

## **Executive summary:**

The ERA-PRISM OMC Network was established to helping small European countries (with a population less than 2.5 million) through more effective R&I (Research and Innovation) policy design to play a more effective role in the drive to establish the European Research Area. At the same time the project engaged larger countries to ensure wider policy learning and exploring ways in which their links with the small countries could be beneficial. The underlying issue explored was scale dependence in R&I Policy.

The project had four main elements:

- The development, improvement and use of appropriate R&I indicators for more effective benchmarking of policies;
- Adapting the use of public procurement to stimulate research and innovation;
- Achieving balance within research funding systems; and
- Mutual learning approaches across a series of policy issues of common interest.

Work on indicators included an extensive compilation and analysis of R&I data on small countries, a survey of policymakers about their usage and requirements for indicators, policy dialogue workshops and a case-study based examination and aimed to get behind the numbers on individual publications and patents.

The adequacy of indicators currently used for small countries was questioned at three levels. The first, the governance of data collection raised issues about timeliness, the existence of reduced datasets, confidentiality concerns, difficulties in classifying multi-tasked activities and exclusion of small countries from some datasets. The second category, statistical issues, highlighted the consequences of the small numbers of observations and the mechanistic effects of small size leading to phenomena such as very high proportions of internationally collaborative publications. Thirdly, there were issues of comparability and interpretation, raising questions of what to highlight and how to select the right benchmarks given the great variety of situations in the countries. Considering the needs for future indicators, systemic requirements include the need to upgrade or redesign data collection and the need to capitalise upon smallness to explore quantitative data through qualitative follow up. The criteria for adequate indicators for small countries were that they should be Specific, Stable, Practical, Robust, and Amenable to analysis. Work on the exploration of potential to use public procurement to drive innovation (PPI) in small countries drew on the experiences of larger partners and was executed through five exercises: a review of countries' policies and practices, a survey of 33 ministries on use of PPI, case-studies, a review of demand-led policy incentives and a survey to define high potential sectors. The project found that innovation procurement is finding its way onto the policy agenda and will increase through EU activities. A base of experience already exists in using advanced 'innovation-friendly' procurement approaches. Small countries have provided some leading edge results, though primarily in ICT-related or 'architectural' innovations.

Work on funding frameworks aimed to identify particular features of small country funding governance structures and their implementation. It was based on comparison of detailed structured country briefs, targeted supplementary surveys to project members, two policy dialogue workshops and input from an external advisory panel. Research systems were characterised in terms of how selective the system is between fields of research (for example

the role of priority setting), how concentrated the research system is (for example the degree of competitive funding and its consequences) and how sustainable the research system is (involving issues of age and replacement of the research labour force, role of international cooperation, and the response to the economic crisis). As an OMC project, it can be argued that the principal users of the outputs are the participating governments.

## **Project Context and Objectives:**

### Context

The recent consultations on the launch of the ERA Green Paper and the review of progress to date in implementing the ERA highlighted the fact that one-size-fits-all approaches do not work and more efforts need to be invested in designing R&I policies for specific countries and sectors. Effective R&I policy design should take into account the country context, i.e. the particular framework conditions for R&I, the historical and socio-economic backdrop, the level of economic development, path dependency and the transition challenge to move from outdated systems of governance (resulting from Soviet or colonial legacy). ERA-PRISM is based upon the observation that there are scale effects in research and innovation (and in the systems which support them) and hence that the needs of small European countries are not best served by a one-size-fits-all approach or by benchmarking with much larger economies.

The project was based on the premises that:

- there is an advantage in helping small countries to understand better their common research and innovation policy challenges relating to both constraints and opportunities and to identify areas for mutual learning and complementary action;
- small European countries have developed and in many ways benefited from important links with larger Member states and these collaborations should not be underestimated but need to be enhanced to ensure faster learning and catch-up processes.

An immediate issue was the need to have a working definition of a small country for the purposes of the project. There is a long-standing literature on the issue of small nations or small economies. International organizations such as the United Nations and the Commonwealth have also sought to address specific policies to such nations. Identification of small countries has normally relied on a definition based on population, typically less than 1.5 million. Geographical territory and GDP are also considered. All such analyses recognize the need for some flexibility and the official lists normally contain some additional entries which do not meet the officially stated criteria.

For ERA-PRISM population size was taken as the key criterion since this can most directly be related to R&D and innovation potential. Our working assumption for this project was to group countries with a population of less than 2.5 million. The following EU member states met this criterion: Cyprus (0.78M), Estonia (1.34M), Latvia (2.27M), Luxembourg (0.48M), Malta (0.41M), and Slovenia (2.03M). In addition, we have included Iceland (0.30M). Any cut-off point has some degree of arbitrariness but with this definition we have a gap of over 1 million to the next largest state (Lithuania) and a clear distinction from medium-sized economies such as Denmark, Finland, Bulgaria and Austria. An alternative terminology would be to refer to micro-economies but for the purpose of the project the above understanding of small size was applied.

The project brought together a group comprising these small European countries, and together with expertise from other Member States sought ways of taking forward key aspects of the development of the European Research Area in the light of their context, resources and governance. The ERA-PRISM project has focused primarily on addressing the need to develop more effective research and innovation policy design for small EU member states in playing their part in the drive towards establishing the European Research Area. The

consultations on the launch of the ERA Green Paper and the review of progress to date in implementing the ERA have highlighted the fact that one-size-fits-all approaches do not work and more efforts need to be invested in designing R&I policies for specific countries and sectors. Effective R&I policy design should take into account the country context, i.e. the particular framework conditions for R&I, the historical and socio-economic backdrop, the level of economic development, path dependency and the transition challenge to move from outdated systems of governance (resulting from Soviet or colonial legacy). In the case of small countries, more specifically, concerns over policy lock-in, lack of critical mass, brain drain, dependency on Foreign Direct Investment (FDI), raise particular policy challenges requiring targeted policy responses.

The Project focused efforts on a number of specific policy concerns at varying levels of depth and coverage as follows:

1. In-depth focus on improving and refining R&I indicators, primarily building on the European Scoreboard and Community Innovation Survey. This will be addressed through a dedicated work package.
2. In-depth focus on public procurement for innovation which will build on the ongoing OMC-PTP project. Two partners from this project form part of ERA-PRISM and will provide this important link between the two projects to avoid duplication of effort and ensure that the learning from the OMC-PTP project will be incorporated and built upon. The aim is to add value to OMC-PTP by focusing on the small country dimension of public procurement for research and innovation and address the Lead Markets Initiative. This will be addressed through a dedicated work package.
3. In-depth focus on research funding frameworks for small countries. The issue here is that with a lack of diversity of funding instruments (and funding sources) individual grant decisions can have major consequences for research teams. At the same time there is a need to explore the best balance between base funding for institutions and infrastructures versus competitive funding to reward the best teams, stimulate excellence and to assure sustainability. This will be addressed through a dedicated work package.
4. A broader coverage of a range of R&I policy issues which provide the context for the ERA-PRISM work. These include: peer review and evaluation, mobility, international cooperation and other European issues which may emerge over the lifetime of the project. These will be addressed through the mutual learning work package.

### Concept

Several issues may be identified which are scale dependent in R&I policy:

- Maintaining broad coverage of science and technology may mean that resources are spread thinly and that capacity in a field is dependent upon one or two key individuals: as a result the ability to assemble interdisciplinary teams nationally may be inhibited where key gaps exist. This creates a particular vulnerability to brain drain and highlights the importance of effective measures for inward and outward mobility of researchers.
- Scoreboards such as the European Innovation Scoreboard are not effective enough in capturing the extent of R&I capacity, activity and/or progress in small European countries due to the fact that some indicators are not relevant, or are not currently captured by

national statistics office surveys, or the figures available date back to surveys held several years before. Indicators of research and innovation are prone to fluctuation because the effect of a single firm or institution can be highly significant as noted in the EIS 2007. Some small EU member states such as Estonia Slovenia and Malta are currently not included in OECD's main S&T indicators review and this restricts comparison across different scoreboards;

- Funding frameworks for R&I require particular adaptation to the small country context and framework conditions if they are to prove effective and sustainable, particularly in stimulating private sector R&D investments.
- International collaboration is likely to account for a much higher proportion of activity than in a large country. While this has advantages it may inhibit the emergence of a national strategy or effective implementation of national R&I goals where these are set, due to a drain of human resources experienced with growing participation in EU programmes (FP) ;
- S&T policy capability and national statistics often involve a few individuals multi-tasking. While coordination is simplified, meeting specialized requirements imposed externally may be problematic;
- More generally small economies can be highly coordinated and fast-moving on the one hand but on the other hand there may be lock-in to existing relationships between institutions;
- Small markets make it harder to develop lead markets for the introduction of innovations. On the other hand specialized needs of smaller states could be a market in themselves and some pooling of market opportunities could be beneficial.
- Small countries face particular challenges with peer review and evaluation and often have to rely on external peer reviewers for evaluation and selection of project proposals to be funded through national research programmes. On the other hand the evaluation and review of the performance of small countries in R&I are often problematic due to the fact that external reviewers tend to evaluate a small country through a large country lens.
- Small countries are rarely able to afford large scale or even medium scale scientific infrastructures and hence are particularly dependent on sharing and/or access arrangements.
- Danger of 'overspecialisation' on the one side and 'over generalisation' on the other. The challenge is how to find appropriate balance between these two ends. The ability to adapt to external shocks depends on this equilibrium!

These issues point to the need to address effective R&I policy design on a number of levels, including:

- The development, improvement and use of appropriate R&I indicators for more effective benchmarking of policies between large and small member states regardless of scale.
- The appropriate design of funding frameworks and programmes
- Adapting innovative and green procurement approaches to small scale markets
- The development of an appropriate evaluation framework which takes account of small size.
- The need for mutual learning platform linking small countries where they can share policy experiences and develop more coordinated approaches at European level to address these challenges.

### Project objectives:

ERA-PRISM's prime focus was the development of an appropriate R&I policy mix for small member states. The project achieved this by starting up a discussion and exchange of experiences on a range of policy issues relating to scale effects. ERA-PRISM's main objective was to initiate a process for developing appropriate and better specified R&I policy design and mix for small countries to ensure their more effective and proactive participation in the European Research Area. This is especially important now after the introduction of Joint programming initiative, which presupposes well-elaborated national research strategies.

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### Main Goals:

The project implemented these aims and objectives by:

- building on relevant ongoing European R&I policy initiatives and projects in the area of R&I indicators and public procurement for innovation and define the relevance of their insights and results for small countries;
- enhancing existing links with larger countries with a view to developing collaborative partnerships in R&I policy development and implementation;
- setting up a mutual learning platform on R&I policy design to serve as a point of reference for small EU member states and other small countries outside Europe. Links with IPTS and its ERAWATCH Inventory as well as the Pro-Inno Europe will be developed with a view to ensuring a more accurate reflection of national R&I capacity and current activity.

- developing joint policy coordination activities between the project partners to address: R&I indicators, public procurement for innovation and R&I funding frameworks for small countries. Joint policy coordination activities are here defined as the development of information-sharing, exchange visits and collaborative arrangements between the partner countries to build closer working links. They may build on ongoing national initiatives in the partner countries and will encourage more focused exchanges of experiences and good practices between different configurations of partners.

## **Project Results:**

### Main S&T results

The main results of the project may be divided into two principal categories:

- Policy domains (Indicators, Public Procurement, Funding Frameworks)
- Methodological developments (surveys, policy dialogue workshops, mutual learning exercise)

### Policy Domains

#### *Adequacy of R&I Indicators and potential future requirements for new indicators*

A key objective of the ERA-PRISM project was the analysis of current research and innovation indicators in part to assess to what extent these are adequate in representing the R&I situation, capacity and performance of small countries and to guide policy action. A further objective was that by identifying shortcomings, recommendations could be made for improving the utility of current indicators and proposing new indicators.

The analysis was based upon four related exercises:

1. An extensive compilation and analysis of research and innovation indicators for the small countries;
2. A survey of policymakers about their usage and requirements for indicators;
3. Policy Dialogue Workshops held in Paris and Reykjavik reviewing current and potential indicators; and
4. A case-study based examination aimed at getting 'behind the numbers' on individual publications and patents.

#### *Adequacy of Indicators*

The term adequacy needs to be considered in relation to a purpose - adequate for what? A starting point has come from the survey of policymakers in small countries which indicated three major types of usage of indicators:

- Policy design and orientation - in principle policy interventions exist to correct deficiencies, the most fundamental being the well-argued case for government to finance basic research but also extending to market and system failure rationales for the full range of research and innovation policies. The foundation of such rationales lies in the existence of metrics to describe the existing situation and the construction of targets to indicate ways in which the policy could improve it.
- Benchmarking performance at European level - this is increasingly an issue of compliance with obligations agreed to as part of EU policies (for example basic indicators are combined to construct the Innovation Scoreboard);
- Assessing the performance of the research and innovation system. Linked closely to the preceding two uses, performance assessment may be set in the context of comparison with others, be longitudinal or set against expectations. In all of these circumstances indicators play a role in effecting the comparison. At this level, the use is not only from the bird's eye view of the policymaker but also is relevant for research performers who may wish to assess their performance or standing.



Indicators may thus be assessed in terms of their ability to support these functions. It should be recalled from the beginning that many indicators are in effect proxies (for example citation counts as a proxy for quality of research and patents as a proxy for innovation). Hence assessments of adequacy are limited by the ability of the proxy in particular circumstances to provide an acceptable measure of the real policy goal.

A strong message coming out of the studies has been that the adequacy of an indicator should not on its own be assessed on the basis of whether small countries exhibit particularly poor or strong performance against it. Such performance may be real. On the other hand if the extreme values turn out to be a statistical artefact related to the size of a country then questions about its utility may be raised. Similarly, the utility and hence adequacy may be challenged if most small countries are compressed at one end of a geometric scale - for example the absolute amounts spent on R&D. This highlights the apparent dichotomy between political sensitivity (having 'looking-good' indicators) versus functional efficacy ('policy useful/meaningful' indicators). Political sensitivity also emerged around the issue of clustering of countries for indicator purposes and highlighted the need to balance socio-cultural and geographical proximity with scale issues.

The work in ERA-PRISM has exposed issues relating to adequacy which may be assessed in three main groups:

- governance of data collection;
- technical statistical issues; and
- comparability of interpretation.

Taking these in turn:

#### *Governance of Data collection*

One group of issues results from the process by which data are collected in several of the small countries covered by this study. Resource limitations may mean that the frequency of data collection is reduced in comparison with larger states and hence that data items may be out of date but persist as the most recent observation in comparative tables. It should be noted that some small countries have an exemplary record in data collection with more complete data than large states.

A combination of these limited resources at National Statistical Offices and the restriction of having to abide by the same statistics regulations as the large member states may lead to the production of less strictly regulated statistics. In turn this may result in publication delays, small sample sizes, shortened questionnaires and fewer resources dedicated to indicator development and data validation. All these factors affect the comparability of indicators across countries

In the field, the limited number of players means that the response burden can be highly concentrated with, for example, the same firms being repeatedly asked for data whereas, in a larger country, a sampling approach would introduce variety. Feedback from project members suggests that response burden may result more in missing values than in absolute non-compliance.

An observer might expect that in small countries all the person and business registers would be matched (since it would be very easy to do it) but this is not the case. In the smallest countries people may even be more concerned about data confidentiality and privacy. Indeed, some indicators may not be published due to the fact that it may be obvious that the data pertains to a particular company.

A pressing issue in statistics is merging data from different sources. In small countries this is problematic for two reasons. Firstly, merging two small data sets leads to one tiny data set. Secondly, biases due to matching two survey data sets are bigger than in large samples. This data merging affects more the data reliability in small countries. OECD and Eurostat have had, and will have, research projects comparing country performances in RD, innovation and ICT. These studies increasingly are based on merged data sets. Small countries are at risk of exclusion from this work. There should be parallel projects analysing the same issues in less data intensive frameworks to which the small countries could also contribute.

A common feature in small countries is multi-tasking whereby respondents may have more than one identity in the research and innovation system. Issues of classification become more important in this context with a risk of over-reporting being one area where caution is needed.

International structures for data collation and comparison do not always extend to all small countries. Some small EU member states, for example Malta, Cyprus, Latvia and (in the past) Estonia, are not included in OECD Main Science and Technology Indicators, and Iceland is not always included in Eurostat data.

Finally in this category we may encounter variations that may also be true for larger countries but which nonetheless are important, these being differences in definitions or means of collecting data (and also interpretations by respondents to surveys).

### *Statistical issues*

Broadly speaking there are two classes of statistical issues which need to be noted when dealing with small countries, the first resulting from small numbers of observations and the second from what Remi Barré has termed the 'mechanistic effects of small size'.

Taking first the small size of survey populations, this means that the behaviour of an individual institution can affect the macro result, particularly if it is a major player in the system. For example the closure or relocation of a large industrial establishment can result in sharp fluctuations in the level of business R&D. When such instability is apparent it is essential that the disruptive event is identified if adequate interpretation is to be achieved. Indicators should always be accompanied by comments or notes to make such information available.

A second consequence of small populations is that there is less opportunity for errors to be smoothed and hence results could be inherently less reliable. On the other hand this effect may be offset by a higher probability of such errors being detected in the first place.

Turning to the mechanistic effects of small size, certain results become highly likely but need careful interpretation. One such case is the high incidence of international co-publication. For some countries, high international co-publication is taken as a measure of the attractiveness of its researchers as research partners. However, while this may also be the case for small

countries, for them it is primarily driven by the fact that low numbers in a particular field mean that collaborators are far more likely to be situated across borders. The same argument applies to research facilities. For those which have less developed research systems this effect could be amplified by EU or other international funding accounting for a relatively high proportion of research project support.

High mobility is another feature that is strongly associated with small size. In some small countries, notably those with land borders, statistics may be affected by border-related features. For example GDP in Luxembourg includes wealth created by cross-border commuters who constitute one third of the workforce.

Finally, there is the structural feature of small countries tending to have a high presence of SMEs in their business sectors. Small firms account for between half and three-quarters of all innovation spend in this group. A large number of these are micro-enterprises which currently fall below the threshold for data collection. Even if resources were made available to collect the data there would then be an issue of response burden.

### *Comparability and interpretation*

Issues raised in this category include both the choice of what is measured and analysed and where any benchmarks for performance might lie. For example there are phenomena visible at national level which may only surface at regional level in larger countries but new difficulties of comparability arise if an independent country is compared with a region that has far less autonomy and is almost certainly reliant to some degree on national research and innovation institutions beyond the regional boundary.

In the light of the structural features discussed above, it follows that certain issues are likely to be of higher interest in small countries and hence demand more input from analyses of indicators. Specialisation, both in research and more generally, is inevitable for a small country and carries with it a high degree of risk. Policymakers are likely to wish to track the data underpinning decisions on, for example, investments with particular care. A related issue is that of critical mass, resources are typically spread thinly in small countries making them vulnerable to the departure of individuals or mobile organisations. Measurement (or even understanding) of critical mass is underdeveloped but important here. A final example in the category of highlighted policy issues is that of international collaboration (and strategy for participation in EU activities).

The overall balance of what is measured can also be inappropriate. Several small countries have indicated that available indicators are excessively focused on R&D when the structure of their economies, due to critical mass or other issues, means that there is a highlighted need for tracking and promoting innovation (including service and organisational innovation which may not be directly based upon R&D).

Small countries may wish to place particular emphasis upon variables such as co-patenting and co-publication which reflect issues of high priority for them and correspondingly less upon measures which are dependent upon scale.

The issue of finding suitable benchmarks to assess performance is particularly problematic. ERA-PRISM studies have revealed more diversity than commonality among small countries, ranging from areas of specialisation in research, innovation and economic structure and also

in the levels of development and performance of the systems. While commonalities have been found in such areas as governance issues and interaction with the EU, in practice many small countries are more likely to benchmark themselves in regional groupings (e.g. Nordic, Baltic, Mediterranean...) even where the other members of the grouping are much larger. This also links to the point made above about political sensitivity, in this case the argument being about clustering of countries and consequent comparisons of performance.

### *Potential Future Requirements*

The previous section has emphasised the very real challenges encountered in developing an indicators framework that is adequate for the needs of small countries. In this section we aim to identify the requirements for constructing such a framework. This falls into three sections: requirements at systemic level; criteria for indicators; and specific suggestions for areas where indicators need to be developed.

### *Systemic requirements*

As a starting point, there seems to be a need to upgrade or re-design data collection systems. This issue needs to be addressed in the forthcoming revision of the Frascati and Oslo Manuals. Requirements from small countries can be communicated to NESTI at OECD and to Eurostat. A particular concern is the guidance on data for Technology Balance of Payments. Transnational flows of resources are key for small countries and are not seen to be adequately captured at present.

Improvements in data collection in turn would be facilitated if they are conceived as part of an information system with open and clear documentation. Such activities are more likely to be properly resourced if they better meet the needs of policymakers. From the discussion above this implies putting in place or upgrading a well developed framework for analyses and interpreting capabilities for the indicators. This should make it easier to generate a holistic picture for policymakers in small countries. This is an area again where some small countries have already made good progress in making data transparent and could be seen as an exemplar of good practice.

Cooperation between the bodies responsible for collection and analyses of indicators in small countries could result in more influence upon international statistical bodies such as EUROSTAT and OECD and in turn produce approaches which are more sensitive to the needs of small countries.

Examples of shortcomings are:

- CIS does not collect information on the innovation outcomes of projects or of day-to-day problem-solving.
- CIS does not account adequately for differences between the service and manufacturing sectors.
- The classification of NACE does not easily allow for the capture of new or emerging sectors such as financial services and gaming which are significant for some small countries.
- CIS does not capture innovation in microenterprises under 10 employees.

- There needs to be wider core sectoral coverage of CIS and extension by the small countries themselves to relevant sectors - in most countries sectoral coverage is weak. The proper channel for addressing this is Eurostat and the relevant directive.

Work in ERA-PRISM has shown that there is a small-country advantage emerging from the 'behind the numbers' approach in that it is possible to gain an extra level of interpretation and understanding by combining qualitative and quantitative approaches. This involves sampling indicators such as publications and patents (individually or in clusters) and using interviews with the authors or others to interpret their significance.

Picking up the point about the need to annotate official data, the methodology of data collection and calculation of indicators should include data to characterize the variation of the samples when it is known that fluctuations may have potentially important consequences. The sensitivity of indicators due to sampling variations has not been sufficiently taken into consideration, particularly but not exclusively for small countries. Real case simulation should be conducted if not already done.

Not specific to small countries but important nonetheless is the need to link categories used in different databases (e.g. fields of research and sectors) to allow, for example, tracking of commercialisation of research. It is possible that this issue could be more important in a small country context where specialisation needs are more acute (and this approach would make linkages more visible).

#### *Criteria for Indicators*

Any indicators selected on the basis that they are useful for small countries will need to meet a series of criteria. The list below shows the generic criteria for useful indicators based on the discussion of adequacy above:

- Specificity
  - Correspondence to property being measured - avoid measuring only what is easily measurable
  - Avoidance of over-dependence on assumptions about input variables
  - Sensitive to country-specific characteristics - economic, social, cultural, historical
- Stability
  - Needs to remain valid over the range of values which cover the subjects under study
  - Avoiding sudden points of inflection/scalable
  - Sufficient frequency to avoid dependence on micro-events
- Practical to collect
  - Affordable data collection as far as possible using existing sources and low burden
  - Mutual confidence in data quality between countries
  - Avoidance of cultural factors or assumptions which may affect response
- Engender confidence
  - Robust to attempted manipulation
  - Understandable intuitively - avoiding complex mathematical manipulations
  - Replicable
- Amenability to analysis

- Comparison possible longitudinally, with comparators/benchmarks and against expectations
- Can sensibly be combined with other indicators

(Source: ERA-PRISM Policy Dialogue Workshop, Reykjavik May 2011)

### *Specific Indicator Needs*

Some specific needs for indicators identified during the course of the project are identified below.

The first need is for a class of indicators that highlights the potential of a research and innovation system rather than its level of attainment. For example this could measure the rate of progress in developing publication or citation profiles or the rate of development of research infrastructures.

Policymakers have also indicated that they would like to see more reflection of the measurement of impact in the indicator portfolio. This would require systematic monitoring and evaluation frameworks to be put in place and as mentioned above linkage of databases to allow tracking of developments.

Turning to some of the issues highlighted above, specific indicators are desirable to address:

- Specialisation, particularly of applied research;
- Cohort studies of the location of SET graduates (because of the high numbers studying abroad);
- Use made of foreign research infrastructures;
- Measurement of the consequences of international collaboration;
- Statistics on the R&D and innovation activities of micro-enterprises;
- Indicators of wider innovation activities (including innovation in services) that are not reflected in the production of patents;
- Public-private partnerships;
- National patterns of collaboration and networking.

### *Public procurement of innovation in small countries*

The potential for the use of public procurement as an instrument to stimulate innovation has received growing emphasis in Europe in recent years. Representing 16.3% of European GDP, public procurement represents a key source of demand for firms in sectors such as construction, health care and transport, and a major area in which governments are striving to improve effectiveness in their delivery of public services.

The official EU definition of public procurement is: 'The process used by governments, regional and local public authorities or bodies governed by public law (financed, supervised or managed for more than 50% by public authorities) to obtain goods and services with taxpayer money.' ERA-PRISM is concerned with what is called Innovation Procurement, Innovative Procurement or Public Technology Procurement. All of these are intended to use public procurement of innovative goods and services to induce innovation by specifying levels of performance or functionality that are not achievable with 'off-the-shelf' solutions and hence require an innovation to meet the demand. The innovation may also require R&D.

The project explored whether the opportunity to use procurement to drive innovation is one that is available to small countries in Europe, nations defined by the ERA-PRISM project as those with a population of less than 2.5 million. Using country profiles, a survey of ministries on the use of public procurement which received 33 responses and case-studies, as well as comparison with large countries (notably the UK and Sweden), the project examined the experience of five small countries: Estonia, Latvia, Iceland, Malta, and Slovenia.

#### *Overall situation*

The annual procurement spent as a percentage of GDP in the small countries tends to be below the EU average. Available data are rather limited but project enquiries indicated levels somewhat higher than those shown in official statistics collected by Eurostat, probably because these include only those advertised via the Official Journal of the European Communities. 2008 figures show annual spend in public procurement as a % of GDP as Latvia (10.3%), Estonia (10.8%), Slovenia (12.98%), Iceland (13-16%) and Malta (16-18%).

#### *Responsibilities and configurations*

Most of the five countries have a centralised procurement policy. Slovenia has a semi-centralised structure, where decision making in procurement is the responsibility of various ministries. In general procurement is the responsibility of a central body, subordinated to the Ministry of Finance of the Ministry of Economy. The central bodies undertake a number of functions: Responsibility for core policy and (in some cases) legislative functions; National and international co-ordination; Administrative and monitoring tasks; Publication and information; Professionalization and capacity building and in some cases they also act as a central purchasing unit.

#### *Procedures and coordination*

In general the countries have no standardised procedures for procurement, particularly in more decentralised settings. Generally individual ministries are responsible for procurement procedures. Similarly, there are no central purchasing organisations. However some ministries are in charge of procurement of certain goods or services on behalf of others, for example the Ministry of Public Administration in Latvia and Slovenia. However, joint procurement across government tends to be the exception rather than the rule and is limited to generic goods and services.

However there are recent instances of large joint procurement projects, for instance big common building projects such as sewage systems (Slovenia), centrally led improvement processes such as the procurement of corporate systems (Malta), and complex procurement such as transport and IT (Estonia). Certain countries, such as Iceland, make extensive use of framework contracts as a form of coordination in procurement.

#### *International cooperation*

There are not many examples of international cooperation in procurement involving the small countries but the cases that exist are focussed on Nordic cooperation. The countries all have participated in EU level collaboration activities for the sharing of good practice and training.

Procurers in many countries maintain international contacts at a personal level, with regular contacts to determine the best practices for public procurement. The project survey indicated



that collaboration is seen as a positive way to achieve better value for money, access to expertise, bigger and more competitive markets, and to support innovation. However, some respondents indicated a need to deepen collaboration at national level first.

#### *Supplier base and procurement capacity*

Procurement in our five countries is highly reliant on local suppliers, with a small participation of international players, with ratios of about 90% local and 10% international suppliers (higher for Estonia and Latvia, lower for Slovenia and Malta). Many international companies may have a branch office in the country.

#### *Innovation procurement policy*

Only Estonia, Iceland and Malta explicitly include the use of public procurement as a policy tool to stimulate innovation in policy documents. However no local guidelines to implement this policy have been developed to date. Green procurement is a stronger concern in all five countries and reflected in policy design and implementation.

#### *Capacity*

There are generally no formal schemes being carried out to professionalize the procurement function (university programmes, training courses, professional networks, etc) in the countries in question. For staff involved in procurement across the civil service, training is most of the time an on-the-job affair', rather than attained through formal qualifications. Generally training is provided to procurement officers within departments through training programmes, with the collaboration of the central procurement body.

The survey of ministries reveals different attitudes in relation to whether procurers have sufficient commercial/technological skills to understand the possibilities of innovation in the marketplace. In general there is a perception of a relative paucity of skills and expertise and significant room for improvement in developing those.

#### *Innovation in procurement practice and in procurement activities*

Modernisation of the procurement process and good practices were reported in terms of e-services and e-administration, green procurement, better IT systems, improved (more user-friendly) procurement processes creating better opportunities for suppliers, and processes to stimulate innovation such as negotiated procedures and technical dialogue. There were also concrete examples of innovation procurement such as Mobile parking in Tartu, Estonia and the electronic Reykjavík gateway.

#### *Hypotheses about small country procurement*

When asked to give their views on a series of hypotheses about innovation procurement in small countries, a wide range of views was recorded, varying between and within countries. The survey of ministries asked respondents to indicate whether they agreed or disagreed with a series of statements or hypotheses relevant to innovation procurement in small countries. There is always at least a significant minority of ministries who perceive both the disadvantages and the opportunities of the small country situation.



However, if results are examined in aggregate, it can be seen that only two of the propositions, those of needs not being well met by international goods and that procurement decisions favour foreign suppliers, fall on the negative side. All others show some degree of agreement, with the strongest consensus around the opportunities of niche markets, insufficient local competition reducing the incentive to innovate and the constraint of lack of procurement expertise.

#### *Aggregate results of ministry survey*

- Small countries have niche markets that offer opportunities for innovations that could be exploited in other settings: 3.93
- A low level of local competition reduces the incentive to innovate: 3.82
- Small countries often lack sufficient procurement expertise for complex purchases involving innovation: 3.63
- Local markets are hard to break into for newcomers: 3.35
- The dependence of local suppliers on government makes legal challenges more likely and creates a risk averse culture: 3.25
- Structural funds offer an opportunity to link procurement for innovation to the modernisation agenda: 3.24
- The local supply base is averse to cooperation between firms: 3.22
- Smaller government means better coordination and the possibility to bundle demand: 3.22
- The local supply base often lacks the capacity to innovate: 3.03
- Small countries can have specific needs that are not well met by goods or services designed for international markets: 2.82
- Procurement decisions may favour foreign suppliers: 2.22

*(Legend: 1: Strongly disagree; 2: Slightly disagree; 3: Neither agree nor disagree; 4: Slightly Agree; 5: Strongly agree)*

#### *Case studies*

As well as compiling a database of case-studies across Europe the project conducted a series of original case-studies of innovation procurement in order to engage with the sometimes complex and unpredictable nature of real world procurement and to offer the possibility to reduce errors in the future and capture ideas that worked. Three examples are summarised below:

For each of these cases, positive impacts have been reported in terms of resource efficiency and timeliness of service

- X-Road provides new technological possibilities for creating public services - it has increased the state's administrative ability and decreased the need for resources for administration. It has provided basis for exports to other small countries demonstrating lead market effect.
- Active Data Centre: The product performed well as expected and was more efficient than what it replaced. The product met the target in terms of cost-efficiency, but it cannot be directly compared with its predecessor due to different/additional functions, and lack of information of the previous system. The level of service to the end-users improved due to the specific business requirements.

- Smart card system is still in its introductory phase with the smart cards available to the users for about 6 months - mainly used for bus service. After this first phase, expansion of functionalities to all mentioned above is to ensue. So far, the feedback is mostly positive and there have not been any major technical concerns. Overall, the public have an easier, less complicated and more modern way of accessing the city services, especially when taking into consideration the future functionality expansions. Previously, they were using a plethora of paper copy tickets, membership cards, and were not always able to predict what sort of payment would be possible for various kinds of services or tickets.

#### *Insights from case studies*

- Small countries appear well able to engage with innovation procurement in the ICT Sector The case studies which involved the greatest degree of innovation and the most complex procurement procedures (negotiated procedure and competitive dialogue) were in the ICT sector.
- Beyond conventional solutions: In these cases there was a clear need in government, so the needs of the purchaser were being met, but those involved went beyond conventional solutions to achieve an innovation-based result.
- Advanced procedures are not a panacea: It was not a coincidence that these procedures needed to be used - needs were complex and had to be articulated over a period of time with a significant degree of interaction.

#### *Potential for small countries and innovation procurement*

The investigations reported here indicate that innovation procurement has begun to find its way onto the policy agenda for small EU member states. Interest in this approach is likely to increase as a result of the Innovation Union initiative and other supporting measures from the European Commission. Interest and expertise in this approach are also likely to spread from some of the larger countries who have longer experience in this area, though they too are in a learning mode.

It is also the case that the small countries have some background upon which to build their capability. Some of the more challenging innovation-friendly procurement procedures have been used (competitive and technical dialogues) and both the case-studies and the survey have yielded examples of innovation emerging from procurements, even though much of that innovation was incremental or architectural (combining existing technologies in novel ways and/or in new situations). Survey data indicated some evidence of procurement linked to innovation in all of the countries. Future opportunities are also perceived.

In some respects the small countries have dissimilar approaches to public procurement. There is a greater tendency to have centralised structures but this is not uniform in all cases and joint procurement is occasional and normally limited to the Ministry level. There is also some variation on how prescriptive procedures are across government. No country studied has established a strategic policy on innovation procurement so far, despite various attempts and initiatives. This can be contrasted with a more institutionalised approach to green procurement.

Not surprisingly, human capacity to handle more complex innovation-related procurement has emerged as a key constraint in all countries. In some countries the capacity of local suppliers to respond is also questioned, linked to lack of local competition. While niche markets for

small countries were widely seen as an opportunity the broader advantages of small size do not yet seem to have been exploited, including better coordination and easier aggregation of demand.

### *Funding Frameworks*

This part of the project provided a comparative analysis of the funding frameworks for research and innovation in small European countries. It examined funding governance structures, policies, and their implementation in the ERA-PRISM small countries (Estonia, Iceland, Latvia, Luxembourg, Malta, Slovenia) and draws comparisons with other small countries (Cyprus) and larger countries (Finland and Switzerland). The underlying aim was to identify particular features of small county funding systems, to pinpoint any gaps in setup and implementation framework as compared to larger countries and good practices to help improve the robustness and sustainability of these funding frameworks in supporting the research and innovation ecosystems. Based on these insights, partners could engage in mutual learning about each others' systems and explore the possibilities of joint policy coordination.

The analysis was principally based upon a series of structured country briefs that allowed systematic comparison across a series of descriptors and dimensions. These were supplemented by a series of supplementary surveys to project members, two policy dialogue workshops held in Tallinn and Ljubljana and the advice of an external expert panel.

The key messages emerging from this analysis are:

#### *Structures and Institutions*

R&D funding structures and governance in small countries generally involve a similar range of institutions as those in large countries but within these institutions, specialized functions are often combined and have to compete for limited time and budgetary resources. Human resource constraints are particularly significant. Functions which are less likely to receive systematic support include development of sectoral policies, anticipatory intelligence, and impact assessment. This is a constraint which has implications for the policy process. There is some variation in structures but also many similarities:

- The highest policy and/or funding decision making body in the majority of the small countries covered in the analysis is the Parliament, with the exception of Cyprus (the Council of Ministers).
- R&D policy and strategy design and implementation engage a wide range of key players and stakeholders and there is a strong public debate and engagement. In these complex R&D governance systems there are numerous consultative bodies involved taking the advisory role in policy making.
- Research policy and funding decisions are normally in the domain of a single national body responsible for R&D policy implementation. However, the allocation of budgets for the implementing measures and programmes is devolved among a number of public entities This can be a dedicated ministry for science/research or for economy/industry, or sometimes a public research agency (as in Iceland). Normally there is also participation of other ministries and sectoral policy making institutions (for example information technology, agriculture, social affairs and environment etc.). Nonetheless all countries reported that such links could still be improved.

- Funding for the private sector sometimes is allocated by a dedicated intermediary and sometimes is integrated with funding for the public sector. These differences are reflected in policies and outcomes through the use of different instruments and policy measures. Such differences reflect not only the needs of the beneficiaries but also the characteristics and traditions of the implementing institutions.
- The main performers of R&D in all countries are public universities and national research institutions. However, the size and scope of performers of R&D in the private sector should not be neglected, since in small countries, a few main players (often just one) determine the structural framework and dominate measurements of the ratio between sectors of performance. In the smaller countries (Malta, Cyprus, Luxembourg and Iceland) the number of public universities and national research institutions is smaller, the research areas covered restricted and in some cases these entities have only been set up recently.
- R&D ecosystems have been stable in the small countries for several years even in the wake of the financial crisis. There has been little change evident in terms of institutional setup, power dynamics and priorities in recent years.

### *R&D Inputs*

An insight into input indicators shows great differences in the structure and scope of the funding frameworks:

- R&D gross expenditure measured as a percentage of the national GDP covers almost the full range of EU levels. It is highest in Iceland (2,65% in 2008) and lowest in Latvia and Cyprus (0,46% in 2008).
- A similar spread exists in per capita R&D spend: Luxemburg spends EUR 1295 per inhabitant of their gross expenditure for R&D, compared to only EUR 37.5 spent in Latvia per inhabitant with the EU average being EUR 473.9 per inhabitant
- Differences are also wide in the scope and structure of the finances of R&D. The business enterprise sector with 76% in 2008 is the main funder of R&D in Luxemburg whereas in Cyprus only 18% of funds come from that source.

### *Selectivity and Concentration*

The proportion of research funding allocated competitively varied across the countries but there were significant methodological difficulties in effecting a comparison. The highest proportion of competitive funding in GBAORD in the EU 27 was found in Estonia, followed by Slovenia. Non-competitive funding, referred to also as 'block funding' is allocated to institutions of strategic national importance such as universities, academic institutions or national public research institutions and infrastructures. It is generally distributed following a set of criteria and sustainability principles as shown in the cases of Iceland and Malta.

All countries had some form of prioritisation mechanism reflecting their policy objectives. The distribution of instruments and share of public funds between fields and objectives indicates where priorities in R&D spending lie. Macro priorities, functional priorities, mission oriented and thematic priorities were identified. Countries were in general trying to balance overspecialisation and overgeneralization, with this issue reflected in a set of long term R&D strategies. Other factors driving prioritisation included the agenda set by the OECD and the policies of neighbouring countries.

- Distribution of funding between the fields of sciences revealed weaknesses in methodologies for monitoring this issue but pointed to patterns of priority-setting with allocation of funding resources to certain priority fields. Data on the distribution of HERD shows that in all small countries except Malta about 60% of R&D public funds goes into natural sciences and engineering, the smallest shares in all countries goes into agriculture and about a quarter of all public R&D funds goes into social sciences and humanities (largely to support what is often a unique language, national culture and heritage). The share of this sector is highest in Malta where it is 50%.
- The distribution of funds between fields has been changing over time. Changes in shares over the past few years also show the patterns of development of the higher education sector. The share of medical sciences grew in Estonia, but declined in Slovenia where it dropped along with the engineering field at the expense of an increasing share for humanities.
- Small countries may not support all fields at all levels. Analysis of HERD reveals that Malta, Cyprus and Luxemburg are the three countries where not all scientific fields are represented (agriculture and medical sciences are not supported in the University sector in Luxembourg and Cyprus and agriculture is not in Malta, though there are public sector R&D activities in these fields).
- The extent to which the funding system is effective in leveraging private sector R&D investments varies and depends on the priority given to this as a criterion in R&D funding programmes.
- Even where priority setting mechanisms are in place there is a further challenge in implementing them.

### Sustainability

#### *Human resources*

A key question for small countries is whether the next generation of researchers is trained and supported with funding and policy mechanisms - in other words whether human resources and the R&D labour market are sustainable. All have programmes seeking to boost the number of researchers at early career stages and before that to interest young people in science and technology. Key findings on HR profiles were:

- A wide range exists in the share of total employment accounted for by researchers. Slovenia (0,76%) and Estonia (0.72%) have a share of researchers very close to the EU average of 0.73%. The shares of researchers in Latvia (0,37%), Malta (0,30%) and Cyprus (0,22%) are about half of that. The share of researchers in Luxembourg is much higher (1,11%). In all countries but Latvia the share has been increasing over the period 2001-2009.
- Growth patterns have reflected policy trends. In most countries the numbers of researchers in the HE and government sectors have both grown but in Cyprus and Iceland substantial growth in the HE sector was accompanied by a largely static picture in the government sector.
- Age distributions vary according to the degree of growth and reform in the system. Hence in Cyprus and Slovenia the share of researchers in the age group 25-35 is nearly double that in the group 45-55, and in Luxembourg the number of researchers in age group 45-55 is only ca 20% of the group 25-35. The picture in the Baltic countries is different

reflecting the pace of reform from the Soviet era - in Latvia the share of older researchers is high while in Estonia the share of the younger age group has been growing.

### *International cooperation*

Similarity in the small size in geographical or population terms has not driven collaborative links between the small countries but all show high degrees of internationalisation. Depending on the country's traditions and geographical position international cooperation may be sectorally or regionally based. It is driven by motivations such as achieving critical mass, gaining access to infrastructures that are uneconomic for a small country, seeking project funding from abroad and seeking complementary expertise. A more detailed picture of cooperation shows:

- The highest level of internationalisation in research is observed in Luxembourg with 70%-90% of all publications being internationally co-authored (twice as high as in larger EU states in all disciplines), followed by Cyprus and Iceland (70% co-authorship). Estonia, Latvia, Slovenia and Malta have levels of international co-publications of between 40% and 55%.
- The patterns of internationalisation reflect traditional linkages. Malta had its highest co-publication rate with the United Kingdom, Cyprus with Greece, Estonia with Sweden and Finland, Latvia with Lithuania, Luxemburg with France and Germany, and Slovenia with Croatia. There are few other co-publication links between small countries - only Estonia and Iceland co publish. Iceland and Slovenia have strong bilateral cooperation also with the United States.
- All countries report significant numbers of bilateral cooperation agreements but the number and range is varied. In Slovenia bilateral cooperation agreements exist with over 80 countries worldwide and bilateral project cooperation with 58 countries was undertaken in 2008. Estonia reports to have bilateral agreements with over 40 countries including China, USA, India, and Mexico. Latvia has 27 agreements and Malta 25, while Cyprus has 9 and Luxembourg 5.
- In terms of success in FP7 applications in 2007-9, the small countries are distributed around the EU average. An above average (22%) success rate in terms of the share of applicants that were retained was achieved by Estonia (24%) and Iceland. All other small countries have lower success rates of retained applications than the EU average with Cyprus the lowest at 16%. All of the small countries have below average share of EC financial contribution to the applicants from their countries. Cyprus, Estonia and Slovenia have EC financial contribution per head and per GDP higher than EU average, while Malta has an above average contribution per GDP. Specific national support measures are available to support FP participation, notably in Slovenia and Cyprus. Among the causes for the low success rate of small countries is the under-representation of evaluators from small countries and the criteria used to evaluate proposals. For example the criterion of excellence differs depending on the research institution, individual researcher or for small SME, basic and applied projects, especially if coming from a small country. These support measures can be the cause for relatively lower success rates for both countries. Other system causes relate to barriers preventing participation in certain parts of FP where scale, critical mass, capacity for coordination of projects and/or commitment of national funding programmes/resources are factors. While some of these barriers may relate to real issues which need to be addressed, there are also concerns that these are perceived as

no-go factors during the project evaluation process. It is therefore important that there is sufficient representation of evaluators from small countries in the less accessible parts of FP and/or these evaluators are briefed to handle these issues.

### *Response to the economic crisis*

The economic crisis has in some cases had a negative impact on funding but has also driven new investment in R&D. Substantial budget cuts were reported in Iceland, Cyprus and Latvia (the largest with a 45% cut) with closure or suspension or downsizing of some research programmes. However not all of the impacts had negative consequences. R&D policies in all countries were given a new wind in playing a significant role with the preparation of the country's reform programmes and Stability/Convergence programmes for strengthening the Euro in countries who have this currency. In Luxemburg and Slovenia, after the crisis the funding for R&D was increased as the sector was recognised to be a driver for future social and economic growth.

### *Policy dynamics*

Europe 2020 and related initiatives have stimulated a dynamic picture of structural change and strategic initiatives but underlying structures remain stable. In small countries, the R&D ecosystem is currently relatively stable with little change evident in terms of institutional setup, power dynamics and priorities in recent years. However change is also evident: for example, Estonia has reorganised its R&D funding system, extending the structure of individual and institutional grants. In Malta the government announced a number of measures to give incentives to research and innovation, aid schemes for SMEs engaging in research and innovating have been announced and Malta University Research, Innovation and Development Trust Fund was set up to stimulate research at the University and help its use for commercial and industrial purposes. Similarly, changes related to the R&D funding system are being introduced in Slovenia, where a new Research and Innovation Strategy until 2020 was approved in 2011. Changes include merging some of the implementing agencies, empowering research organisations, setting up procedures for prioritisation and handling bigger investments into priority infrastructure.



## **Recommendations:**

To further develop R&D systems in small countries it is recommended that a series of cooperative and methodological actions be undertaken:

- Different approaches to policy design and implementation should be explored in more detail. Approaches worthy of further exploration include the development of multi-stakeholder R&D systems embedded in the economic and social traditions of the countries. These would invoke changing governance models and an R&D cross-sectoral dimension in which stronger collaboration between government, the business sector and civil society creates a new innovative mechanism for governing and tackling global challenges and gives R&D a leading role. Consultation processes for setting priorities form an integral part of such an approach. Shared policy intelligence facility could be developed at European level to support this capacity-building process for more robust, evidence-based policy design.
- An effective comparative methodology for determining the balance between competitive and non- competitive funding should be developed. The practical but very important issue of striking the right balance between competition to drive quality and stability to allow strategic research institutions to develop needs to be informed by better analyses. Comparison is needed on a consistent basis which makes it clear which aspects of research support are included in the frame and definitions.
- The issue of critical mass is vital for small countries and needs to be better understood as driver of funding policy. Fragmentation of numbers of researchers in a given field is one dimension. Another is whether to concentrate them in government, higher education or business. Related policies include priority setting and regional specialisation.
- Deeper understanding is also needed of the relationship between international cooperation and achieving critical mass. Construction of a network diagram (cluster diagram) of bilateral/multilateral relations could underpin a wider discussion on critical mass in R&D. A detailed compilation of examples of measures and instruments within the states for supporting bilateral and multilateral co-operation more fully will allow assessment of the potential of inward and outward knowledge transfer and the effects these processes have on the welfare of the cooperating states or specific research fields in Europe. Possibilities for creating joint programmes should be explored.
- A check list of the major reform programmes and the position R&D plays in the National reform programmes and Stability/Convergence programmes for the Euro zone countries in them should be prepared. Such a list would help countries to exchange experience and deal with what is currently a major impetus for change.
- Better evaluation and measurement systems are needed that are adapted to the needs of small countries. More work is needed to develop indicators that would measure various aspects of the R&D system, having in mind the complexity of the R&D governance systems in small countries. This should consist not only of input and output indicators but also should address the results and impacts of investments made in R&D and the contribution of R&D to the socio-economic growth and development of small countries. To achieve this, the necessary resources and expertise needs to be developed and where helpful shared between small countries.
- Means need to be developed for further simplification of administrative and financial procedures in the national and EU funding, including FP7 and cohesion funds particularly due to the fact the private sector in most small countries is composed of micro enterprises.



- A more in-depth analysis of FP country participation needs to be developed which addresses not only quantitative but also qualitative participation. FP country participation needs to look more closely at the type of projects which small countries are engaging in (research projects as distinct from support actions and NCP projects) and the extent and role assigned to small country partners. There are parts of FP7 which are less accessible to small countries due to insufficient critical mass and scale, or the requirement to commit national research programme funding. These include the IDEAS and Capacities Programmes and JTIIs, ERANETs and JPIs, There are also concerns that small countries may not be considered to have sufficient scale of resources and competence to participate and coordinate research projects. It is important to ensure sufficient representation of evaluators from small countries in the programmes which are less accessible. The evaluation criteria in particular the excellence criterion should be re-examined in the light of the small country context. For FP7 programme monitoring, the system of benchmarking the performance of small countries in terms of FP participation and funding needs to be improved.
- Design of more robust R&D systems is needed. How to achieve greater financial stability in R&D systems to cope better with oscillations caused by budgetary cuts and increases? This will include building administrative capacities needed to adapt to changes. Weaknesses and vulnerability of the funding systems in respect of their capacity to absorb and respond to investment is another aspect.

## **Conclusions on Scientific Findings:**

The ERA-PRISM project has developed its activities over the last 28 months on the basis of a sound partnership of small European countries (Estonia, Iceland, Latvia, Luxembourg, Malta, Slovenia and Cyprus) together with expertise from other Member States (UK, France, Sweden) in research and innovation indicators, funding frameworks and public procurement for R&I, the main themes of the project. Beyond this, the project team have also looked more broadly at R&I issues from a national and European perspective and have been seeking ways of taking forward key aspects of the development of the European Research Area in the light of their context, resources and governance. These include emerging themes and, in particular, joint programming (pooling of national research funding programmes at European level), grand challenges, smart specialization, internationalization and innovation policy. Policy dialogue workshops have been held to address these themes in the partner countries and important insights have emerged to guide national and European R&I policies - indeed in a number of the partner countries the project findings have been used to inform the formulation of new Strategic Plans.

ERA-PRISM Project has highlighted not only the diversity of European countries as a whole but also the diversity among the small country group in terms of their national R&I ecosystem, its maturity, size and related capacity and performance. Among the key project findings is the fact that, despite the diversity in R&I policies, funding systems and performance, small countries share a dependence on international collaboration evident in co-publications and joint projects. They share a good record of participation in the EU Framework Programme, although parts of the programme are still inaccessible for a range of reasons including lack of critical mass.

There are also significant areas of common concern and interest shared by small countries and areas of opportunity for sharing know how on R&I policy approaches as well as actual areas of cooperation. National context influences and shapes a country's performance in R&D investment and innovation outputs and this restricts the level of applicability and transferability of policy approaches from one country to the other. Indeed small countries face certain constraints in implementing EU policies which are designed from a large country perspective. From a national perspective the project has been useful in providing a sounder basis for policy. This has been done by understanding better each other's systems, through more detailed analysis of different indicators, comparing with countries of similar size and scale.

The analysis on the use of public procurement to leverage research and innovation activity, which has been carried out in the small partner countries highlights the fact that there are good examples of its effective use and identifies ways of promoting an ongoing exchange of experiences. A Manual for small country use of public procurement for research and innovation has been produced targeting specific small country concerns and niche opportunities.

The work on indicators has shown both that indicators are critical to assess the situation of small countries but also that a greater tuning is needed to get beyond conventional measurements and interpretations of those measurements.

In the work on funding frameworks the core objective of an OMC project has been most evident as very detailed benchmarking of research support systems was undertaken. The three dimensions of selectivity, concentration and sustainability provided a useful framework for characterising the funding frameworks and highlighted the central challenge of how to achieve and maintain critical mass in research. For a small country there is no option but to take bets on specialisation strategies. The in-depth analyses of the type undertaken by the project help to guide these critical decisions.

One of the main benefits of ERA-PRISM is the strong network which has developed between the partners and the exchange of know-how and information that this has facilitated. There is strong potential for developing this network into an ongoing platform for supporting the interests and needs of small countries and building a critical mass in putting forward the perspectives of small countries in the area of research and innovation policy to the European Commission and beyond

## Methodological Findings:

It was necessary to apply a range of methodologies to execute the three main work packages on indicators, procurement and finding frameworks. In terms of new experiences we could highlight from these the following:

- The survey of policymakers on the use of indicators is to our knowledge the first such exercise carried out on an international scale. Linked to this the framework for assessing the adequacy of indicators can also be seen as an original contribution. Analyses of the indicators themselves from OECD databases and from innovation survey data has not been carried out at this level of detail for small countries.
- A specific methodological advantage of working with small countries was exploited by the project. Considerable effort went into matching data with specific addresses to allow data cleaning and accuracy to a new level. Beyond this the pilot exercise of following up with interviews, a sample of publications and patents provided a combination of quantitative and qualitative approaches.
- Within the work on procurement this was the first systematic international survey of ministries on their innovation procurement activities.
- The finding frameworks activity used an original framework for analysis of systems focussing on selectivity, concentration and selectivity and worked in an unusual interactive way with national administrations to clarify the detailed descriptions of the national systems.

A second dimension of methodological findings concerns the interpretation the project approach made of the Open Method of Coordination approach. Two instruments could be highlighted here:

Policy dialogue workshops: there had been concerns expressed in previous OMC projects that interaction could be limited to the immediate participants and hence be restricted in scope. To address this ERA-PRISM introduced the concept of Policy Dialogue Workshops. These were events held in each of the participating countries which addressed key topics identified in the description of work would be addressed as well as important initiatives relating to research and innovation emerging at EU level, including Joint Programming, ERA Indicators, Public Procurement for Research and Innovation, Innovation Union, Sustainability of R&I Funding Frameworks, Smart Specialisation, Internationalisation, Priority-setting and Adequacy of R&I Indicators and Design of Indicators. They engaged specialist policymakers from all over Europe and stakeholders from the host country. Many had high level attendees up to Director General level. To ensure a focussed and informed discussion, for each Policy Dialogue Workshop, a 4-6 page Brief was prepared by the Coordinator in consultation with the Scientific Coordinator based on a review of existing literature and policy documents. Where necessary, a questionnaire-based survey was also carried out among partners to obtain more detailed information on their policy perspectives and approaches in relation to the topic under discussion. The results were compiled and presented in the Policy Brief and discussed during the workshop.

Mutual learning exercises: While many activities of the project could broadly be described as having mutual learning benefits (a process of vigorous discussion that also continued during

the breaks and meals!), the project also experimented with a formalised approach. As part of the work on Funding Frameworks, members filled in a specific questionnaire, read the resulting synthesis and then were asked to comment on a brief describing another country's system, identify any areas of good practice relevant to their own country and note areas for possible collaboration or joint policy coordination/action or requiring Community Action. Categories of key issues that emerged included:

- Comparing institutional setups
- Capacity-building and Human resources measures
- Policy Tools for Transforming the system
- Country role models and transferability of good practices
- Learning from the past
- Potential for joint policy coordination

## **Potential Impact:**

### *Potential Impact and Dissemination*

Given the specific nature of OMC projects, it can be argued that the principal users of the outputs are the participating governments, particularly since all small countries were engaged in the network. A second category of beneficiary covers those who engage with small countries. Given the focus on European R&I policy issues clearly the European Commission was a major target and several parts of DG Research and Innovation and DG Enterprise engaged with project. A final dissemination event was held in DG R&I to complete this transfer of knowledge.

Spillover benefits could also be expected to accrue to larger countries, both in terms of increasing their understanding of small countries (and hence their ability to cooperate with them) and in transferrable lessons which applied also to them.

Future potential for impact lies in the prospects for joint policy coordination. Small countries have indicated their interest in increasing this activity. Potential areas for greater coordination include opportunities for resource sharing (funding of R&D programmes and infrastructures) and sharing of expertise in relation to joint evaluation and assessment activities, joint benchmarking and indicator development. This coordination could be hampered by a general lack of a driving force and uncertainty over the benefits together with resource constraints (a factor exacerbated by the small country context). This offers considerable scope for policy intervention at the European level.

The project achieved a high profile in dissemination terms not only through its meetings (held in all participating countries) but also through dissemination of outputs and presentations at large general conferences and key policy fora.

Such activities included:

1. The production of a project poster;
2. An article about key project insights in Research Europe (Readership 12000);
3. Media coverage;
4. Circulation of the procurement report and case studies to 3000 interested parties by DG Enterprise;
5. Presentation by the project coordinator at the Belgian Presidency Joint Programming Conference and the Polish Presidency event on Joint Programming;
6. Presentation by the Indicators WP leader to the OECD NESTI committee;
7. Organising a dedicated session at the ENID indicators conference in Rome 2011
7. Presentation by the Coordinator to the Commonwealth Small Island Training Programme (Malta ) [http://www.um.edu.mt/\\_\\_data/assets/pdf\\_file/0020/127406/Cassingena\\_Harper\\_J.pdf](http://www.um.edu.mt/__data/assets/pdf_file/0020/127406/Cassingena_Harper_J.pdf)
9. Latvian Enterprise Europe Newsletter

*Media coverage:*

Articles were featured in the local press in the Malta Independent newspaper.

<http://www.independent.com.mt/news.asp?newsitemid=89488>

<http://www.maltarightnow.com/?module=news&t=a&aid=99812976&cid=19#>

## References to the Project in other publications, articles and websites:

The ERA-PRISM project is mentioned in a number of publications and websites, including the recently published Proinno Thematic Report on Trends and Challenges in Demand-Side Innovation Policies in Europe, October 2011

### Web references and Presentations

#### *Joint Programming Conference 2010*

- <http://jointprogramming2010.eu/pdf-abstract/Cassingena-Harper%20Jennifer.pdf>
- [http://netwatch.jrc.ec.europa.eu/static/download/workshop\\_april\\_2011/3.2%20Cassingena%20Harper.pdf](http://netwatch.jrc.ec.europa.eu/static/download/workshop_april_2011/3.2%20Cassingena%20Harper.pdf)
- [http://www.comune.torino.it/relint/PPI/pdf/Georghiou\\_Turin.pdf](http://www.comune.torino.it/relint/PPI/pdf/Georghiou_Turin.pdf)
- <http://ec.europa.eu/environment/gpp/pdf/Public%20Procurement%20for%20Innovation%20in%20Small%20European%20Countries.pdf>
- [http://www.enid-europe.org/conference/abstract%20pdf/Asikainen\\_abstract.pdf](http://www.enid-europe.org/conference/abstract%20pdf/Asikainen_abstract.pdf)
- [http://www.enid-europe.org/conference/poster%20pdf/Laurens\\_specialisation\\_abstract.pdf](http://www.enid-europe.org/conference/poster%20pdf/Laurens_specialisation_abstract.pdf)
- <http://underpin.portals.mbs.ac.uk/RelatedProjects/tabid/1579/language/en-GB/Default.aspx>
- <http://www.buy-smart.info/news/public-procurement-for-innovation-in-small-european-countries>
- [http://www.openaire.eu/en/about-openaire/publications-presentations/dissemination-material/doc\\_view/248-openaire-poster-malta-online](http://www.openaire.eu/en/about-openaire/publications-presentations/dissemination-material/doc_view/248-openaire-poster-malta-online)
- [http://www.partager-le-savoir.org/template/fs/malte2011/presentations/sammut\\_malta\\_2.pdf](http://www.partager-le-savoir.org/template/fs/malte2011/presentations/sammut_malta_2.pdf)
- <http://www.innovation.lv/ino2/eng/?kat=projekti>
- <http://www.tehnopol.ee/et/syndmused/tehnopoli-syndmused&nID=416>
- [http://prezi.com/usyydadg0l5n/procurementinnovation\\_era-prism\\_luxjan11/?auth\\_key=91a1ec3dc1b969a5e7e7d7ab447b0411c520f1e6](http://prezi.com/usyydadg0l5n/procurementinnovation_era-prism_luxjan11/?auth_key=91a1ec3dc1b969a5e7e7d7ab447b0411c520f1e6)
- The address of the project public website, if applicable as well as relevant contact details.

The address of the project public website is <http://www.eraprism.eu>

### Function of the ERA-PRISM Project website

As envisaged in the description of work, the Project has invested substantial effort in designing a web-based platform for sharing knowledge both among the partners and the extended network including:

#### Target Groups:

- EU Commission (Project Officer and other officials who follow the project)
- ERA-PRISM Advisory Group and WP5 Expert Group
- Small EU countries including Cyprus, Lithuania
- Other EU countries including Denmark and Norway
- Policy Dialogue Workshop speakers and experts
- ERAC Members
- Policy-makers identified through the Policy Maker Survey



- Wider outreach to researchers in this area

The web-based Platform is structured to provide easy access to information on the Project. The web-based platform has been designed to provide easy access to content on the following three tier mutual learning activities:

- Facilitating an enhanced understanding of effective approaches in implementing the R&I Policy Mix through effective interactions and learning between larger and small member states and the sharing of good practices
- Defining the appropriate R&I Policy Mix for small member states
- Best Practices Repository

The folders related to mutual learning are:

1. *Countries Folder* - this brings together information on the R&I systems in the partner countries. The information is uploaded by the partners themselves and includes documents and links to key policy documents and other relevant material.
2. *Meetings Folder* - this provides access to sub-folders for each of the meetings organised by the project including the Policy Dialogue Workshops. Within each sub-folder the agenda of the meeting, the meeting report, presentations and related documents are provided. The Coordinator is responsible for uploading documents but partners supplement the information.
3. *Work Packages Folder* - this is organised into sub-folders for each work package and features easy access to key reports produced by the work package. These sub-folders are maintained by the work package leaders.
4. *Useful Links* - this folder provides access to key links generated by the Project. Links are uploaded by the partners and those who have access to the internal site.
5. *Best Practices Repository* - this is the key folder for promoting mutual learning through an exchange of good practices. This brings together case studies from partner countries which provide insights of good practice. A number of sub-folders have been developed so far covering key project themes. The procurement case studies combining both secondary sources and small country case studies generated through the project provide a unique consolidated source of policy-relevant information

With the finalisation of key project outcomes and reports, the public outreach aspect of the website became more prominent in offering project-generated documents and a number of key finalised project reports were made accessible to the public on the website.

The public site mirrors the majority of the folders included in the internal site except for the contractual documents folder. The documents on the internal site which are finalised for public viewing were released by partners for public viewing by simply ticking the public box next to the document.

The home page features an attractive graphic of the globe with a measuring tape referring to the benchmarking and indicators work. This graphic is also available as a project poster and the latter has been displayed in various international and local events.

An important role of the site is to provide basic information and news:

- The home page provides information on all the project partners

- News on forthcoming project events
- Archive to access information on past events and related documents
- Knowledge platform linking to the Best Practices Repository, Countries and Work Packages

#### *Best Practices Repository*

The aim of this Repository is to provide easy access to policy-makers and researchers interested in accessing actual policy case studies from small, medium and large European countries in relation to:

- Public Procurement for Research and Innovation
- Funding frameworks
- Research and Innovation Indicators

This online Repository of R&I policy approaches and related documentation on small countries is to provide a useful reference to guide national policies and improve their effectiveness. It is to also provide small countries with the opportunity to share their experiences and develop where appropriate common action.

From a European perspective, the online repository is to serve as a common reference point for helping to harmonise policies among small European countries and to identify how large countries can benefit from and support small country policy approaches. The database is to also serve as a marketing tool for European research and innovation policies in other world regions, in particular the Mediterranean and the Caribbean.

## **Start-up Phase:**

With these functions in mind, work started in the first months of the project start-up on developing an appropriate design for the repository based on a simple structure for organizing the information. The aim was to ensure that the repository would be easily accessible both in terms of uploading the case studies by the partners and downloading the resources by a wider network of users.

The Repository features a range of country case studies generated through the surveys and compilation activity undertaken by each work package. The final structure adopted for organizing the material is the following:

### *Best Practices Repository*

- A Best Practices Manual
- Funding Framework Case Studies
- Internationalisation Strategies
- Procurement Case Studies
- Specialisation Strategies

The individual folders feature the following materials:

#### *A Best Practices Manual*

This folder features the Small Country Guide to Public Procurement for Research and Innovation which draws on insights, good practices and pitfalls identified through the ERA-PRISM procurement case studies.

#### *Funding framework case studies*

This folder features the country briefs for Cyprus, Estonia, Iceland, Latvia, Luxembourg, Malta and Slovenia. These briefs provide key up-to-date information on the funding framework for R&I in place in each of these countries focusing on a similar set of features to allow comparability. The briefs help to identify key areas of strength and weakness in each country providing policy-makers with insights for how to structure their R&I ecosystem, types of programmes and measures in place and current performance.

#### *Procurement Case Studies*

This folder features a rich source of unique information on public procurement for R&I, including:

- The compilation of existing country case studies (168 page document) includes over 39 case studies on procurement of innovation. It is work in progress jointly between the ongoing project UNDERPINN, which analyses procurement of innovation in depth (<http://underpin.portals.mbs.ac.uk/Home/tabid/1537/language/en-GB/Default.aspx>) and which is led by Prof. Jakob Edler and Prof. Luke Georghiou from the Manchester Institute of Innovation and the OMC-Net ERA-PRISM. The preliminary version of the compilation was circulated in e-Newsletter N°2 - October 2010, New Developments on Public Procurement & Innovation, European Commission -- DG Enterprise & Industry -

DG Information & Communication sent to over 2000 parties interested in innovation procurement and lead markets.

- A number of case studies from the UK
- ERA-PRISM Compilation of Best Practice Country Case Studies on procurement of innovation
- Individual ERA-PRISM country case studies on procurement of innovation in more detailed format for Estonia, Iceland, Latvia, Malta, Slovenia.

#### *Internationalisation Strategies*

This folder features the internationalization strategies of ERA-PRISM countries and an overview comparing these strategies with a view to identifying key insights and practices. The folder also includes the internationalization strategies of countries which have been successful in their implementation in particular Finland and Ireland.

#### *Specialisation Strategies*

This folder features the specialization strategies of ERA-PRISM countries. The folder also includes regional specialization strategies and smart specialization approaches.

## List of Websites:

ERA-PRISM: <http://www.eraprism.eu>

- Malta Council for Science and Technology (Malta): Jennifer Cassingena Harper  
Jennifer.harper@gov.mt
- The University of Manchester (United Kingdom): Luke Georghiou  
Luke.georghiou@mbs.ac.uk
- Ministry of Education and Research (Estonia): Rein Kaarli  
Rein.Kaarli@hm.ee
- The Icelandic Center for Research (Iceland): Thorvald  
thorvald@rannis.is
- Slovenian Research Agency (Slovenia): Marko Perdih  
Marko.Perdih@arrs.si
- Swedish Governmental Agency for Innovation Systems (Sweden): Nina Widmark  
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- Latvian Technology Center (Latvia): Valdis Eglev  
eglev@lanet.lv
- Department for Business, Innovation & Skills (United Kingdom): Sue Creese  
Sue.Creese@bis.gsi.gov.uk
- Observatory of Science and Technology (France): Patricia Laurens  
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- Public Research Centre Henri Tudor (Luxembourg ): Anna-Leena Asikainen  
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- UPEMLV - Université Paris-Est Marne-la-Vallée (France): Patricia Laurens  
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