: Financial support for enterprises; I: Internationalisation support for enterprises; J: An education system which adequately shapes future human capacity in R&I; K: Supporting graduates to become researchers; L: Strengthening linkages between the academic and the private sector for effective knowledge transfer; M: Supporting international collaboration (human capital); N: Embedding a culture which is supportive of science, research and innovation; O: Strengthening local research facilities; P: Increased international cooperation (infrastructures); Q: Capacity building for excellence in climate change adaptation; R: ICT as an enabler; S: ICT-based innovation; T: Tourism product development; U: Maritime Services; V: Aviation and Aerospace; W: Health with a focus on healthy living and active ageing, and e-health; X: Resource-efficient buildings; Y: High value-added manufacturing with a focus on processes and design; Z: Aquaculture.

CHAPTER 2: GOAL AND KEY PRINCIPLES GUIDING THE PROPOSED MONITORING SYSTEM

2.1. Goal of the proposed monitoring system

The Maltese National Research and Innovation Strategy includes, as an integral part, the setting up of a monitoring system for its implementation. Such system is also considered a relevant building block for the accomplishment of the goals and tasks of Action line B “Monitoring and Evaluation”¹, included in the Action Plan 2015-2020 (see Figure 1 above).

Solid evidence-based policy-making requires: the appropriate involvement of stakeholders to develop policy goals and design programmes (Barca and McCann 2011); wide-ranging and solid collection of the necessary data to evaluate progress with the policy goals; and, finally, learning processes to improve policy design as the strategies get implemented (Edler al. 2013; Schumann 2016).

Monitoring is a fundamental part of all these aspects for the reasons outlined below:

1. It contributes to creating shared expectations and a **common understanding of progress**, based upon stakeholders’ engagement.
2. It raises the **accountability** of public actions by systematically collecting and assessing data on specific activities and their main characteristics.
3. It provides an appropriate way to track progress and to obtain “**early warning**” on the implementation of policy actions.
4. It allows **policies to get adjusted over time** on the basis of feedback loops, allowing policy-makers to better gauge and decide which practices are more beneficial and can be scaled up, or which ones need to be redefined and/ or changed.
5. It gathers the evidence needed for **communicating** about policy achievements.
6. It is a fundamental **cornerstone for the subsequent evaluation** of the Maltese National Research and Innovation Strategy and the Action Plan, as it provides a solid empirical basis for it (European Commission 2014).

Thus, building a monitoring System for R&I for Malta aims at creating a solid and robust structure that serves the overall goals of the national research and innovation system. It also permits to track the implementation of the Action lines and specific measures of the Maltese National Research and Innovation Strategy.

2.2. Key principles of the proposed monitoring system

In line with well-established findings from the academic literature, a good monitoring system should have a number of key features (European Commission 2013a, European Commission 2014, Barca and McCann 2011, Abreu 2012, Diez 2011):

1. **Robustness.** The goals of measures and Action lines should be clearly stated (Technopolis and MIOIR 2012). It is important to avoid ambiguity and to ensure a common understanding of the main purpose of each measure and Action line. It is crucial that managers of the monitoring system (administrators or government officials) and beneficiaries agree on the reliability of the existing information and on the needs for new information to monitor the policy developments. This is particularly important given the challenges in finding accurate and relevant indicators to measure the results of specific actions. It is also fundamental as aggregating results from various measures into a limited number of indicators faces a number of difficulties.

¹ While Action line B includes the tasks of monitoring and evaluation, this report only covers the monitoring task. Monitoring and evaluation represent two different steps in the analysis of policy progress and have different purposes. There are however relevant synergies and interactions between the two. *Monitoring* involves the regular collection of data and information as well as the regular reporting based upon a number of selected indicators to outline progress, outputs and results. *Evaluation*, which needs to be carried out by external actors as a matter of principle and credibility, implies an analytical effort to understand the process of policy implementation and to assess the contributions of the various activities towards the desired strategic goals, as well as the success factors and barriers.

2. **Measurability.** Indicators should be established in terms of inputs, outputs and results (see Chapter 4) (European Commission 2013b), and they should include standard metrics and indicators for research and innovation activities, though often these indicators are the result of complex and multiple interactions among different variables.
3. **Feasibility and cost effectiveness.** Monitoring is a process that should be organized to gather information and data on each specific action and programme, and it should build upon existing capabilities and data. The costs for implementing those activities should not be a burden, and exploitation of secondary sources of information must be explored. As far as possible, single reporting procedures should be established for project beneficiaries, and they must serve both the purpose of the funding bodies including the Managing Authorities of EU Structural Funds, and of the monitoring system.
4. **Standardization.** Data collection and reporting should be done following regular and standard procedures. Data and variables to be collected should be designed and defined in such way that they will nurture monitoring and prepare for evaluation.
5. **Sense making and stakeholders' participation.** Information from the monitoring system must focus on making sense of available data and on providing insights for further analysis in order to better characterize measures and actions based on a proper characterization of users, etc. Installing a monitoring system will cost time and efforts, hence it is important to get the commitment of these stakeholders and ensure that they are aware of the strategic use of the data they will be asked to collect. Work carried out during the present exercise under the PSF provided a quick start in this mobilization process.
6. **Stability and Flexibility.** Measures and projects contributing to the Action Plan will vary in the course of time, and consequently the system should be flexible enough to incorporate changes in funding flows and mechanisms while keeping its main structure.

CHAPTER 3: GOVERNANCE AND PRACTICAL STEPS FOR THE SETTING UP OF THE PROPOSED MONITORING SYSTEM

3.1. Governance of the monitoring system

It is important to **secure ownership and proper functioning** of the proposed monitoring system by clarifying the role of key actors:

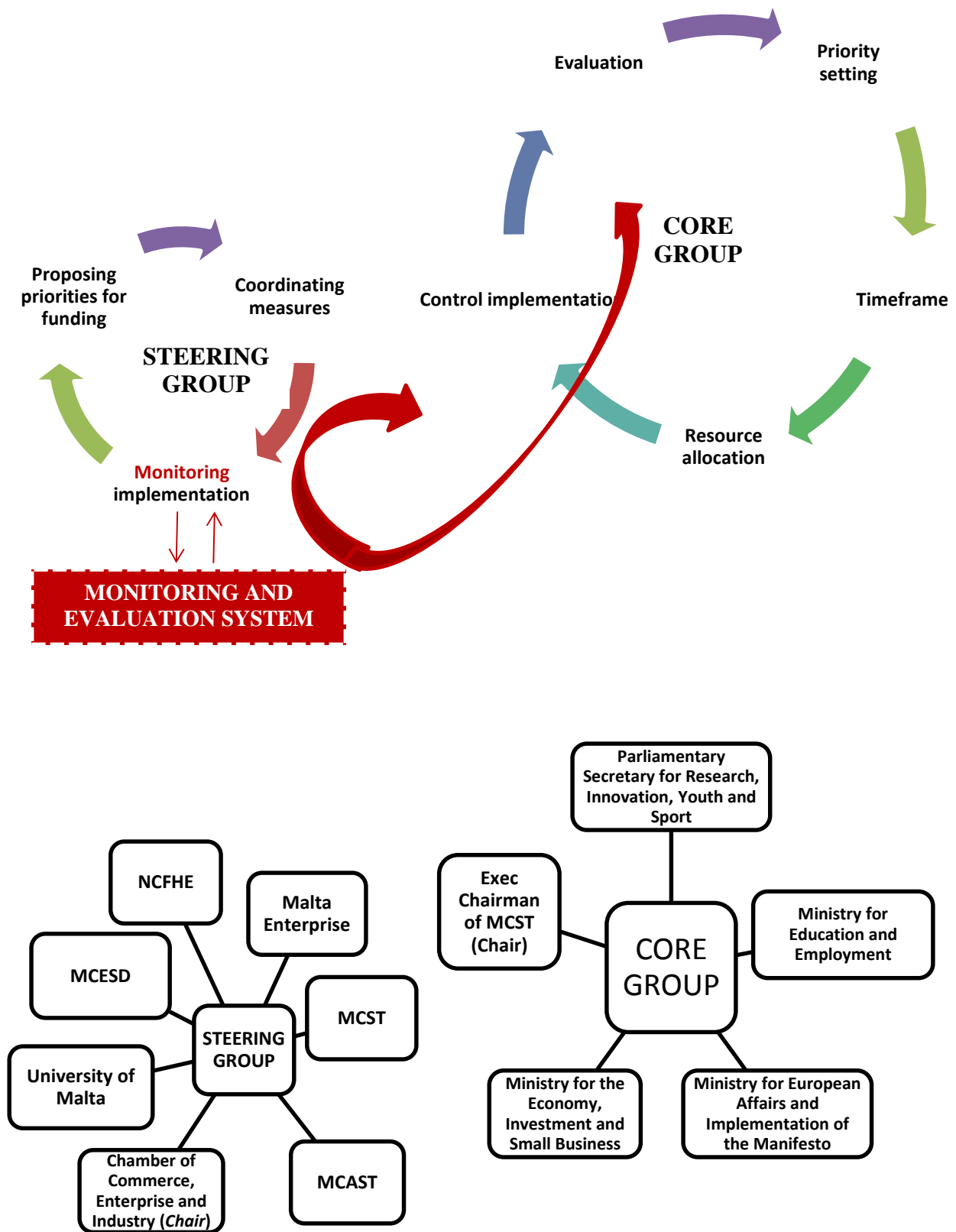
- *Responsibility for building and implementing the system.* It is allocated to **MCST, the Malta Council for Science and Technology**. MCST will coordinate all activities for the design, setting up and operation of the monitoring system. This includes the provision of common methodologies and information needed for proper policy monitoring, including the definition and updating of the set of indicators for the monitoring system, as well as the exploitation of data collected (see Chapter 4). It is essential to endow MCST with sufficient resources and qualified staff to carry out this mission.
- *Main policy users of the monitoring system.* These are the governing bodies of the Maltese National Research and Innovation Strategy and Action Plan: **the Steering Group and the Core Group**². The Core Group meets at Permanent Secretary level and is responsible for deciding on priorities for action as well as timeframes, resources and budgets on the basis of recommendations made by the Steering Group. The Steering Group meets at the level of Heads of Public Entities and Organisations or their high-level delegates. These instances ensure the political endorsement of the monitoring system. They are in charge of the revision and monitoring of the Action Plan. Under this mission, the role of those instances is to ensure that close linkages are created between the outcomes of the monitoring system and further development of policies (Figure 2).

As mentioned above (section 2.1), effective monitoring can play a major role in enhancing the effectiveness of actions and programmes, contribute to learning from past successes and challenges and inform decision making so that current and future initiatives will be better able to fulfill aims and goals and to optimize the impact of results. Thus, the verification and exploitation of main results represents a relevant milestone (i.e. annual progress reports, etc.) to provide both the Steering Group and the Core Group with valuable information and analysis for evidence-based policy.

As result of the PSF work on the monitoring system, the Steering Group came to the conclusion that **the Managing Authorities of EU Structural Funds should be closely associated** to its work, in order to facilitate the alignment and the exchange of data between monitoring and evaluation carried out for implementation of Structural Funds and the forthcoming R&I monitoring system.

² The **Steering Group** includes: three Government entities (the Malta Council for Science and Technology (MCST), the National Commission for Further and Higher Education (NCFHE) and Malta Enterprise); two higher education and vocational training entities (the University of Malta and the Malta College of Arts, Science and Technology (MCAST)); a representative of the private sector (the Malta Chamber of Commerce, Enterprise and Industry) whose President chairs the Steering Group. Additionally, the Malta Council for Economic and Social Development (MCESD), an advisory council that issues opinions and recommendations to the Maltese government on matters of economic and social relevance, represents all the main players of civil society. The **Core Group** includes: the Parliamentary Secretary for Research, Innovation, Youth and Sport; and Permanent Secretaries of the key R&I Ministries, including the Ministry for Education and Employment, the Ministry for Finance, the Ministry for European Affairs and Implementation of the Manifesto, and the Ministry for the Economy, Investment and Small Business. The Executive Chairman of MCST chairs this group.

Figure 2. Governance of the monitoring system



MCESD: Malta Council for Economic and Social Development
 MCAST: Malta College of Arts, Science and Technology
 MCST: Malta Council for Science and Technology
 NCFHE: National Commission for Further & Higher Education

- *Gathering of data and indicators on specific measures.* This is the responsibility of **several stakeholders**, most of them being part of the Steering Group. First, the stakeholders in charge of all the policy measures are identified (through looking at the list of owners of the measures in the Action Plan); and, second, good communication channels to these information producers should be established or reinforced (see principle 5 in section 2.2 above). Typically, monitoring at the level of specific measures is performed by the units and departments responsible for funding and managing programmes, projects and specific actions, contributing to the accountability of these departments. However, aggregation and analysis of diverse and heterogeneous actions require both standardization of data and technical expertise. In such context, the monitoring and evaluation system is defined first as a centralized database that may evolve in the future into an IT-based platform for collecting a common set of variables to better characterize each funded project (and measure).
- *Setting up and functioning of the monitoring system.* It requires a **technical body/unit** that will provide the tools including the development of an IT-based platform in close coordination with MCST. A team of **3 FTE** would seem appropriate to cover both the people in charge of this platform and the staff at MCST in charge of collection and exploitation of data for the monitoring system.

3.2. Practical steps for setting up the proposed monitoring system

The practical establishment of the proposed monitoring system requires the following tasks to be performed and coordinated by MCST, as the leading entity:

1. Defining the set of **quantitative and qualitative indicators** for each Action line and specific measure.
2. Tracking and identifying the **organizations that will be jointly responsible for implementing** different specific measures included in the Action Plan.
3. Gathering the **relevant data** (quantitative values/qualitative information). For the system to be effective, this should be undertaken by the bodies in charge of the measures, in line with the defined indicators.

Such process involves monitoring the main results from the implementation of each specific measure, including generating or collecting the data on the main characteristics of beneficiaries or the total amount of funding (co-funding if appropriate). Additionally, complementary qualitative methods can be developed, including questionnaires to be addressed to a representative sample of beneficiaries, in order to assess their degree of satisfaction with the measures proposed and the impact of those measures.

Bodies in charge of the specific measures should also identify alternative ways of generating data from administrative records, dedicated administrative documents, feedback from beneficiaries, ratings by peers, tests, observation, surveys/ questionnaires, and other evidence (see example of new data collection in Box 1).

4. Gathering **data from other sources than bodies in charge of the specific measures** (including the National Statistics Office, Eurostat, or other sources). Those types of data will be particularly relevant to provide the indicators at the level of each Action line. This task involves the fine-tuning, adaptation and extension of existing regular surveys and enquiries that serve the main goals of the proposed monitoring system. Fruitful interactions and collaborative arrangements have emerged or are emerging between MCST, the Malta Chamber of Commerce and NSO as result of the PSF specific support work. The national authorities are encouraged to pursue this further.
5. Providing **support and coordination** by means of regular meetings with the units in the national administration responsible for producing data and information.
6. **Aggregating the data and providing analysis** and insights on data interpretation (Figure 3).
7. **Reporting to the Steering Group and Core Group** on the potential deviation from initially set goals, as well as on potential improvements on monitoring and indicators attached to each Action line and specific measure. In case of negative evolutions of indicators, corrective measures should be decided according to a basic risk analysis associated to each group of indicators. In case of positive evolutions, their causes will also be analyzed in order to transfer the experience to other areas and inspire future actions.
8. Elaborating an **Annual Report** on the implementation of the results of the Action Plan and the Maltese National Research and Innovation Strategy.

The last two steps will ensure that the information gained through the monitoring activities will flow into the policy-making process (Figure 4).

Box 1. Case study: New data collection for the Valetta Design Cluster

The Valletta Design Cluster has been working on the development of new metrics in an attempt at understanding better the integration of design practice in the Maltese business community. In the 2015 Small Business Survey, a new question was introduced with the aim of collecting data on how many firms in Malta do design in practice. Respondents were asked to answer in the affirmative if they/the firm undertake design as an economic activity done to be sold in the market. Design by a company or professional was described as activity to create a product or a service, one in which the product or service is devised for an intended use or outcome. Product and Service were described as designed if they were invented, originated through drawings, blueprints, schemes or models that were made before the product was made or the service delivered.

Figure 3. The data collection and treatment process under the monitoring system

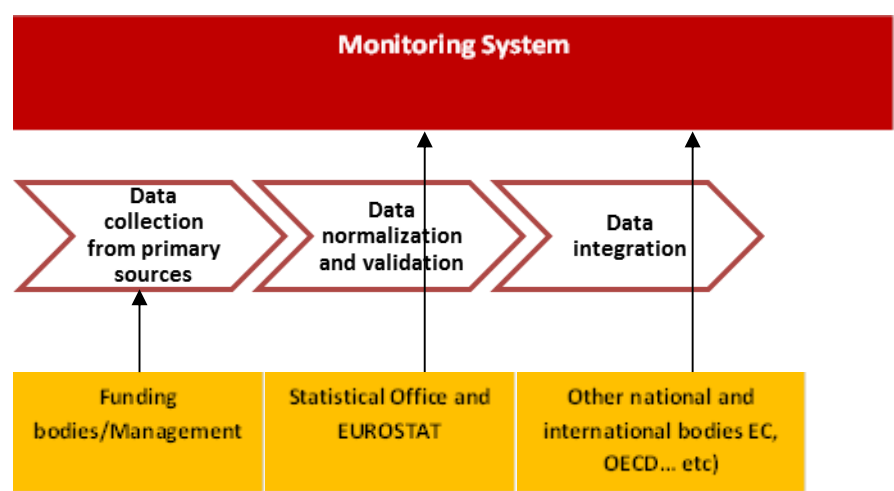
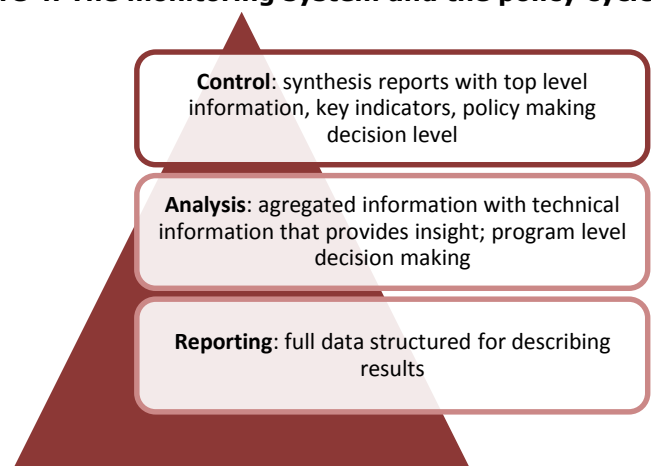


Figure 4. The monitoring system and the policy cycle



CHAPTER 4: KEY INDICATORS FOR THE PROPOSED MONITORING SYSTEM

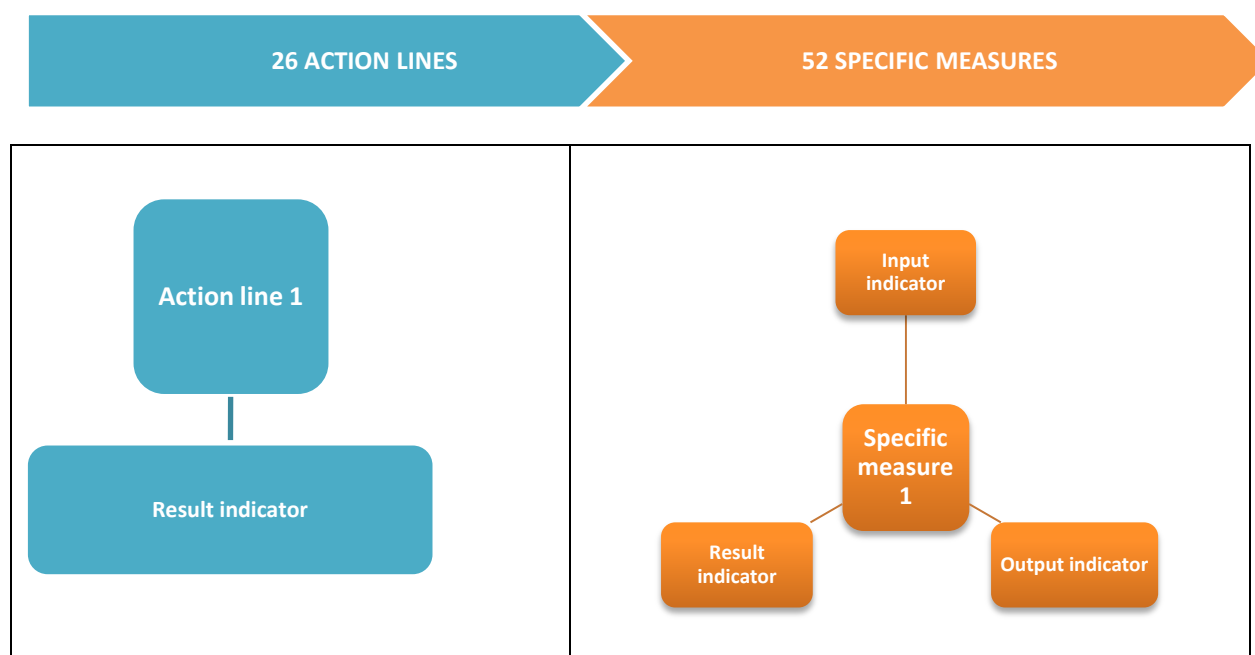
4.1. Criteria for the definition of indicators for the monitoring system

Indicators for the monitoring system have been identified using the following criteria, in line with well-established literature on monitoring and indicators (Barca and McCan 2011, Gault 2013, Gianelle et Kleibrink 2015), and after discussion with Maltese stakeholders during the January and March visits (see [Annex 1](#)):

1. **Relevance.** Indicators should be relevant for the definition of the policy courses of action as identified under the Action lines. In spite of time lag and complexity associated to the statistical elaboration of some indicators, the proposed set of indicators should convey a clear picture to policy makers on the evolution of the Maltese National Research and Innovation Strategy' goals.
2. **Availability and comparability.** Indicators should be publicly available and transparent. It should be noted that while indicators provided by official statistics fulfill these conditions, they are mostly produced with a time lag of at least two years. Consequently, statistical indicators are mainly "retrospective" indicators. Nevertheless they are robust and allow for international comparisons. In addition to statistical indicators, the proposed monitoring system includes a set of variables based on administrative records aimed at reporting on specific relevant features of the implementation process at national level and whenever possible to allow for comparisons to European level. Therefore the set of indicators included in this analysis will ensure comparability across Member States.
3. **Type of indicators.** The proper monitoring of the Action Plan requires three types of indicators. Input indicators provide a proxy on the "effort" to accomplish the desired strategic goals, while output and result indicators are a proxy of the "effectiveness" of the policy actions and initiatives in place³. Hence, these three types of indicators will be collected (Figure 5) (European Commission 2013b):
 - **Input indicators** aim to understand how resources are allocated to various elements of the policy mix. They are collected for each measure: they reflect intensity of public support/funding for the measure.
 - **Output indicators** are collected for each measure: they depict their direct effects and their aim is to highlight how implementation proceeds. They represent what is directly produced or supplied through a particular measure but they do not inform on progress to achieve the policy objectives; they rather describe the specific deliverables of the intervention. They can be multiple, reflecting different types of deliverables for a measure.
 - **Result indicators** are collected both at the level of each Action line and for each specific measure. They aim to assess whether goals pursued are evolving in the right direction. At measure level, they describe the effects of measures towards the achievement of initial aims and expectations on target groups (several indicators are needed for those measures with effects spread over various Action lines). At Action line level, they depict changes in the goals pursued by the Action line. Each Action line has minimum one and maximum three result indicators, the latter situation of multiple indicators prevails notably in order to measure the evolution of smart specialization domains (Action lines R to Z).

³ Systematic data collection and monitoring of input, output and result indicators will contribute to measuring impact and to the establishment of impact indicators that often require both quantitative and qualitative information as well as specific assessment methodologies. Policy impact needs to be assessed through specific independent evaluation exercises, including qualitative information as well as modeling techniques aimed at measuring the specific contribution of R&I policies from the effects associated to other relevant variables.

Figure 5. A schematic view of types of monitoring indicators



4.2. Proposal for key indicators for the monitoring system

The expert team has worked along the above principles to draft a **concrete proposal for key indicators** for the monitoring system. Those indicators appear in two tables, which (due to their size) are placed immediately after the conclusion and recommendations at the end of the report.

Table 2 (pages 23-28) provides the set of proposed **result indicators for each Action line** of the Maltese National Research and Innovation Strategy, as well as for each Pillar as represented in Figure 1 and Figure 5 above. Indicators have been identified by the appointed PSF experts based on the analysis of the available documentation and in line with international indicators, and subsequently discussed with Maltese stakeholders. Table 2 also includes data sources and data collection frequency. Action lines may be monitored by more than one indicator, though *indicators in bold are suggested* as they convey key information on relevant aspects of the Maltese National Research and Innovation Strategy. Proposed indicators should be validated by the governing instances as they need to properly reflect the intention sought by each Pillar and Action line.

Table 3 (pages 29-34) provides the **detailed set of input, output and result indicators for a subset of measures** included in the Action Plan, as shown in Figure 5 above. These proposed indicators have been drafted following analyses of the content of measures and their links with the Action lines, based on information collected during the field work in Malta, and following established standards in monitoring research and innovation activities. Identification of data sources and data collection frequency is provided. Since the information provided during the PSF specific support work was not complete, the set of indicators in Table 3 represents an illustrative example elaborated by the two experts. These indicators and their feasibility should be validated by the managers responsible for implementing each of the measures.

Additionally the following remarks can be made with respect to the proposed key indicators.

First, despite the effort made to avoid work overload and duplication, the indicators listed in Table 3 may not correspond to standard variables currently collected for administrative and operational purposes, and therefore **more effort is needed to refine these indicators**. The cases of the National Aerospace Centre (see Box 2 below) and the Sustainable Living Complex (outlined in Box 3) show that managers may go further than the general needs of the monitoring system and collect additional data to develop more detailed and technical indicators which are specific to their particular R&I activity. The establishment of a monitoring system should go hand in hand with such good management practices involving in-depth work at the level of each measure. Indicators provided for the monitoring system are those that can be **aggregated and are comparable across measures**.

Second, when analysing the level of correspondence between the set of indicators capturing main effects of policy actions and measures, the PSF panel noted various **inconsistencies in the assignment of specific measures across Actions lines**. The correspondence between the two, as defined by the authorities when drafting the Action Plan (see [Annex 3](#)) raised questions when digging into detailed work on indicators. For example, it is unclear why the measure “B start”, which is a scheme to support the emergence of start-ups is seen as contributing to Action line D “Using inward investment to leverage indigenous R&D”; or why the measure “Esplora”, which is an interactive science centre aiming at bringing science closer to a larger public and increasing the appetite for science subjects at secondary level, is associated with Action line L “Strengthening linkages between the academic and the private sector for effective knowledge transfer”. At best the link between these measures and the Action lines can be qualified as weak. A summary view on such inconsistencies is reported in [Annex 4](#) in which all measures are listed and their contribution to proposed result indicators at the level of Action lines are qualified as strong, medium or weak based on the policy goals and description of each specific measure and its potential contribution to the effects captured by proposed indicators.

Box 2. Case study: Key Performance Indicators for the National Aerospace Centre

The Malta National Aerospace Centre (NAC) is a national R&I institution owned by the Ministry of Tourism. It aims to become a centre of excellence in cutting-edge technologies in avionics, air traffic management, RPAS and Maintenance, Repair and Overhaul. In addition, it will provide the facilities for RPAS testing through a Flight Test Facility, aerospace training courses, and advice to the government on matters related to aerospace.

The current **NAC Key Performance Indicators** (KPIs) are the following:

1. R&D and integration to TRL level 8 or 9 and transfer to the industry for commercialisation of at least one aerospace-related technology by end of 2018 and at least two technologies by end of 2020.
2. By 2018, at least 25% of NAC human resources to be dedicated to local support.
3. Obtaining at least one R&I grant to participate in an international cooperative research project by end of 2017 and in at least two by end of 2019.
4. Participation in international aerospace policy activities in at least one forum by end of 2016 and at least two fora from 2017.
5. Hosting of two student and/or worker placements from 2017 and an additional four from 2018.
6. Local promotion of the R&I in aerospace through at least three public dissemination activities held in 2016 and at least 5 from 2017.
7. Signing of a Memorandum of Understanding or other form of agreement for cooperation with a stakeholder in the education and vocational sector and/or an aerospace institution – one by the end of 2016 and three by the end of 2018.

Box 3. Case study: Monitoring of the Sustainable Living Complex project

The primary objective of the Sustainable Living Complex project is to design and monitor a building to explore which parameters can be most effective to produce as close to near-zero energy emissions. The building is intended to be modular, to allow real-life testing of different construction or infrastructure systems.

Data to be collected include:

1. Data related to materials and namely parameters such as the theoretical (extraction, processing, logistics) carbon footprint, and the real (measured during construction) carbon footprint of the building materials, including material wastage, and packaging, and opportunities for recycling. Operational generation of waste will also be closely monitored over the life of the project.
2. Data related to comfort and energy performance, including surface and air temperatures, surface and air humidity, air movements, energy distribution and consumption, renewable energy generation, water collection, generation and consumption, air quality, lighting levels, acoustic comfort.
3. Data related to the way the building is used, and how the different systems being tested impact operational behaviour, (eg. comfort, movement); this will be done by a high-level of integration of smart sensor technologies in the fabric.

Expected impact of the project:

- a) To change attitudes to near-zero energy, and resource-efficient construction in the industry.
- b) To change attitude to research as a career, and hence change the relationship with foreign partners and students, particularly from the region.
- c) To shape and inform related policy-making.

Therefore, indicators to monitor the project will refer to:

1. The relationships that will be developed with industry, either in the development of new eco-efficient materials, or in the development of better systems of construction, or technological support, or similar (e.g. number of MoUs concerning collaboration in the research activities in the building with industry operators).
2. The development and testing of innovative materials and technologies (e.g. filing of a number of patents for new materials or systems, or of monitoring systems.)
3. The success of outreach programmes, wherein stakeholders and consumers of the construction industry will be able to explore, assess and become more aware of the significance of the different parameters that can inform near-zero construction (e.g. number of open day events, with the transmission and display of real-time performance data, or a target number of visitors to the facility over the life of the project).
4. The increase in the number of researchers, exploiting the data collated, and the technological facilities provided in the building, originating from Malta, but also from abroad, particularly from the Mediterranean region, to develop niche research clusters (e.g. increase in the number of PhD students active in the specific research area, and increase in the number of countries, from the Mediterranean region, from which such researcher come from – a measure of the internationalisation of the project).
5. The development of new specialist training courses based on the data collected, possibly in collaboration with other regional institutes (e.g. number of new post-graduate or CPD courses).
6. The development of new design tools, based on software programmes, calibrated against the data collected, to allow better prediction of building behaviour and performance, and hence innovative eco-efficient services (e.g. development of one/two new IT simulation or design tools).
7. The increase in the amount of published research output (e.g. percentage increase in publications in peer-reviewed journals, and available on open access).
8. The major impact that this research has on official policies or regulations (e.g. government policy related to near-zero energy construction or similar, which is demonstrably informed by the published research).

CONCLUSION AND RECOMMENDATIONS

Monitoring systems are an **integral part of well-designed public policies** (Podhorea et al. 2013; You-Na Lee 2015). The Maltese authorities have firmly incorporated this element into their recently adopted Maltese National Research and Innovation Strategy. The present report presents the overall architecture, principles, operational steps and proposals for indicators to operationally establish such a system.

The existence of a specific Action Plan associated to the Maltese National Research and Innovation Strategy has been most useful to define, evaluate and select the most suitable indicators for the proposed monitoring system. Often, strategies are not translated into concrete operational measures and as a result the object of the monitoring system remains unclear. In the case of Malta **the Action Plan formed a common and agreed basis for the interactive work deployed between the experts and Maltese stakeholders in the frame of the PSF exercise.**

A clear **governance arrangement** is required to support the monitoring system and ensure the identification and follow up of the relevant indicators proposed for the different levels of the analysis. This is already well in place and the PSF exercise was instrumental in bringing the relevant actors together and in clarifying the purpose and scope of the envisaged monitoring system.

Upon completing this work, the PSF experts propose the following recommendations to establish an effective monitoring system for the Maltese National Research and Innovation Strategy:

Recommendation 1: Securing the commitment from all the stakeholders and organisations in charge of the measures in the Action Plan, and their direct engagement and contribution to the monitoring system. This implies mutual alignment between monitoring practices existing at many national organisations and the needs of the overall monitoring system. This will contribute to the validation and completion of indicators proposed in this report.

Recommendation 2: Refining the correspondence between the Action lines and the specific measures underpinning the Maltese National Research and Innovation Strategy and the Action Plan, as the work carried out by experts to identify the correspondence between specific measures definition, policy goals and output and result indicators revealed a number of inconsistencies.

Recommendation 3: Providing MCST, as the organization in charge of the development and implementation of the monitoring system, with adequate resources and skills to carry out this important task for the success of Malta's R&I policy goals.

Recommendation 4: Reinforcing collaboration on monitoring that took place during the Horizon 2020 PSF work, in particular between MCST, the National Statistical Office, the Malta Chamber of Commerce and the Managing Authorities of Structural Funds – all key stakeholders – data providers- for the monitoring system.

Recommendation 5: Preparing for evaluation. The monitoring system will provide the evidence base for evaluating the effectiveness of the Maltese National Research and Innovation Strategy and to improve the quality and adaptation of R&I policies.

With a **robust and effective monitoring system** in place, the Maltese authorities will be able to reliably assess the success of their strategy and fine-tune or revise their R&I policies accordingly. This can support Malta's ambition in becoming a frontrunner in the implementation of its smart specialization strategy.

Table 2. Result indicators for Action lines of the Maltese National Research and Innovation Strategy

PILLAR 1: Comprehensive R&I support system			
Action line	RESULT indicators (key indicators in bold)	Source/Data provider	Frequency
Pillar 1 as a whole	Pillar 1.1: Private R&D expenditures (€ total and % of GDP) Pillar 1.2: Business enterprise researchers (FTE) per thousand labour force Pillar 1.3: Business investment in innovation Pillar 1.4: Share of high tech exports/total exports	1.1.NSO/PPCD 1.2, 1.3, 1.4. NSO	1.1, 1.2, 1.4 Annual 1.3 Bi-annual
A Up-scaling, extending and coordinating the level of support provided to business	A1: Number of SMEs involved in R&D and innovation projects A2: Number of SMEs that have introduced innovations A3: Possible new indicator to be collected through a dedicated business survey: Rate of satisfaction from businesses with respect to the innovation support system.	A1, A2: NSO A3: Chamber of Commerce	A1. Annual A2. Bi-annual A3. 5-years
B Evaluation and Monitoring	B1: YES/NO type of indicator. Monitoring refers to the fulfilment of the specific actions listed in the Action Plan concerning monitoring, indicators and evaluation: it takes the form of an annual monitoring report	B1. MCST	Annual
C Embedding a culture for innovation, creativity, risk-taking and entrepreneurship	C1: Amounts of public money spent under public procurement for innovation	C1. European Public Sector Innovation Scoreboard	Annual
D Using inward investment to	D1: Amount of R&D spending by local companies leveraged by foreign firms R&D expenditures D2: Private R&D funds spent by foreign companies in Malta as % of total business R&D expenditures	D1, D2. NSO	Annual

leverage indigenous R&I	in Malta. Split between funds spent in-house and in cooperation with Maltese organisations		
E Improved access to knowledge	E1: Number of firms engaged in R&D collaborative projects E2: Number of innovative of start-ups	E1, E2. NSO	Annual
F Improved transfer of knowledge	F1: Number of formalized commitments between public research organizations (and research groups) and business firms. Split between commitments for R&D and commercial commitments F2: Number of spin-off companies F3: Number of applications for co-patents by firms	F1, F2: NSO and UoM and MCAST F3. PPCD (Min of EU Affairs)	Annual
G Open access to publications	G1: Share of publications in Open access on total publications G2: Development of institutional repositories for OA publications YES/NO type of indicator.	UoM	Annual
H Financial support for enterprises	H1: % of public funding for R&D performed by the business sector H2: Amount of private funds leveraged by public funding schemes for enterprises	H1: NSO H2: NSO	Annual
I Internationalisation support for enterprises	I1: Total competitive EU funds attracted by Maltese private organisations (not including Structural Funds) I2: Number of Maltese companies participating in EU competitive schemes	MCST	Annual

PILLAR 2: Stronger knowledge base

Action line	RESULT indicators (key indicators in bold)	Source/Data provider	Frequency
Pillar 2 as a whole	Pillar 2.1: Global Talent Competitiveness Index (http://global-indices.insead.edu/gtci/) Pillar 2.2: EU indicator of research excellence (Innovation Union progress report)	2.1.INSEAD 2.2.DG Research and Innovation	2.1, Annual 2.2
J An education system which adequately shapes future human capacity in R&I	J1: Number of new tertiary graduates in S&T per 1000 pop aged 20-29	J1: NSO/Eurostat	Annual
K Supporting graduates to become researchers	K1: Number of researchers in public sector K2: Number of graduates conducting R&D activities. Split between public and business sector	K1, K2: NSO	Annual
L Strengthening linkages between the academic and the private sector for effective knowledge transfer	L1: Public R&D financed by private sector L2: Revenues from sales of R&D by PROs L3: Public-private scientific co-publications per million population L4: Researchers employed by businesses L5: Number of innovative firms cooperating with PROs (F1 is also relevant for this action line but not repeated)	L1-L5, NSO (using CIS data) and PPCD (Min of EU Affairs)	Annual
M Supporting international	M1: Total competitive EU funds attracted by Maltese public organisations (not including Structural Funds)	M1, M2: E-CORDA	Annual

collaboration	<p>M2: Number of proposals presented to H2020 involving Maltese research institutions (output indicator)</p> <p>M3: Internationally co-authored scientific publications within the 10 % most cited scientific publications worldwide as % of total scientific publications of the country</p> <p>M4: Number of foreign researchers in Malta's public research organisations</p> <p>M5: Number of foreign doctoral students (ISCED 6) as % of all doctoral students in Maltese research organisations</p>	<p>M3: DG Research and Innovation</p> <p>MCST</p> <p>M4, M5: UoM, MCAST, MARC</p>	
N Embedding a culture which is supportive of science, research and innovation	N1: results from survey on public understanding of science (new indicator)	N1: Esplora	Every years? 4
O Strengthening local research facilities	O1: Scientific publications within the 10 % most cited scientific publications worldwide as % of total scientific publications of the country	WoS or Scopus	Annual
P Increased international cooperation	P1: Rate of access of Maltese researchers to infrastructures part of ESFRI (tbc)	MCST, UoM	Annual
Q Capacity building for excellence in climate change adaptation	<p>Q1: Number of scientific publications (top tier journals) on climate change as % of total number of publications</p> <p>Q2: Number of international R&D projects on climate change in which Maltese researchers are participating</p>	Q1, Q2: UoM	Annual

Note: DG Research and Innovation refers to the publication "Science, Research and Innovation performance of the EU".

PILLAR 3: Smart, flexible specialisation

Action line	RESULT indicators (key indicators in bold)	Source/Data provider	Frequency
Pillar 3 as a whole	Pillar 3.1: Value-added in knowledge-intensive activities as a share of total value-added Pillar 3.2: Value-added in S3 areas as a share of total value-added	NSO	Annual
R ICT as an enabler	R1: Number of SMEs engaged in e-commerce solutions R2: % of households with access to broadband lines with speed above 10MBps	?	
S ICT-based innovation	S1: % of public funding expenditures allocated to ICT technologies (both in public and private sectors) S2: Number of innovative firms in ICT NACE codes S3: share of ICT in EU-funded research projects awarded to Maltese actors	S1, S2: NSO S3: MCST, E-CORDA	S1, S3: Annual S2: Bi-Annual
T Tourism product development	T-Z1: Value-added in relevant NACE codes T-Z2: Exports in relevant NACE codes T-Z3: Jobs in relevant NACE codes		Annual
U Maritime services	T-Z4: Number of SMEs introducing innovations (all types) as % of total SMEs in relevant NACE codes T-Z5: Turnover from innovation as a % of total turnover in relevant NACE codes		
V Aviation and Aerospace	T-Z6: Number of researchers in relevant NACE codes and disciplines, split private and public T-Z7: FDI attracted in relevant NACE codes		
W Health with a focus on			

healthy living and active ageing, e-health	V-Z8 : Patents filed in relevant NACE codes and disciplines T-Z9: Knowledge-based start-ups in relevant NACE codes		
X Resource-efficient buildings			
Y High value-added manufacturing with focus on processes & design			
Z: Aquaculture			

Table 3. Input, output and result indicators for a sample of measures in the Maltese National Research and Innovation Strategy

Measure	Input indicators	Output and result indicators (key indicators in bold)	Source/Data provider	Frequency
1. Competence Centre for Manufacturing and Integrated Design (CCMID)	1. Public € invested in CCMID (national and EU)	<p>OUTPUT</p> <p>1.1 Number of m² of new infrastructure built</p> <p>1.2 Number of researchers from public sector working in improved research facilities</p> <p>1.3 Number of research projects carried out in the centre, split by TRL</p> <p>RESULT</p> <p><u>Research:</u></p> <p>1.4 Publications total and 1.3 publication in high impact journals</p> <p>1.5 Competitive public funding for research attracted (national) and 1.6 (foreign)</p> <p>1.7 Number of research partnerships with foreign public research entities</p> <p><u>Technology and innovation:</u></p> <p>1.8 Number of research partnerships with private sector actors (national) and 1.9 (foreign)</p> <p>1.10 Number of patents applications and 1.11 number of patents awarded</p> <p>1.12 Commercial commitments such as technology innovations to be included in a centre's partner existing product or service (5 achievement, 3 planned, and 1 very early stage of engagement)</p> <p>1.13. Commercial commitments such as technology transfer licenses (5 achievement, 3 planned, and 1 very early stage of engagement)</p> <p>1.14 Joint academia/industry publications</p> <p>1.15 Private funding attracted in centre's budget (national) and 1.16 (foreign)</p> <p><u>Business:</u></p> <p>1.17 Private funding attracted in centre's budget (national) and 1.18 (foreign)</p> <p>1.19 Start-ups or technology-based firms based on research in the centre</p>	CCMID Malta Enterprise PPCD (Min of EU Affairs)	Annual (for commercial commitment, also 3 years after project's end)

2. FUSION (Commercial Voucher Programme CVP and Technology Development Programme TDP)	2.Public € invested in FUSION (national and EU)	<p>OUTPUT</p> <p>2.1 Number of CVP projects awarded, total and split by S3 area, split by public, academic, private</p> <p>2.2 Number of TDP projects awarded, total and split by S3 area, split by public, academic, private</p> <p>2.3 Number of successful CVP projects (projects that produced the 5 reports)</p> <p>2.4 Number of CVP projects that got TDP projects</p> <p>RESULT</p> <p><u>Research:</u></p> <p>2.5 Publications total and 2.6 publication in high impact journals, split by S3 area</p> <p><u>Technology and innovation:</u></p> <p>2.7 Joint academia/industry publications, split by S3 area</p> <p>2.8 Number of industry-academia collaborations and industry-public collaborations (TDP only), split by S3 area</p> <p>2.9 Private co-funding of grants</p> <p>2.10 Start and end TRL following TDP projects, split by S3 area</p> <p>2.11 Number of patents applications and 2.12 number of patents awarded (from TDP projects), split by S3 area</p> <p>2.12 Commercial commitments such as technology innovations resulting from TDP projects (5 achievement, 3 planned, and 1 very early stage of engagement), split by S3 area</p> <p>2.13 Commercial commitments such as technology transfer licenses resulting from TDP projects (5 achievement, 3 planned, and 1 very early stage of engagement), split by S3 area</p>	MCST	Annual (for commercial commitment, also 3 years after project's end)
8. B Start	8. Public € invested in B-Start (national and EU)	<p>OUTPUT</p> <p>8.1 Number of start-ups being awarded a grant, total, split by S3 area</p> <p>RESULT</p> <p>8.2 Number of jobs created in start-ups, 5 years after creation, total, split</p>	Malta Enterprise	Output: Annual Result: 5 years

		by S3 area		
10.Valetta Design Cluster VDC	10. Public € invested in VDC (number of FTE transformed in €) (national and EU)	OUTPUT 10.1. Number of SMES receiving support for their design activities RESULT 10.2 Number of SMEs involved in design as an economic activity 10.3. Turnover from design activity by SMEs	Ministry of Culture (from survey of business)	Annual?
22.Competence Centre for Pharmaceutical Technology (CCPT)	22. Public € invested in CCPT (national and EU)	OUTPUT 22.1 Rate of use of equipment (% of time) 22.2 Number of researchers and technical staff working in the centre (public) 22.3 Number of research projects carried out in the centre, split by TRL RESULT <u>Research:</u> 22.4. Publications total and 22.3 publication in high impact journals 22.5 Number of research partnerships with foreign public research entities 22.6 Competitive public funding for research attracted (national) and 22.7 (foreign) <u>Technology and innovation:</u> 22.8 Number of research partnerships with private sector actors (national) and 22.9 (foreign) 22.10 Joint academia/industry publications 22.11 Number of patents applications and 22.12 number of patents awarded 22.13 Commercial commitments such as technology innovations to be included in a centre's partner existing product or service (5 achievement, 3 planned, and 1 very early stage of engagement) 22.14 Commercial commitments such as technology transfer licenses (5 achievement, 3 planned, and 1 very early stage of engagement) <u>Business:</u>	CCPT Malta Enterprise	Annual

		<p>22.15 Private funding attracted (national) and 22.16 (foreign)</p> <p>22.17 Start-ups or technology-based firms based on research carried out in the centre</p>		
<p>23. Reach high post-doc scholarship scheme</p>	<p>23. Public € invested in post-doc scheme (national and EU)</p>	<p>OUTPUT</p> <p>23.1 Number of persons being awarded a scholarship, total, split by S3 area</p> <p>RESULT</p> <p>Research:</p> <p>23.2 Number of awardees getting a researcher job after grant period in public sector, total, split by S3 area</p> <p>23.3 Academic publications total and 23.4 publication in high impact journals, total and split by S3 area</p> <p>Technology and innovation:</p> <p>23.5 Number of awardees getting a researcher job after grant period in private sector, total, split by S3 area</p> <p>23.6 Joint academia/industry publications, split by S3 area</p>	<p>Ministry for Education and Employment (programme implementation directorate)</p>	<p>Annual</p>
<p>25. Sustainable Living Complex SLC</p>	<p>25. Public € invested in Sustainable Living Complex (national and EU)</p>	<p>OUTPUT</p> <p>25.1 Number of m² of new infrastructure built</p> <p>25.2 Number of training sessions implemented in the SLC</p> <p>25.3 Number of trainees in the SLC</p> <p>25.4 Number of research projects carried out in the centre, split by TRL</p> <p>25.5 Number of visitors (business) to the SLC</p> <p>RESULT</p> <p>Research:</p> <p>25.6 Publications total and 25.7 publication in high impact journals</p> <p>25.8 Number of PhD students active in the SLC and 25.9 number of countries of origin for PhD students</p>	<p>UoM</p>	<p>Annual</p>

		<p><u>Technology and innovation:</u></p> <p>25.10 Number of R&D partnerships with industry 25.11 Joint academia/industry publications 25.12 Number of patents applications and 25.13 number of patents awarded 25.14 Commercial commitments such as technology innovations to be included in a centre's partner existing product or service (5 achievement, 3 planned, and 1 very early stage of engagement) 25.15 Commercial commitments such as technology transfer licenses (5 achievement, 3 planned, and 1 very early stage of engagement) 25.16 Competitive public funding attracted (national) and 25.17 (foreign) 25.18 Number of government policies influenced by the centre</p> <p><u>Business:</u></p> <p>25.19 Private funding attracted 25.20 Start-ups or technology-based firms based on activities carried out in the SLC</p>		
40. The National Aerospace Centre (NAC)	40. Public € invested in NAC (national and EU)	<p><u>OUTPUT</u></p> <p>40.1 Number of m² of new infrastructure built 40.2 Number of training sessions 40.3 Number of trainees in NAC 40.4 Number of research projects carried out in the centre, split by TRL 40.5 Number of flight test facilities provided by the centre 40.6 Number of advices given on aerospace matters</p> <p><u>RESULT</u></p> <p><u>Research and training:</u></p> <p>40.7 Publications total and 40.8 publication in high impact journals 40.9 Number of researchers and technical staff from public sector working in NAC facilities 40.10 Number of students and workers placement 40.11 Competitive public funding for research attracted (national) 40.12 Competitive public funding for research attracted to participate in international cooperative research projects 40.13 Number of research partnerships with foreign public research entities</p>	National Aerospace Centre (owned by Ministry of Tourism)	Annual

		<p>40.14 Number of MoU with educational or vocational sector bodies</p> <p><u>Technology and innovation:</u></p> <p>40.15 Share of NAC human resources dedicated to local support</p> <p>40.16 Research, development and integration to TRL level 8 or 9 and transfer to the industry for commercialisation of aerospace-related technology (5 achievement, 3 planned, and 1 very early stage of engagement)</p> <p>40.17 Joint academia/industry publications</p> <p><u>Business&policy:</u></p> <p>40.18 Private funding attracted in centre's budget (national) and 40.19 (foreign)</p> <p>40.20 Start-ups or technology-based firms based on research carried out in the centre</p> <p>40.21 Participation in international aerospace policy activities</p> <p>40.22 Public dissemination activities</p>		
--	--	--	--	--

ANNEX 1: STAKEHOLDERS MEETINGS

Malta, 26-27 January 2016 and 17-18 March 2016

The Horizon 2020 PSF work to develop a monitoring system for the Maltese National Research and Innovation Strategy required interactions with key people and organizations in charge of collecting, analyzing and using data on the Maltese R&I performance.

To this aim, a large number of dedicated meetings were organized between the external experts, MCST and key stakeholders to discuss governance and detailed operational aspects.

TOPICS FOR DISCUSSION

Governance issues

- The overall approach to the monitoring system and its link to the Strategy;
- The quality of the ownership and the nature of the demand for, and expected use of the system: ensuring that the system meets stakeholders' needs;
- The policy relevance of the (types of) proposed indicators.

Operational issues

- The concrete definition of Actions lines;
- The accuracy of the links between measures and Action lines and the identification of main versus secondary effects;
- Details on the current information available on public R&D funds (grants, etc.) and status of data collection by key stakeholders in charge of the various measures;
- The feasibility of the collection of indicators: checking availability of "low hanging fruits" (data that are available in suitable form at no or little costs); feasibility of collecting new data and developing new indicators either through further digging into existing but unused databases or by creating new data e.g. through additional questions to existing surveys; resources issues;
- Confidentiality issues to be resolved;
- The realistic timing for the collection and production of indicators;
- IT availability, team skills and data providers (current status and further plans).

AGENDA OF MEETINGS

26th January 2016

- 09:30 – 11:00 Malta Council of Science and Technology: discussion on Governance issues and Operational issues for the Monitoring system, at MCST
- 11:00 – 12:15 Ministry of Education and Employment, Ministry for European Affairs and Planning and Priorities Coordination Division within this Ministry, Ministry of Gozo, Ministry for Culture, at MCST
- 12:15 – 13:00 Ministry for Tourism, at MCST
- 13:00 – 14:00 Lunch Break
- 14:30 – 15:30 Malta Aquaculture Research Centre, Marsaxlokk
- 16:00 – 16:45 University of Malta, Msida

27th January 2016

- 09:00 – 10:00 National Statistics Office, at MCST
- 10:30 – 11:30 Life Sciences Park, Malta Enterprise, San Gwann
- 12:00 – 12:45 Malta College of Arts, Science and Technology, Paola
- 13:00 – 14:00 Malta Council of Science and Technology: conclusions and further work, at MCST.

17th March 2016

- 11:00 – 12:00 MCST
- 12:00 – 12:30 Light lunch
- 12:30 – 13:30 MEAIM (Ministry for EU Affairs and Implementation of the Manifesto): Marilou Micallef (Planning & Priorities Coordination Division, Monitoring & Evaluation Unit)
- 13:30 – 15:00 Steering Group: Jeffrey Pullicino Orlando (MCST Executive Chairman); Marisa Xuereb (Chamber of Commerce, member of the Council); Karl Herrera (Malta Enterprise) ; Christine Scholz (National Commission for Further & Higher Education); Eric Flask (MCAST, Director)

18th March 2016

- 09:00 – 10:00 NSO: Christianne Micallef (Business Unit); Lara Cordina Friggieri (Public Finance)
- 10:00 – 12:00 Presentation of Monitoring Mechanism to all Stakeholders:
 - Caldon Mercieca (Valletta Design Cluster, Ministry for Justice, Culture and Local Government)
 - Paul Buhagiar (Valletta Design Cluster, Ministry for Justice, Culture and Local Government)
 - Alex Torpiano (University of Malta)
 - Richard Muscat (University of Malta)
 - Robert Vassallo Agius (Malta Aquaculture Research Centre)
 - Albert Delia (Programming Directorate, Ministry for Education and Employment)
 - Gabriella Briffa Darmanin (EU Affairs, Ministry for Education and Employment)
 - Alistair Paul Zammit (Ministry for Tourism, National Aerospace Centre)
 - Matteo Aquilina (Ministry for Tourism, National Aerospace Centre)
 - Eric Flask (MCAST)
 - Anthony Camilleri (Head Coordinator EU Funds, Ministry for EU Affairs and Implementation of the Manifesto)
 - Jennifer Casingena Harper (Policy Consultant, MCST)
 - Ramona Saliba Scerri (Assistant Director, MCST)
 - Christianne Micallef (NSO)
 - Lara Cordina Friggieri (NSO)
- 12:00 – 13:00 Discussion on Way Forward

ANNEX 2: REFERENCES

- Abreu, M. (2012), *Good Practices in the Selection and Use of Outcome Indicators*, Available at: http://ec.europa.eu/regional_policy/sources/docgener/evaluation/doc/performance/abreu.pdf
- Arnold, E. (2004), Evaluating research and innovation policy: a system world needs systems evaluation, *Research Evaluation*, Vol. 13, No.1, 3-17.
- Barca, F. and P. McCann (2011), *Outcome indicators and targets: towards a new system of monitoring and evaluation in EU Cohesion policy; and Outcome indicators for the thematic priorities addressing the Europe 2020 objective 'improving the conditions for innovation, research and development'*, http://ec.europa.eu/regional_policy/sources/docgener/evaluation/doc/performance/outcome_indicators_en.pdf
- Cunningham, P, Edler, J., Gök, A. and P. Shapira (2015), Conclusions: Evidence on the Effectiveness of Innovation Policy Intervention, *Handbook of Innovation Policy Impact*. London: Edward Elgar Publishing Limited.
- David, P., Foray, D., and B. Hall (2009), *Measuring smart specialisation: The concept and the need for indicators*. Knowledge for Growth Expert Group, DG Research & Innovation.
- Diez, M.-A. (2001), The Evaluation of Regional Innovation and Cluster Policies: Towards a Participatory Approach, *European Planning Studies*, Vol. 9, No. 7.
- Edler, J., P. Cunningham, A. Gök and P. Shapira (2013), *Compendium of Evidence on the Effectiveness of Innovation Policy Intervention Project*, Manchester Institute of Innovation Research.
- European Commission (2015), *Research and Innovation performance in the EU: Innovation Union progress at country level, country profile Malta*, Luxembourg.
- European Commission (2014a), *European Research Area: facts and figures 2014 Malta*, Luxembourg.
- European Commission (2014b), *The Programming Period 2014-2020: guidance document on monitoring and evaluation European Regional development fund and cohesion fund. Concepts and Recommendations*.
- European Commission (2013a), EVALSED: The resource for the evaluation of Socio-Economic Development: http://ec.europa.eu/regional_policy/en/policy/evaluations/guidance.
- European Commission (2013b), *Pilot report on result indicators*, http://ec.europa.eu/regional_policy/sources/docoffic/2014/working/result_indicator_pilot_report.pdf
- Gault, F. (Ed.) (2013), *Handbook of innovation indicators and measurement*. Cheltenham: Edward Elgar.
- Georghiou, L and E. Uyarra (2014), Adapting smart specialization to a micro-economy - the case of Malta, *European Journal of Innovation Management*, vol.17 n°4, pp.428-447.
- Gianelle, C and A. Kleibrink (2015), Monitoring mechanisms for smart specialization strategies, *S3 Policy Brief Series N°13/2015*.
- Government of Lower Austria, IWT Flanders and IDEUM (2013), *SCINNOPOLI Policy Recommendations for monitoring and evaluating the impact of regional innovation policy, report from Interreg IVC project*.
- Magro, E. and J Wilson (2014), Complex innovation policy systems: Towards an evaluation mix, *Research Policy*, Vol. 42, No.9, 1647-1656
- Malta Chamber of Commerce and Industry (2014), *Economic vision for Malta 2014-2020*, la Valette.
- Malta Council for Science and Technology (2015), *Malta National Research and Innovation Action Plan 2015-2020*.
- Malta Council for Science and Technology and Ministry for Education and Employment (2015), *FUSION Commercialisation Vouchers and Technology Development Programmes: rules for participation*, www.mcst.gov.mt.
- Malta Council for Science and Technology and Ministry for Education and Employment (2014), *National Research and Innovation Strategy 2020*.
- Malta Ministry for Finance (2015), *Malta National Reform Programme*.
- Malta National Statistical Office (2014), *Innovation Survey 2014*.

Malta National Statistical Office (2014), *Research and Development Survey 2014*.

Malta National Statistical Office (2014), *Survey of Research and Development in the general government sector 2014 and 2015*.

Malta National Statistical Office (2015), *Research and Development in Malta: 2011-2013*, News release 14 July 2015.

Podhoraa, A., Helminga, K., Adenäuerb, L., Heckeib, T., Kauttoc, P., Reidsmad, P., Renningse, K., Turnpennyf, J. and J. Janseng (2013), The policy-relevancy of impact assessment tools: Evaluating nine years of European research funding, *Environmental Science & Policy*, Vol. 31, 83-95.

Schumann, A. (2016), "Using Outcome Indicators to Improve Policies: Methods, Design Strategies and Implementation", *OECD Regional Development Working Papers*, 2016/02.

Technopolis Group and MIOIR (2012), *Evaluation of Innovation Activities: Guidance on Methods and Practices*, Study Funded by the European Commission Directorate-General for Regional Policy, Brussels.

Warrington, B. (2015), *RIO Country report Malta*, JRC science and policy report, Seville.

Warrington, B. (2015), *Stairway to excellence country report Malta*, JRC science and policy report, Seville.

You-Na Lee (2015) Evaluating and extending innovation indicators for innovation policy, *Research Evaluation*, First published online: July 30, 2015

ANNEX 3: CORRESPONDENCE BY MCST BETWEEN ACTION LINES AND SPECIFIC MEASURES IN THE ACTION PLAN

PILLAR 1: R&I SUPPORT ECOSYSTEM									
Measures	A: Up-scaling, extending and coordinating the level of support provided to business	B: Monitoring and evaluation	C: Embedding a culture for innovation, creativity, risk-taking and entrepreneurship	D: Using inward investment to leverage indigenous R&I	E: Improved access to knowledge	F: Improved transfer of knowledge	G: Open access to publications	H: Financial support for enterprises	I: Internationalisation support for enterprises
1 Competence Centre Manufacturing & Integrated Design	X		X		X	X			
2 FUSION					X	X	X	X	
3 Science in the City			X						
4 Royalty Income from Patents	X					X		X	
5 R&D Scheme including collaborative research (EUREKA / EUROSTARS)								X	X
6 Tax Credits for Industrial & Experimental Research - included in Investment Aid Tax Credits	X							X	
7 Enterprise Europe Network (EEN)	X							X	X
8 B. Start	X			X				X	
9 Esplora - the National Interactive Science Centre			X		X	X			
10 Benchmarking and Competitiveness Reinforcement Initiative (CRI) for the Valletta Design Cluster	X		X			X		X	
11 Public Sector Innovation Fund								X	X

PILLAR 2: STRONGER KNOWLEDGE BASE									
Measures	J: An education system which adequately shapes future human capacity in R&I	K: Supporting graduates to become researchers	L: Strengthening linkages between the academic and the private sector for effective knowledge transfer	M: Supporting international collaboration (human capital)	N: Embedding a culture which is supportive of science, research and innovation	O: Strengthening local research facilities	P: Increased international cooperation (infrastructures)	Q: Capacity building for excellence in climate change adaptation	
1 Competence Centre for Manufacturing & Integrated Design				X	X	X			
3 Science in the City		X							
9 Esplora - the National Interactive Science Centre	X	X	X		X	X			
18 Internationalization Review				X					
20 Study on Internationalisation in Academia				X					
21 GET QUALIFIED		X							
22 Competence Centre for Pharmaceutical Technology						X	X		
23 Post-Doctoral Scholarships	X	X	X		X				
24 Malta Aquaculture Research Centre						X			
25 Sustainable Living Complex						X	X		
26 Research Centre of Excellence in Molecular Medicine & Bio-banking	X	X	X	X	X	X	X		
27 Post-doc and Research Incubator Complex	X	X	X	X	X	X	X		
28 R&I Centre on Agriculture & Environment Management	X	X	X	X	X	X	X		
29 Innovation Centre of Excellence for Blood, Tissue and Cell Banking (ICE-BTC)						X	X		

30 Support for R&I participation in Internationalisation initiatives		X	X
31 Bi-lateral R&I Initiatives		X	X
32 Membership to international initiatives such as JPIs, Art 185s, etc.		X	X
33 Schemes with the aim of stimulating significant innovation, driven by the private sector			X X
34 ESA R&I Traineeships	X		X
35 Bi-Regional R&I Initiatives			X X
36 Support for International Collaboration	X		X
37 France-Malta Scholarships	X		X
38 Aquaponics			X
39 Life Sciences Park and Expansion Area			X X

PILLAR 3: Smart Specialization									
Measures	R: ICT as an enabler	S: ICT-based innovation	T: Tourism product development	U: Maritime Services	V: Aviation and Aerospace	W: Health with a focus on healthy living and active ageing, and e-health	X: Resource-efficient buildings	Y: High value-added manufacturing with a focus on processes and design	Z: Aquaculture
1 Competence Centre for Manufacturing & Integrated Design								X	
10 Benchmarking and Competitiveness Reinforcement Initiative (CRI) for the Valletta Design Cluster	X				X			X	
22 Competence Centre for Pharmaceutical Technology						X		X	
24 Malta Aquaculture Research Centre									X
25 Sustainable Living Complex							X		
26 Research Centre of Excellence in Molecular Medicine & Bio-banking						X			
29 Innovation Centre of Excellence for Blood, Tissue and Cell Banking (ICE-BTC)						X			
38 Aquaponics									X
39 Life Sciences Park and Expansion Area						X			
40 The National Aerospace Centre					X				
41 Implement a mobile innovative solution to improve the tourism experience in Gozo		X	X						
42 KENUP						X			
43 ESMERALDA							X		
44 R&I-2013-039 - Development of a framework to put human-machine interfaces (HMI) in the cloud		X							

ANNEX 4. PSF PANEL VIEWS ON THE CONTRIBUTION OF SPECIFIC MEASURES TO ACTION LINES⁴

Action Line	Policy goals	Suggested indicator	Suggested indicator
A: Up-scaling, extending and coordinating the level of support provided to business	Improve efficiency; upscaling business support	A1: Number of business firms (SMEs) participating in R&D (and innovation) projects	A2: Number of business firms (SMEs) that have introduced innovations
Competence Centre for Manufacturing and Integrated Design	To stimulate local industry to cluster and collaborate on the basis of medium and long-term R&D projects.	S	S
Royalty Income from Patents	To encourage researchers to exploit intellectual property through the licensing of patented knowledge.	W	M
Tax Credits for Industrial & Experimental Research - included in Investment Aid Tax Credits	This incentive is aimed specifically to SMEs that after conducting an approved Industrial Research or Experimental Development project.	S	S
Enterprise Europe Network (EEN)	EEN assists enterprises to: develop the business in new markets ; source or license new technologies and access EU finance and EU funding.	S	S
B. Start	Support start-ups engaged in manufacturing, design, R&D and other innovative business ventures.	W	W
Benchmarking and Competitiveness Reinforcement Initiative (CRI) for the Valletta Design Cluster	Valletta Design Cluster shall focus its strategic efforts in supporting design start-ups and enterprises addressing gaps or weaknesses in the identified value chains. The ultimate scope of the exercise is to strengthen the Valletta Design Cluster's efforts to incentivise and support innovation and internationalisation for Malta's design sector.	M	M
National Policy for Open Access	To promote open access to scientific publications	W	W

⁴ **S**: STRONG LINKAGES BETWEEN SPECIFIC MEASURES AND ACTION LINES RESULT INDICATORS; **M**: MEDIUM LINKAGES BETWEEN SPECIFIC MEASURES AND ACTION LINES RESULT INDICATORS; **W**: WEAK LINKAGES BETWEEN SPECIFIC MEASURES AND ACTION LINES RESULT INDICATORS

Action Line	Policy goals	Suggested indicator
B: Monitoring and evaluation	Effective implementation of policy monitoring and evaluation	B1: YES/NO (O)
12 Evaluation of implementation of AP measures and updates		S
13 Development of new indicators		S
15 National Policy for Open Access	To promote open access to scientific publications	S
16 Coordination of the implementation of the Strategy		S
17 Monitoring of existing indicators		S
18 Internationalisation Review		S
19 FP evaluation		S
20 Study on Internationalisation in Academia		S

Action Line	Policy goals	Suggested indicator
C: Embedding a culture for innovation, creativity, risk-taking and entrepreneurship	Improve entrepreneurship, and S&T awareness to foster new innovative en	C1: Amount of public funding under public procurement for innovation
1 Competence Centre for Manufacturing and Integrated Design	To stimulate local industry to cluster and collaborate on the basis of medium and long-term R&D projects.	W
3 Science in the City	The aim of this 'yearly event' is to popularise Science.	W
9 Esplora - the National Interactive Science Centre	The aim is to bring science closer to the target audience and aid in increasing the number of students taking up science subjects at secondary level. In the long term this will contribute to the increase in Science and Technology professionals. Science Popularisation activities will also be undertaken under Esplora.	W
10 Benchmarking and Competitiveness Reinforcement Initiative (CRI) for the Valletta Design Cluster	Valletta Design Cluster shall focus its strategic efforts in supporting design start-ups and enterprises addressing gaps or weaknesses in the identified value chains. The ultimate scope of the exercise is to strengthen the Valletta Design Cluster's efforts to incentivise and support innovation and internationalisation for Malta's design sector.	W
14 Supporting procurement for innovation	To further support and entice public entities to demand innovation in their procurement procedures , with a particular focus on procurement related to the smart specialisation areas	S
15 National Policy for Open Access	To promote open access to scientific publications	W

Action Line	Policy goals	Suggested indicator	Suggested indicator
D: Using inward investment to leverage indigenous R&I		D1: Amount of R&D spending by local companies leveraged by foreign firms R&D expenditures	D2: Private R&D funds spent by foreign companies in Malta as % of total business R&D expenditures in Malta. Split between funds spent in-house and in cooperation with Maltese organisations
8 B. Start	Support start-ups engaged in manufacturing, design, R&D and other innovative business ventures.	W	W
14 Supporting procurement for innovation	To further support and entice public entities to demand innovation in their procurement procedures , with a particular focus on procurement related to the smart specialisation areas	W	W
15 National Policy for Open Access	To promote open access to scientific publications	W	W
Action Line	Policy goals	Suggested indicator	Suggested indicator
E: Improved access to knowledge		E1: Number of firms engage in R&D collaborative projects	E2: Number of innovative start ups
1 Competence Centre for Manufacturing and Integrated Design	To stimulate local industry to cluster and collaborate on the basis of medium and long-term R&D projects.	S	M
2 FUSION	Ultimate goal of promoting and supporting local research and innovation as well as providing the necessary handholding in order to enable researchers and technologists to turn their innovative ideas into a market ready reality.	S	S
9 Esplora - the National Interactive Science Centre	NISC will provide a state-of-the-art permanent infrastructure where students, teachers and the general public will be able to immerse themselves in a hands-on, interactive science experience. The aim is to bring science closer to the target audience and aid in increasing the number of students taking up science subjects at secondary level. In the long term this will contribute to the increase in Science and Technology professionals. Science Popularisation activities will also be undertaken under Esplora.	W	M
15 National Policy for Open Access	To promote open access to scientific publications	W	M

Action Line	Policy goals	Suggested indicator	Suggested indicator	Suggested indicator
F: Improved transfer of knowledge		F1: Number of formalized commitments between public research organizations (and research groups) and business firms. Split between commitments for R&D and commercial commitments	F2: Private R&D financed by Higher education	F3: Number of applications for patents
1 Competence Centre for Manufacturing and Integrated Design	To stimulate local industry to cluster and collaborate on the basis of medium and long-term R&D projects.	S	W	W
2 FUSION	Ultimate goal of promoting and supporting local research and innovation as well as providing the necessary handholding in order to enable researchers and technologists to turn their innovative ideas into a market ready reality.	S	S	S
4 Royalty Income from Patents	The objective of this initiative is to encourage researchers to exploit intellectual property through the licensing of patented knowledge. The incentive gives fiscal benefits to persons (individuals and enterprises) that own the rights to patented intellectual property and are receiving income in the form of royalties.	S	M	M
9 Esplora - the National Interactive Science Centre	NISC will provide a state-of-the-art permanent infrastructure where students, teachers and the general public will be able to immerse themselves in a hands-on, interactive science experience. The aim is to bring science closer to the target audience and aid in increasing the number of students taking up science subjects at secondary level. In the long term this will contribute to the increase in Science and Technology professionals. Science Popularisation activities will also be undertaken under Esplora.	W	W	W
10 Benchmarking and Competitiveness Reinforcement Initiative (CRI) for the Valletta Design Cluster	Valletta Design Cluster shall focus its strategic efforts in supporting design start-ups and enterprises addressing gaps or weaknesses in the identified value chains. The ultimate scope of the exercise is to strengthen the Valletta Design Cluster's efforts to incentivise and support innovation and internationalisation for Malta's design sector.	S	M	M
15 National Policy for Open Access	To promote open access to scientific publications	W	W	W

Action Line	Policy goals	Suggested indicator	Suggested indicator
G: Open access to publications		G1: Share of OA publications/Tot scientific publications	G2: Institutional repositories for OA
2 FUSION	Ultimate goal of promoting and supporting local research and innovation as well as providing the necessary handholding in order to enable researchers and technologists to turn their innovative ideas into a market ready reality.	M	W
15 National Policy for Open Access	To promote open access to scientific publications	S	S

Action Line	Policy goals	Suggested indicator	Suggested indicator
H: Financial support for enterprises		H1: % of public funding for R&D performed by the business sector	H2: Amount of private funds leveraged by public funding schemes for enterprises
2 FUSION	Ultimate goal of promoting and supporting local research and innovation as well as providing the necessary handholding in order to enable researchers and technologists to turn their innovative ideas into a market ready reality.	S	S
5 R&D Scheme including collaborative research (EUREKA / EUROSTARS)		S	S
6 Tax Credits for Industrial & Experimental Research - included in Investment Aid Tax Credits	This incentive is aimed specifically to SMEs that after conducting an approved Industrial Research or Experimental Development project. The value of qualifying expenditure is calculated either as the value of: a) qualifying tangible and intangible assets acquired in relation to an initial investment project; or b) the value of wage costs for jobs directly created by the initial investment project.	S	S
7 Enterprise Europe Network (EEN)	Helps small business to make the most of the European marketplace. Working through local business organisations, the EEN assists enterprises to: develop the business in new markets ; source or license new technologies and access EU finance and EU funding .	S	S
8 B. Start	Support start-ups engaged in manufacturing, design, R&D and other innovative business ventures.	S	S
10 Benchmarking and Competitiveness Reinforcement Initiative (CRI) for the Valletta Design Cluster	Valletta Design Cluster shall focus its strategic efforts in supporting design start-ups and enterprises addressing gaps or weaknesses in the identified value chains. The ultimate scope of the exercise is to strengthen the Valletta Design Cluster's efforts to incentivise and support innovation and internationalisation for Malta's design sector.	S	S
11 Public Sector Innovation Fund	Assessment of the feasibility of setting up a fund through a pilot call. The overall aim of this measure will be to support entities within the Public Sector wishing to undertake projects leading to innovation in the public sector	S	S

14 Supporting procurement for innovation	To further support and entice public entities to demand innovation in their procurement procedures , with a particular focus on procurement related to the smart specialisation areas	S	S
--	--	----------	----------

Action Line	Policy goals	Suggested indicator	Suggested indicator
I: Internationalisation support for enterprises		I1: Total competitive EU funds attracted by Maltese private organisations (not including Structural Funds)	I2: Number of Maltese companies participating in EU competitive schemes
5 R&D Scheme including collaborative research (EUREKA / EUROSTARS)		S	S
7 Enterprise Europe Network (EEN)	Helps small business to make the most of the European marketplace. Working through local business organisations, the EEN assists enterprises to: develop the business in new markets ; source or license new technologies and access EU finance and EU funding .	S	S
11 Public Sector Innovation Fund	Assessment of the feasibility of setting up a fund through a pilot call. The overall aim of this measure will be to support entities within the Public Sector wishing to undertake projects leading to innovation in the public sector	W	M

Action Line	Policy goals	Suggested indicator
J: An education system which adequately shapes future human capacity in R&I		J1: Number of new tertiary graduates in S&T per 1000 pop aged 20-29
9 Esplora - the National Interactive Science Centre	NISC will provide a state-of-the-art permanent infrastructure where students, teachers and the general public will be able to immerse themselves in a hands-on, interactive science experience . The aim is to bring science closer to the target audience and aid in increasing the number of students taking up science subjects at secondary level. In the long term this will contribute to the increase in Science and Technology professionals. Science Popularisation activities will also be undertaken under Esplora.	S
23 Post-Doctoral Scholarships	Post-doctoral grants as a means to address the brain drain issue. Post-doc grants will be offered to researchers who would like to specialise in a specific area.	S
26 Research Centre of Excellence in Molecular Medicine & Bio-banking	The Centre will be housed in the extension of the Biomedical Sciences building currently being constructed with funds generated by the University. The Centre now requires funds to purchase state-of-the-art equipment to enhance its scope and research capacity	M
27 Post-doc and Research Incubator Complex	The construction of a Post-doc, Creative, and Engineering Labs Complex – coined as the University's trans-disciplinary "Research Incubator".	S
28 R&I Centre on Agriculture & Environment Management	The centre is meant to foster improvements and innovation within the agricultural community, while continuing to train the farming community. The Ministry is seeking partnership with Academic institutions (amongst which the University of Malta) in order to realise this project.	W

Action Line	Policy goals	Suggested indicator	Suggested indicator
K: Supporting graduates to become researchers		K1: Number of researchers in public sector	K2: Number of graduates conducting R&D activities. Split between public and business sector
3 Science in the City	Science and art festival. The aim of this 'yearly event' is to popularise Science .	W	S
9 Esplora - the National Interactive Science Centre	NISC will provide a state-of-the-art permanent infrastructure where students, teachers and the general public will be able to immerse themselves in a hands-on, interactive science experience. The aim is to bring science closer to the target audience and aid in increasing the number of students taking up science subjects at secondary level. In the long term this will contribute to the increase in Science and Technology professionals. Science Popularisation activities will also be undertaken under Esplora.	M	M
21 GET QUALIFIED	Supports the personal development of individuals for the achievement of qualifications and certifications required by industry . The incentive is applicable to individuals following a course of studies leading to a certification, diploma, degree or post-graduate degree courses.	S	S
23 Post-Doctoral Scholarships	Post-doctoral grants as a means to address the brain drain issue. Post-doc grants will be offered to researchers who would like to specialise in a specific area.	S	S
26 Research Centre of Excellence in Molecular Medicine & Bio-banking	The Centre will be housed in the extension of the Biomedical Sciences building currently being constructed with funds generated by the University. The Centre now requires funds to purchase state-of-the-art equipment to enhance its scope and research capacity	S	S
27 Post-doc and Research Incubator Complex	The construction of a Post-doc, Creative, and Engineering Labs Complex – coined as the University's trans-disciplinary "Research Incubator".	S	S
28 R&I Centre on Agriculture & Environment Management	The centre is meant to foster improvements and innovation within the agricultural community, while continuing to train the farming community. The Ministry is seeking partnership with Academic institutions (amongst which the University of Malta) in order to realise this project.	S	S
37 France-Malta Scholarships	These scholarships are designed to help provide the additional support needed for local researchers to supplement their Masters or Doctoral work.	S	S

Action Line	Policy goals	Suggested indicator	Suggested indicator	Suggested indicator
L: Strengthening linkages between the academic and the private sector for effective knowledge transfer		L1: Public R&D financed by private sector	L2: N formalized committments by PRIs with private organizations	L3:Public-private scientific co-publications per million population
9 Esplora - the National Interactive Science Centre	NISC will provide a state-of-the-art permanent infrastructure where students, teachers and the general public will be able to immerse themselves in a hands-on, interactive science experience. The aim is to bring science closer to the target audience and aid in increasing the number of students taking up science subjects at secondary level. In the long term this will contribute to the increase in Science and Technology professionals. Science Popularisation activities will also be undertaken under Esplora.	S	W	W
23 Post-Doctoral Scholarships	Post-doctoral grants as a means to address the brain drain issue. Post-doc grants will be offered to researchers who would like to specialise in a specific area.	S	S	W
26 Research Centre of Excellence in Molecular Medicine & Bio-banking	The Centre will be housed in the extension of the Biomedical Sciences building currently being constructed with funds generated by the University. The Centre now requires funds to purchase state-of-the-art equipment to enhance its scope and research capacity	S	S	S
27 Post-doc and Research Incubator Complex	The construction of a Post-doc, Creative, and Engineering Labs Complex – coined as the University's trans-disciplinary "Research Incubator".	S	S	W
28 R&I Centre on Agriculture & Environment Management	The centre is meant to foster improvements and innovation within the agricultural community, while continuing to train the farming community. The Ministry is seeking partnership with Academic institutions (amongst which the University of Malta) in order to realise this project.	S	S	S
30 Support for R&I participation in Internationalisation initiatives	Support for researchers to access european research institutions through an internationalisation partnership award scheme (IPAS - competitive funding)	W	W	W
31 Bi-lateral R&I Initiatives	The emphasis would be in building stronger collaborations with Chinese Institutes , particularly through the MoST and the Harbin institute of Technology. The main areas of focus will be aquaculture and composite materials for aviation	W	M	W
32 Membership to international initiatives such as JPis, Art 185s, etc.	Choice of initiatives dependent on momentum gathered in successive years. A tentative plan is provided for 2016 and 2017 based on the internationalisation review, that will be re-examined in 2017.	W	W	W

Action Line	Policy goals	Suggested indicator	Suggested indicator	Suggested indicator	Suggested indicator	Suggested indicator
M: Supporting international collaboration (human capital)		M1: Total competitive EU funds attracted by Maltese public organisations (not including Structural Funds)	M2: Number of proposals presented to H2020 involving Maltese research institutions (output indicator)	M3: Internationally co-authored scientific publications within the 10 % most cited scientific publications worldwide as % of total scientific publications of the country	M4: Number of foreign researchers in Malta's public research organisations	M5: Number of foreign doctoral students (ISCED 6) as % of all doctoral students in Maltese research organisations
1 Competence Centre for Manufacturing and Integrated Design	To stimulate local industry to cluster and collaborate on the basis of medium and long-term R&D projects.	W	W	W	W	W
18 Internationalisation Review		M	M	W	W	W
20 Study on Internationalisation in Academia		M	M	W	W	W
26 Research Centre of Excellence in Molecular Medicine & Bio-banking	The Centre will be housed in the extension of the Biomedical Sciences building currently being constructed with funds generated by the University. The Centre now requires funds to purchase state-of-the-art equipment to enhance its scope and research capacity	S	S	S	S	S
27 Post-doc and Research Incubator Complex	The construction of a Post-doc, Creative, and Engineering Labs Complex – coined as the University's trans-disciplinary "Research Incubator".	S	S	M	S	S
28 R&I Centre on Agriculture & Environment Management	The centre is meant to foster improvements and innovation within the agricultural community, while continuing to train the farming community. The Ministry is seeking partnership with Academic institutions (amongst which the University of Malta) in order to realise this project.	S	S	S	W	W
30 Support for R&I participation in Internationalisation initiatives	Support for researchers to access european research institutions through an internationalisation partnership award scheme (IPAS - competitive funding)	S	S	S	S	W

31 Bi-lateral R&I Initiatives	The emphasis would be in building stronger collaborations with Chinese Institutes , particularly through the MoST and the Harbin Institute of Technology. The main areas of focus will be aquaculture and composite materials for aviation	W	W	W	W	S
32 Membership to international initiatives such as JPIS, Art 185s, etc.	Choice of initiatives dependent on momentum gathered in successive years. A tentative plan is provided for 2016 and 2017 based on the internationalisation review, that will be re-examined in 2017.	S	S	S	W	W
35 Bi-Regional R&I Initiatives	This measure will focus on the Euro-Mediterranean R&I initiatives, particularly: ERANET-MED and ARIMNET II between 2014-2017 and PRIMA between 2017 and 2020.	S	S	S	S	S
37 France-Malta Scholarships	These scholarships are designed to help provide the additional support needed for local researchers to supplement their Masters or Doctoral work.	S	S	S	W	W

Action Line	Policy goals	Suggested indicator
N: Embedding a culture which is supportive of science, research and innovation		N1: results from survey on public understanding of science (new indicator)
1 Competence Centre for Manufacturing and Integrated Design	To stimulate local industry to cluster and collaborate on the basis of medium and long-term R&D projects.	W
3 Science in the City	Science and art festival. The aim of this 'yearly event' is to popularise Science.	S
9 Esplora - the National Interactive Science Centre	NISC will provide a state-of-the-art permanent infrastructure where students, teachers and the general public will be able to immerse themselves in a hands-on, interactive science experience. The aim is to bring science closer to the target audience and aid in increasing the number of students taking up science subjects at secondary level. In the long term this will contribute to the increase in Science and Technology professionals. Science Popularisation activities will also be undertaken under Esplora.	S
23 Post-Doctoral Scholarships	Post-doctoral grants as a means to address the brain drain issue. Post-doc grants will be offered to researchers who would like to specialise in a specific area.	M
26 Research Centre of Excellence in Molecular Medicine & Bio-banking	The Centre will be housed in the extension of the Biomedical Sciences building currently being constructed with funds generated by the University. The Centre now requires funds to purchase state-of-the-art equipment to enhance its scope and research capacity	S
27 Post-doc and Research Incubator Complex	The construction of a Post-doc, Creative, and Engineering Labs Complex – coined as the University's trans-disciplinary "Research Incubator".	S
28 R&I Centre on Agriculture & Environment Management	The centre is meant to foster improvements and innovation within the agricultural community, while continuing to train the farming community. The Ministry is seeking partnership with Academic institutions (amongst which the University of Malta) in order to realise this project.	W
35 Bi-Regional R&I Initiatives	This measure will focus on the Euro-Mediterranean R&I initiatives, particularly: ERANET-MED and ARIMNET II between 2014-2017 and PRIMA between 2017 and 2020.	W

Action Line	Policy goals	Suggested indicator
O: Strengthening local research facilities		O1: Scientific publications within the 10 % most cited scientific publications worldwide as % of total scientific publications of the country
1 Competence Centre for Manufacturing and Integrated Design	To stimulate local industry to cluster and collaborate on the basis of medium and long-term R&D projects.	W
9 Esplora - the National Interactive Science Centre	NISC will provide a state-of-the-art permanent infrastructure where students, teachers and the general public will be able to immerse themselves in a hands-on, interactive science experience . The aim is to bring science closer to the target audience and aid in increasing the number of students taking up science subjects at secondary level. In the long term this will contribute to the increase in Science and Technology professionals. Science Popularisation activities will also be undertaken under Esplora.	W
22 Competence Centre for Pharmaceutical Technology	The CoE will carry out R&D in Malta that is market driven and contract based and transfer the technologies generated into industry. The CoE will work closely with Malta's main research performers, namely the University of Malta and MCAST, and major biomedical companies located in Malta.	W
24 Malta Aquaculture Research Centre	Construction of a marine hatchery and research facilities.	W
25 Sustainable Living Complex	State-of-the-art sustainable living complex r to house the Faculty for Built Environment, the Faculty of Education, the Institute of Sustainable Energy, the Institute of Earth Systems, and a School of Visual Art.	W
26 Research Centre of Excellence in Molecular Medicine & Bio-banking	The Centre will be housed in the extension of the Biomedical Sciences building currently being constructed with funds generated by the University. The Centre now requires funds to purchase state-of-the-art equipment to enhance its scope and research capacity	S
27 Post-doc and Research Incubator Complex	The construction of a Post-doc, Creative, and Engineering Labs Complex – coined as the University's trans-disciplinary "Research Incubator".	M
28 R&I Centre on Agriculture & Environment Management	The centre is meant to foster improvements and innovation within the agricultural community, while continuing to train the farming community. The Ministry is seeking partnership with Academic institutions (amongst which the University of Malta) in order to realise this project.	M
29 Innovation Centre of Excellence for Blood, Tissue and Cell Banking (ICE-BTC)	Platform for research in collaboration with the University of Malta allowing students (especially Masters, Doctoral and Post Doctoral) to further their studies and to provide a unique employment opportunity for highly qualified individuals in the field of cell therapy. CE-BTC is envisaged to be a top level training centre in the field of GMP and cell therapy.	S

33 Schemes with the aim of stimulating significant innovation, driven by the private sector	3 schemes: (1) grant scheme to support industrial research and/ or experimental development projects carried out for the acquisition of knowledge leading to the development of innovative products and solutions , and which aim to achieve a technology readiness level of 6 or higher); (2) support to Innovative and knowledge-based technology start-ups (mezzanine finance instrument to support innovative start-ups and Knowledge Based Technology Start-ups), and (3) supporting Private Research Facilities to facilitate the creation of privately-driven innovation facilities that aim to provide shared research facilities that support the development and exchange of knowledge and expertise among the undertakings and other organisations in a cluster (or network)	W
38 Aquaponics	Aquaponics is a new technique to explore as an alternative market for Maltese agriculture. Contacts have been made with a local developer which has constructed a small demonstrating unit. Trials will be carried out on this unit, and provided the required funding is sourced, a small commercial unit will be constructed for further evaluation.	W
39 Life Sciences Park and Expansion Area	It is intended to enable the creation of a research, development and innovation cluster in Malta . The project is being developed by Malta Enterprise in collaboration with the University of Malta and the national hospital, Mater Dei.	W

Action Line	Policy goals	Suggested indicator
P: Increased international cooperation (infrastructures)		P1: Rate of access of Maltese researchers to infrastructures part of ESFRI (tbc)
22 Competence Centre for Pharmaceutical Technology	The CoE will carry out R&D in Malta that is market driven and contract based and transfer the technologies generated into industry . The CoE will work closely with Malta's main research performers, namely the University of Malta and MCAST, and major biomedical companies located in Malta .	M
25 Sustainable Living Complex	State-of-the-art sustainable living complex r to house the Faculty for Built Environment, the Faculty of Education, the Institute of Sustainable Energy, the Institute of Earth Systems, and a School of Visual Art.	W
26 Research Centre of Excellence in Molecular Medicine & Bio-banking	The Centre will be housed in the extension of the Biomedical Sciences building currently being constructed with funds generated by the University. The Centre now requires funds to purchase state-of-the-art equipment to enhance its scope and research capacity	M
27 Post-doc and Research Incubator Complex	The construction of a Post-doc, Creative, and Engineering Labs Complex – coined as the University's trans-disciplinary "Research Incubator".	M
28 R&I Centre on Agriculture & Environment Management	The centre is meant to foster improvements and innovation within the agricultural community, while continuing to train the farming community. The Ministry is seeking partnership with Academic institutions (amongst which the University of Malta) in order to realise this project.	M
29 Innovation Centre of Excellence for Blood, Tissue and Cell Banking (ICE-BTC)	Platform for research in collaboration with the University of Malta allowing students (especially Masters, Doctoral and Post Doctoral) to further their studies and to provide a unique employment opportunity for highly qualified individuals in the field of cell therapy. CE-BTC is envisaged to be a top level training centre in the field of GMP and cell therapy.	S
33 Schemes with the aim of stimulating significant innovation, driven by the private sector	3 schemes: (1) grant scheme to support industrial research and/ or experimental development projects carried out for the acquisition of knowledge leading to the development of innovative products and solutions , and which aim to achieve a technology readiness level of 6 or higher); (2) support to Innovative and knowledge-based technology start-ups (mezzanine finance instrument to support innovative start-ups and Knowledge Based Technology Start-ups), and (3) supporting Private Research Facilities to facilitate the creation of privately-driven innovation facilities that aim to provide shared research facilities that support the development and exchange of knowledge and expertise among the undertakings and other organisations in a cluster (or network)	W
39 Life Sciences Park and Expansion Area	It is intended to enable the creation of a research, development and innovation cluster in Malta . The project is being developed by Malta Enterprise in collaboration with the University of Malta and the national hospital, Mater Dei.	W

Action Line	Policy goals	Suggested indicator	Suggested indicator
Q: Capacity building for excellence in climate change adaptation		Q1: Number of scientific publications (top tier journals) on climate change as % of total number of publications	Q2: Number of international R&D projects on climate change in which Maltese researchers are participating
44 ESERALDA	Mapping and assessment of ecosystems and their services (ES) are core to the EU Biodiversity (BD) Strategy. The 42-month long ESERALDA project aims to deliver a flexible methodology to provide the building blocks for pan-European and regional assessments on mapping ecosystems and their services. The work of the 18 partner consortium (of which MCAST) will ensure the timely delivery to EU member states in relation to Action 5 of the BD Strategy, supporting the needs of assessments in relation to the requirements for planning, agriculture, climate, water and nature policy.	M	S

Action Line	Policy goals	Suggested indicator	Suggested indicator
R: ICT as an enabler		R1: Number of SMEs engaged in e-commerce solutions	R2: % of households with access to broadband lines with speed above 10Mbps
10 Benchmarking and Competitiveness Reinforcement Initiative (CRI) for the Valletta Design Cluster	Valletta Design Cluster shall focus its strategic efforts in supporting design start-ups and enterprises addressing gaps or weaknesses in the identified value chains. The ultimate scope of the exercise is to strengthen the Valletta Design Cluster's efforts to incentivise and support innovation and internationalisation for Malta's design sector.	S	W

Action Line	Policy goals	Suggested indicator	Suggested indicator	Suggested indicator
S: ICT-based innovation		S1: % of public funding expenditures allocated to ICT technologies (both in public and private sectors)	S2: Number of innovative firms in ICT NACE codes	S3: share of ICT in EU-funded research projects awarded to Maltese actors
41 Implement a mobile innovative solution to improve the tourism experience in Gozo	Competitive call to find and implement an innovative solution to improve the tourism experience in Gozo through the utilisation of a mobile application.	M	M	M
42 Scheme to enhance the tourism sector	The scheme's objective is to contribute to development of various segments of the tourism industry . There will be different calls covering different sectors /areas within the industry such as: Start ups and entrepreneurship ; Palazzini – changing of old historical buildings into up-market places of accommodation; enhancing, upgrading and creation of visitor attractions and tourism experiences in order to increase digitization , hands on experience and child friendly interpretation; the creation of tourism products and services that result from the creation of networks created between traditional tourism service providers, the creative industries, artisans, etc.; the development of products and experiences relating to social tourism with special focus on senior tourism and increased accessibility; development of products and services related to emerging niche markets; international marketing initiatives; creation and promotion of innovative events which raise Malta's profile on an international level; improving Gozo's tourism offer through incentives to upgrade the self-catering accommodation sector.	M	M	M
45 R&I-2013-039 - Cloud HMI - Development of a framework to put human-machine interfaces (HMI) in the cloud	SMEs currently feel the burden of high expenditure for an HMI system when they require selective use. The proposed solution aims at filling the void between basic and advanced HMIs with a solution that can be run in parallel with basic controls.	S	S	W

Action Line	Policy goals	Suggested indicators								
T: Tourism product development		T-Z1: Value-added in relevant NACE codes	T-Z2: Exports in relevant NACE codes	T-Z3: Jobs in relevant NACE codes	T-Z4: Number of SMEs introducing innovations (all types) as % of total SMEs in relevant NACE codes	T-Z5: Turnover from innovation as a % of total turnover in relevant NACE codes	T-Z6: Number of researchers in relevant NACE codes and disciplines, split private and public	T-Z7: FDI attracted in relevant NACE codes	V-Z8 : Patents filed in relevant NACE codes and disciplines	T-Z9: Knowledge-based start-ups in relevant NACE codes
41 Implement a mobile innovative solution to improve the tourism experience in Gozo	Competitive call to find and implement an innovative solution to improve the tourism experience in Gozo through the utilisation of a mobile application.	S		S	S	S	W	W	W	M
42 Scheme to enhance the tourism sector	The scheme's objective is to contribute to development of various segments of the tourism industry . There will be different calls covering different sectors /areas within the industry such as: Start ups and entrepreneurship ; Palazzini – changing of old historical buildings into up-market places of accommodation; enhancing, upgrading and creation of visitor attractions and tourism experiences in order to increase digitization , hands on experience and child friendly interpretation; the creation of tourism products and services that result from the creation of networks created between traditional tourism service providers, the creative industries, artisans, etc.; the development of products and experiences relating to social tourism with special focus on senior tourism and increased accessibility; development of products and services related to emerging niche markets; international marketing initiatives; creation and promotion of innovative events which raise Malta's profile on an international level; improving Gozo's tourism offer through incentives to upgrade the self-catering accommodation sector.	S		S	S	S	W	W	W	M

Action Line	Policy goals	Suggested indicators						
V: Aviation and Aerospace		T-Z1: Value-added in relevant NACE codes	T-Z2: Exports in relevant NACE codes	T-Z3: Jobs in relevant NACE codes	T-Z4: Number of SMEs introducing innovations (all types) as % of total SMEs in relevant NACE codes	T-Z5: Turnover from innovation as a % of total turnover in relevant NACE codes	T-Z6: Number of researchers in relevant NACE codes and disciplines, split private and public	T-Z7: FDI attracted in relevant NACE codes
40 National Aerospace Centre	The NAC's specific focus on key strategic technology areas will lead to innovations in aerospace. The consortium, Ministry of Tourism, MCST and NLR have been successful in securing H2020 funding through Teaming to develop a business case for the setting up of a Centre of Excellence. The output of this 1 year project will be submitted as a Stage 2 Funding application (competitive bid) to H2020 to leverage funds for the first 5-7 year operation of the Centre. This application must be backed by an ERDF application for match funding for this to be considered for funding by the EU under H2020 (compulsory).	S	S	S	S	S	M	S

Action Line	Policy goals	Suggested indicators								
W: Health with a focus on healthy living and active ageing, and e-health		T-Z1: Value-added in relevant NACE codes	T-Z2: Exports in relevant NACE codes	T-Z3: Jobs in relevant NACE codes	T-Z4: Number of SMEs introducing innovations (all types) as % of total SMEs in relevant NACE codes	T-Z5: Turnover from innovation as a % of total turnover in relevant NACE codes	T-Z6: Number of researchers in relevant NACE codes and disciplines, split private and public	T-Z7: FDI attracted in relevant NACE codes	V-Z8 : Patents filed in relevant NACE codes and disciplines	T-Z9: Knowledge-based start-ups in relevant NACE codes
22 Competence Centre for Pharmaceutical Technology	The CoE will carry out R&D in Malta that is market driven and contract based and transfer the technologies generated into industry . The CoE will work closely with Malta's main research performers, namely the University of Malta and MCAST, and major biomedical companies located in Malta .	S	W	S	S	S	S	S	S	S
26 Research Centre of Excellence in Molecular Medicine & Bio-banking	The Centre will be housed in the extension of the Biomedical Sciences building currently being constructed with funds generated by the University. The Centre now requires funds to purchase state-of-the-art equipment to enhance its scope and research capacity	M	W	S	S	W	S	M	S	S
29 Innovation Centre of Excellence for Blood, Tissue and Cell Banking (ICE-BTC)	Platform for research in collaboration with the University of Malta allowing students (especially Masters, Doctoral and Post Doctoral) to further their studies and to provide a unique employment opportunity for highly qualified individuals in the field of cell therapy. CE-BTC is envisaged to be a top level training centre in the field of GMP and cell therapy.	W	W	W	W	W	S	W	W	S
39 Life Sciences Park and Expansion Area	It is intended to enable the creation of a research, development and innovation cluster in Malta . The project is being developed by Malta Enterprise in collaboration with the University of Malta and the national hospital, Mater Dei.	W	W	S	S	S	S	M	M	M
43 KENUP	Network of 64 innovation leaders applying for a knowledge and innovation community (KIC) on healthy living and active ageing. It will incubate and scale the multitude of ideas that exist all over Europe and pave the way for tangible societal and economic gains by bringing about regulatory and market reform.	M	W	S	S	S	S	W	M	S

Action Line	Policy goals	Suggested indicators								
X: Resource-efficient buildings		T-Z1: Value-added in relevant NACE codes	T-Z2: Exports in relevant NACE codes	T-Z3: Jobs in relevant NACE codes	T-Z4: Number of SMEs introducing innovations (all types) as % of total SMEs in relevant NACE codes	T-Z5: Turnover from innovation as a % of total turnover in relevant NACE codes	T-Z6: Number of researchers in relevant NACE codes and disciplines, split private and public	T-Z7: FDI attracted in relevant NACE codes	V-Z8 : Patents filed in relevant NACE codes and disciplines	T-Z9: Knowledge-based start-ups in relevant NACE codes
10 Benchmarking and Competitiveness Reinforcement Initiative (CRI) for the Valletta Design Cluster	Valletta Design Cluster shall focus its strategic efforts in supporting design start-ups and enterprises addressing gaps or weaknesses in the identified value chains. The ultimate scope of the exercise is to strengthen the Valletta Design Cluster's efforts to incentivise and support innovation and internationalisation for Malta's design sector.	S	S	S	S	S	S	S	S	S
25 Sustainable Living Complex	State-of-the-art sustainable living complex r to house the Faculty for Built Environment, the Faculty of Education, the Institute of Sustainable Energy, the Institute of Earth Systems, and a School of Visual Art.	W	W	S	S	M	S	W	M	M
44 ESERALDA	Mapping and assessment of ecosystems and their services (ES) are core to the EU Biodiversity (BD) Strategy. The 42-month long ESERALDA project aims to deliver a flexible methodology to provide the building blocks for pan-European and regional assessments on mapping ecosystems and their services. The work of the 18 partner consortium (of which MCAST) will ensure the timely delivery to EU member states in relation to Action 5 of the BD Strategy, supporting the needs of assessments in relation to the requirements for planning, agriculture, climate, water and nature policy.	W	W	S	S	M	S	W	M	M

Action Line	Policy goals	Suggested indicator								
Y: High value-added manufacturing with a focus on processes and design		T-Z1: Value-added in relevant NACE codes	T-Z2: Exports in relevant NACE codes	T-Z3: Jobs in relevant NACE codes	T-Z4: Number of SMEs introducing innovations (all types) as % of total SMEs in relevant NACE codes	T-Z5: Turnover from innovation as a % of total turnover in relevant NACE codes	T-Z6: Number of researchers in relevant NACE codes and disciplines, split private and public	T-Z7: FDI attracted in relevant NACE codes	V-Z8 : Patents filed in relevant NACE codes and disciplines	T-Z9: Knowledge-based start-ups in relevant NACE codes
22 Competence Centre for Pharmaceutical Technology	The CoE will carry out R&D in Malta that is market driven and contract based and transfer the technologies generated into industry . The CoE will work closely with Malta's main research performers, namely the University of Malta and MCAST, and major biomedical companies located in Malta.	S	S	S	S	S	S	S	S	S
Z: Aquaculture		T-Z1: Value-added in relevant NACE codes	T-Z2: Exports in relevant NACE codes	T-Z3: Jobs in relevant NACE codes	T-Z4: Number of SMEs introducing innovations (all types) as % of total SMEs in relevant NACE codes	T-Z5: Turnover from innovation as a % of total turnover in relevant NACE codes	T-Z6: Number of researchers in relevant NACE codes and disciplines, split private and public	T-Z7: FDI attracted in relevant NACE codes	V-Z8 : Patents filed in relevant NACE codes and disciplines	T-Z9: Knowledge-based start-ups in relevant NACE codes
24 Malta Aquaculture Research Centre	Construction of a marine hatchery and research facilities.	S	S	S	W	M	W	W	M	W
38 Aquaponics	Aquaponics is a new technique to explore as an alternative market for Maltese agriculture. Contacts have been made with a local developer which has constructed a small demonstrating unit. Trials will be carried out on this unit, and provided the required funding is sourced, a small commercial unit will be constructed for further evaluation.	S	S	S	S	M	M	W	S	M

How to obtain EU publications

Free publications:

- one copy:
via EU Bookshop (<http://bookshop.europa.eu>);
- more than one copy or posters/maps:
from the European Union's representations (http://ec.europa.eu/represent_en.htm);
from the delegations in non-EU countries (http://eeas.europa.eu/delegations/index_en.htm);
by contacting the Europe Direct service (http://europa.eu/europedirect/index_en.htm) or
calling 00 800 6 7 8 9 10 11 (freephone number from anywhere in the EU) (*).

(*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

Priced publications:

- via EU Bookshop (<http://bookshop.europa.eu>).

To support countries in reforming their research and innovation systems, DG Research & Innovation of the European Commission set up a Policy Support Facility (PSF) under the Horizon 2020 Research and Innovation Framework Programme, aimed at improving the design, implementation and evaluation of R&I policies.

The Maltese authorities expressed their interest in receiving specific support under the PSF for the development of a monitoring system for the Action Plan implementing the Maltese National Research and Innovation Strategy.

This report proposes the overall architecture, principles, operational steps and input, output and result indicators for such a system. It is the product of the analyses and interactions of two external PSF experts and a wide range of stakeholders and organisations in Malta involved in the design and implementation of R&I policies.

The report sets up the framework conditions and the rules for good governance of the monitoring system.

Studies and reports