MONITORING THE IMPACT OF SMART SPECIALISATION STRATEGIES ACROSS EU REGIONS

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The European Union's (EU) directions for Regional Smart Specialisation Strategy (RIS3) development call for the design and integration of a monitoring and evaluation mechanism for allowing a better control and periodic refinement of the strategy. In line with this requirement, the purpose of this paper is to present a Monitoring platform that was created in the context of the project 'Smart Specialization', funded through the 2007 – 2013 Interreg Greece-Bulgaria programme, with the purpose of monitoring the impact of RIS3 across EU regions. The platform, called 'M3' after the 'Measure, Monitor, Mobilise' approach, is a Strategic Decision Support platform, which includes (i) a measuring and monitoring module, (ii) an administration module, (iii) a data repository and (iv) a reporting module that integrates online comments by experts. M3 includes predefined templates for RIS3-specific text and monitoring indicators, whereby the policy maker is required to enter free text and numerical data. Afterwards, a monitoring report is generated automatically. This report can be stored and updated periodically. We also describe a use case of M3 in the Region of Kentriki Makedonia, Greece.

Keywords

Digital Platform, Monitoring and Evaluation, Regional Development, Regional Innovation Policy, Region of Kentriki Makedonia

1. Introduction

National, regional and local policy making authorities nowadays are increasingly pressured to design and implement successful policies tackle complex and interconnected socioeconomic challenges. Such complex challenges are often characterized by uncertainty and ambiguity and require the existence of transdisciplinary knowledge and transparency, as *"there is a plurality of values and opinions"* which often lead *"to strong disagreements within society and power games between various interest groups"* [1]. Moreover, policy makers are striving to create and implement adaptive, fair, and transparent policies [2]. In this demanding and quickly changing environment, policy makers have to become proactive, knowledge based and user driven by building their

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internal capacity to quickly process background information and draw on new and alternative forms of knowledge generated by their stakeholder communities.

Urged by these recent developments, smart specialisation is a new innovation policy concept designed with the purpose of promoting a more precise and informed targeting of public investment into Research and Development (R&D) areas. The primary purpose of smart specialisation is to boost regional innovation in order to achieve economic growth and prosperity, by enabling regions to channel their efforts towards a specific number of policy areas that present increased potential for success. In order to achieve this, Smart Specialisation Strategies (S3) need to build on existing strengths, account for regional competition, and capitalise on the potential of partnerships among businesses, public entities and knowledge institutions [3]. In line with this new way of thinking about innovation, the existence of a regional Smart Specialisation Strategy (RIS3) has been adopted as an 'ex-ante conditionality' for all European Union (EU) regions for the use of European Structural and Investment Funds (ESIF) for the 2014-2020 programming period. To support the uptake of the new policy, the European Commission (EC) released in 2012 the '*Guide to Research and Innovation Strategies for Smart Specialisation'* [4], which describes the concept of smart specialization and puts forward the methodological framework for the design and implementation of RIS3. This methodological framework includes six steps that guide the RIS3 design and implementation process[1].

In line with the above developments, the purpose of this paper is to present a methodology and tool that was created for monitoring the impact of S3 across EU regions, appropriate to 'Step 6: Integration of monitoring and evaluation mechanisms'. This methodology and tool are offered through the 'M3' RIS3 Monitoring platform [5], which was developed by the research lab Urban and regional Innovation Research (URENIO) of the Aristotle University of Thessaloniki, in the context of the project 'Smart Specialization', funded through the 2007 – 2013 Interreg Greece-Bulgaria programme.

The next section (2) elaborates the concept and significance of monitoring and evaluation in the RIS3 context. It also presents the types of indicators used in RIS3 monitoring. Section 3 presents the M3 platform, and more specifically the design process, the platform modules, how the platform can be accessed and used, and a pilot use case on the region of Kentriki Makedonia, Greece. The last and final section of the paper discusses the work undertaken so far and prompts for further work areas.

2. Monitoring and Evaluation in the RIS3 Context

2.1 Concept, significance and characteristics

The monitoring and evaluation (M&E) system is considered to be an important part of the overall governance system, along with budgeting, human resources management and

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[1] These steps are: Step 1: Analysis of the regional context and potential for innovation, Step 2: Set up of a sound and inclusive governance structure, Step 3: Production of a shared vision about the future of the region, Step 4: Selection of a limited number of priorities for regional development, Step 5: Establishment of suitable policy mixes, Step 6: Integration of monitoring and evaluation mechanisms.

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systems' auditing [6]. Its main contribution is to provide an analytical feedback system regarding the outcomes, impacts and effects of the implemented policies and programmes. According to Raimondo [7] there are two key mechanisms through which M&E can affect the effectiveness of implemented projects. First, M&E provides crucial evidence with respect to the degree to which each project achieves its goals and its results compared to the target values. Secondly, there is evidence in the literature that M&E can positively affect the overall quality of project supervision and implementation, resulting to higher quality outputs [8].

That said, *'Monitoring and Evaluation'* is the final and conclusive step (Step 6) of S3, based on the RIS3 Guide developed by Foray, Goddard [4]. It refers to the requirement to closely *monitor* the progress of the implementation of the strategy, while *evaluation* refers to the assessment of whether and to what extent RIS3 strategic objectives are met [9]. A recent definition of monitoring is given by Gianelle and Kleibrink [10], stating that monitoring usually encompasses all sorts of activities that have to do with the collection and processing of information regarding the achievement of expected results and the degree of implementation of policy measures. The monitoring framework is established right from the outset of the RIS3 strategy, determining how and when the different components of the strategy will be audited for their progress. Given the fact that this step greatly influences the tone upon which the pursuit towards smart specialization unfolds thorough the process, it is a crucial part of RIS3, which essentially determines how the success of the strategy will be measured.

Considering that RIS3 are not regarded as static constructs, but rather as continuously evolving and adjusting to new developments and evidence with regards to economic and framework conditions, RIS3 M&E should be addressed as a continuous and iterative process [9]. Given that monitoring can be regarded as an information gathering mechanism, one of its main utilities is to constitute a base upon which a periodic refinement and refocusing could be made. Three main purposes referring to the utility of RIS3 monitoring mechanism should be highlighted here [11]. First, learning-and-acting is one of the core purposes of the monitoring process, indicating the need for policy makers to be well informed about the reality conditions and the risks of failing, as well as the development of a learning system for participants. Second, trust-building amongst stakeholders and citizens is another important dimension of monitoring processes. This characteristic should be accompanied by motivation, commitment and aversion to report failure. Last but not least, accountability is considered to be an integral part of this mechanism, built on clear rules for counting/measuring and bottom layer auditing. Given the fact that monitoring can be regarded as an information gathering mechanism, one of its main utilities is to constitute a base upon which a periodic refinement and refocusing could be made. According to Nauwelaers and Wintjes [12] the evaluation process should also play a key role to understanding the ways in which complex innovation policy systems operate. Although evaluation systems have traditionally been considered to have an ex post character, there is evidence that they can also be used for improving the design of innovation policies in real time [13].

In a RIS3 context, advancing from the phase of vision statement and objectives' setting to the selection of envisaged solutions used to achieve these strategic objectives denotes the transition from the general to the more specific and actions driven part of the planning

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procedure. During this latter phase, the selection of the "means" that will be used to achieve the desirable "ends" (goals) referring to specific socio-economic areas will ultimately define the set of priorities that will be determined. Having chosen a specific set of priorities it is then possible to define explicit variables and indicators, which could be used to measure the expected change made by the selected levers on the targeted socio-economic areas of intervention. More specifically, according to Gianelle and Kleibrink [10], expected change is defined by: (i) a variable of socio-economic nature; (ii) a set of baseline and target values; and (iii) a timeframe for variable observation. The identification process of the expected change measures therefore sets the foundation of the M&E systems. As a result, it becomes evident that the design for a well-organised and effective M&E mechanism is considered to be an integral part of the whole strategic RIS3 planning process.

2.2 Types of indicators used in RIS3 monitoring

The fact that RIS3 strategic planning has turned out to be a fundamental ingredient of policy making within the EU indicates the need to adjust M&E mechanisms accordingly, and thus specify appropriate monitoring indicators under this framework. Three types of monitoring indicators are defined on the basis of the RIS3 Guide [4]: '*(i)* **Context indicators,** *scoring the region against the average score of its Member State or other similar regions. These indicators are usually attached to the overall objectives of the strategy, (ii)* **Result indicators,** *selected for each component of the strategy contributing to the overall strategic goals, e.g. important actions funded by the Structural Funds. These indicators allow verifying whether these actions are successful or not, i.e. whether they lead to the expected change for which purpose they were designed and (iii)* **Output indicators,** *measuring the progress of the actions undertaken in order to achieve the expected results'.*

It would be interesting, however, to explore the concepts of result and output indicators in more depth, accounting for the EU policy making context[2]. Result and output indicators are the main instruments of the M&E processes, and try to capture the effectiveness of the implemented programmes' performance. *Result* indicators are the expression of the objective of an investment priority [14]. They correspond to the specific objectives set out for each investment priority selected. Result indicators go beyond output indicators in so far as they capture a change in the situation, in most cases related to supported entities or participants [15]. *Output* indicators, on the other hand, should be programme specific and be derived from the intervention logic, (i.e. the actions implemented) of the programme [16]. An output is considered what is directly produced/supplied through the implementation of a structural funds operation, measured in physical or monetary units. Outputs are measured at the level of supported people, supported entities, provided goods or services delivered. They are set at the level of investment priorities or specific objective [15]. This is a crucial difference between the two kinds of indicators, as it implies that for

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[2] Context indicators were not used because they are usually attached to the overall objectives of the strategy.

the case of output indicators, there is no need for setting baseline values. This means that the baseline in these cases is zero [16].

In all cases, indicators should be: i) responsive to policy; ii) normative; iii) robust; and iv) they should be available to be collected or calculated over time. For each of them a baseline value should also be required, in order to make comparisons and evaluations of the implemented policies.

A recent mapping exercise which took place in the context of the EU-Horizon2020 Research Project ONLINE-S3[3] reviewed 30 RIS3 strategies across the EU and found that a definition of output and results indicators process has been applied in 27 out of the total 30. This means that M&E systems are not only seen as pivotal instruments in RIS3, but they are also widely used in existing strategies.

3. A System and Platform to Support RIS3 Monitoring and Evaluation

The M3 platform [5] provides the necessary recourses (tool, documentation) that support the M&E exercise of RIS3 (step 6 according to RIS3 Guide by Foray, Goddard [4]). It was developed in the context of the European Territorial Cooperation Programme Greece-Bulgaria 2007-2013 *'Smart Specialization'* and it is addressed to policy makers and experts that conduct these types of analyses in the context of RIS3 development and implementation. The aim of the project *Smart Specialization* was to assist all eligible regions in developing, administrating and implementing their priority policy of RIS3 for the programming period 2014 – 2020. The name of the platform, M3, derives from the '*Measure, Monitor, Mobilise*' sequential conception, implying that policy makers can use this platform to measure outcomes of RIS3, monitor progress towards envisaged targets and mobilise stakeholders into collaborating towards RIS3 objectives.

3.1 Design Process

Three distinct asks guided the development of the M3 platform:

- The first task, entitled *'Comparative analysis of monitoring and measuring systems'* aimed to identify and compare currently existing monitoring and measuring platforms upon different predefined levels (platform aim/function/characteristics, results yielded, value added). Overall, 45 proprietary and open-source platforms were identified and assessed in terms of their functionality, characteristics and added value in the RIS3 framework. This task allowed the identification of the best and most suitable components for the M3 platform, enabling the development of a system that is close to RIS3-specific needs and satisfies user preferences in this respect.

- For the second task, entitled *'Web measuring system design',* the M3 system functions and the system inputs and outputs were defined. On the basis of the previous, a

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[3] http://www.onlines3.eu/

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system operation flowchart was designed and the system requirements were set. The final step of this task was to design mock ups of screen layouts.

- During the third task, entitled *'Web measuring system development (M3 platform)',* we developed the project's M3 platform, tested it (Alpha testing, Beta testing) and launched it to the project partners.

3.2 M3 platform rationale. Accessing and using the platform.

The RIS3 Monitoring platform called M3 is a **Strategic Decision Support platform**. The logical steps for the usage of the platform are:

Step 1 Registration of indicators and their data	→	*Step 2* Build Regional Monitoring System. Create Regional Report	→	*Step 3* (iterative) Create Monitoring Report

Diagram 1. Logical steps for the usage of the M3 platform

The creation of a regional report reflecting the status of the regional innovation system in a region in any given time (step 2) is followed by the creation of a monitoring report which allows the policy maker to monitor the progress of RIS3 towards the fulfilment of its goals (step 3). The loop in Diagram 1 denotes that this process is iterative, in that new regional reports are created at later stages of RIS3 will in turn allow for the creation of new monitoring reports.

The M3 Platform is accessible through the URL: http://www.urenio.org/bwap_m3/. To acquire access to the platform, the prospective user is urged to contact URENIO Research through this same URL in order to acquire a username and password, which they will be able to use in order to access the platform.

3.3 Platform modules

M3 supports the collection and visualisation of data as a bridge to the programming period 2014-2020 in the form of outputs and results indicators. It is a web based monitoring system implemented upon WordPress CMS. It includes the following subsystems:

- **Measuring and monitoring module**. This module aims at the establishment of the RIS3 measurement framework and the included monitoring indicators. The two types of indicators used, result and output, comply with the RIS3 Guide [4] as analytically presented in section 2.2. The selected output indicators measure the progress

undertaken in order to achieve the expected results and selected through the system of common indicators set by regulations of the Structural Funds. These common indicators are defined in the '*Guidance document on monitoring and evaluation*' for the programming period 2014-2020 released by the European Commission [14]. The selected result indicators measure the changes made to the intervention area and due to the impact of funded activities. A template that the user is required to fill in as per each indicator is used –this template includes information about the year, value of the indicator, country and region of reference, the indicator's baseline and target value. It is possible for the user to incorporate new indicators to this database, depending on rising needs. For the development of M3, result and output indicators are defined on an RIS3-related Investment Priority basis. More particularly, for each Investment Priority we identified the most suitable output indicators (ranging from 2 to 8 indicators) and result indicators (ranging from 2 to 9 indicators). Overall, in this exercise we defined and included 40 indicators in a variety of combinations under each Investment Priority. An example of selected indicators for Investment Priority 1a is provided in the Annex of this paper.

- **Administration module.** This module, depending on the users' account privileges, serves the following four functions: *i) Manage regional reports*: add / modify / delete measuring reports for each region. The reports have a predefined structure and different indicators and charts can be incorporated in the reports, ii) *Manage indicators:* add / modify / delete indicators. All the indicators have predefined template that require data input. The indicators are linked to the programme activities, iii) *Manage monitoring reports:* The relationship between the outputs, results and investment priorities is the monitoring system for each region, *iv) Manage users:* Each user can modify their profile. The administrator of the platform can define for each user their privileges such as for which region they can produce monitoring reports.

- **Data repository.** Each WordPress installation has 11 default tables in the database. Each database table contains data for different sections, features, and functionality of WordPress.

- **Reporting module that integrates online comments by experts.** The reports have a predefined structure and different indicators and charts can be incorporated in the reports. Each region might follow the proposed template or modify it according to its RIS3 requirements. The proposed sections of the monitoring report are based upon the investment priorities related to RIS3:

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Table 1 Predefined structure of RIS3 report on M3 platform

Structure of the RIS3 report	S1: INTRODUCTION
	S2: INVESTMENT PRIORITY 1a: Strengthening research and innovation infrastructures
	S3: INVESTMENT PRIORITY 1b: Promoting business investment in R&D
	S4: INVESTMENT PRIORITY 2a: Extension of the development of broadband services and networks
	S5: INVESTMENT PRIORITY 2b: Development of ICT Product and services
	S6: INVESTMENT PRIORITY 3a: Promotion of entrepreneurship by exploiting new ideas
	S7: INVESTMENT PRIORITY 3c: Creation of advanced skills to develop products and services
	S8: INVESTMENT PRIORITY 3d: Support capacity of SMEs to engage in innovation processes
	APPENDIX

For each of the above sections (i.e. per investment priority) the user is called to enter information and text in the following areas:

- Objectives of the priority
- Baseline situation in the region
- Actions implemented in the of field of the Investment Priority
- Policy instruments used
- Indicators: Tables and Diagrams
- Impact analysis
- Conclusions

In sequence, the user is urged to create a RIS3 monitoring report, which includes:

- a description about the monitoring system of each region
- a chart that is produced automatically displaying the relation of outputs and results indicators per investment priority and
- a table with all output and results indicators

3.4 A use case in the region of Kentriki Makedonia, Greece

In the context of the 'Smart Specialization' programme, template reports were created on the M3 platform for the regions of Kentriki Makedonia (EL), Anatoliki Makedonia and Thraki (EL), Yugozapaden (BU), Yuzhen tsentralen (BU). Here we will briefly describe the use case of the region of Kentriki Makedonia.

The first report for the region of Kentriki Makedonia is one of the outcomes of the monitoring system conducted by experts and supported by data analysed and visualised by the M3 Platform. The report aims to show the progress of the implementation of the region's S3 and is structured around the investment priorities that are related to the RIS3

of Kentriki Makedonia. For each Investment Priority, and upon the predefined template of sections mentioned in section 3.3 of this paper, a series of information and data are laid out. For example, for Investment Priority 1a: Strengthening research and innovation infrastructures:

- the basic *target* is to increase overall expenditure on R&D from 0,68% in 2011 to 1% of regional GDP in 2020 with doubling the part of the business sector. Specific *objectives* are to (i) Strengthen the research units to promote applied research in areas of regional interest set by the RIS3, (ii) Strengthen regional research structures and infrastructures, (iii) Exploit research potential to the benefit of the regional economy, (iv) Increase new knowledge inputs to the economic sectors of smart specialization and (v) Increase public expenditure for Research, Technological Development and Innovation (RTDI)

- Afterwards, the *baseline situation* in the region with respect to this investment priority is mapped upon the examination of the region's outputs, assets, strengths and weaknesses. This exercise is documented through monitoring indicators sourced from publically available data sources, including the Hellenic Statistical Authority, the Greek National documentation Centre, the Innovation Union Scoreboard, and the Greek Operational Programme: "Competitiveness, Entrepreneurship and innovation"

- In sequence, the following section identifies the *actions* implemented with regards to the Investment Priority, by looking into the regional Operational Programme of the region, as well is into the Sectoral Programmes for Competitiveness and Entrepreneurship and Agricultural Development.

- Afterwards, the *regional innovation policy instruments* used in the region are analysed. These instruments are categorised as underpinning (i) knowledge production, (ii) knowledge dissemination and (iii) knowledge exploitation.

- Finally, the indicators and special charts produced automatically by the M3 Platform are created. This process allows the user to assess the effectiveness of the actions implemented and the effectiveness of the used policy instruments, through a monitoring of changes of outcome and result indicators.

4. Closing Remarks and Further Work

This paper elaborated on the concept and significance of monitoring and evaluation in a RIS3 context, while it also presented the types of indicators used in RIS3 monitoring. Most importantly, it presented the M3 platform, and more specifically the design process, the platform modules, how the platform can be accessed and used, and a pilot use case of it on the region of Kentriki Makedonia, Greece.

URENIO Research is currently in the process of advancing the presented M3 method and tool into two new distinct tools for RIS3 Monitoring and Evaluation, in the context of the EU funded Horizon2020 Research Project ONLINE-S3. Advances in these two new tools include the creation of the RIS3 monitoring system around specific actions, and the automation of statistical data entry, in contrast with M3, where data is entered manually.

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Annex

Table 2 Example of selected indicators for Investment Priority 1a: Strengthening research and innovation infrastructures

Output indicators

REGION CODE]-O-0001	Number of research infrastructures that are subsidised
[REGION CODE]-O-0002	Number of new researchers in supported entities
[REGION CODE]-O-0003	Number of researchers that are employed in improved research infrastructures
[REGION CODE]-O-0004	Number of enterprises that collaborate with research institutes

Result indicators

[REGION CODE]-R-0001	Average number of citations per publications of Greek researchers (Impact Index)
[REGION CODE]-R-0002	Common scientific publications between public and private entities per million of population
[REGION CODE]-R-0003	Common scientific publications with international partners per million of population
[REGION CODE]-R-0004	Participation of Greek enterprises in Horizon 2020 proposals
[REGION CODE]-R-0005	Researchers in enterprises

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