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SMART SPECIALISATION STRATEGIES IN THE POST-LINEAR ERA OF RESEARCH AND INNOVATION

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Smart specialisation is an entrepreneurial discovery process that makes it possible to identify where regions can benefit from specialising in specific areas of science and technology. The European Commission suggests the development of Research and Innovation Strategies for Smart Specialisation (RIS3) should concentrate resources on the most promising areas of constructive advantage, e.g. on clusters, existing sectors and cross-sectoral activities, eco-innovation, high value-added markets or specific research areas. This calls for regions to assess their assets, single out competitive advantages and highlight the cohesive qualities of territories. The RIS3 Key and Self-Assessment Guides both advise regions on how to prepare for smart specialisation, by identifying existing strengths and the potential for future development efforts, spotting remaining gaps and bottlenecks in the innovation system and mobilizing the relevant institutions involved in the entrepreneurial discovery process. This paper sets out the results of the Online S3 project's open consultation on these guides and the 29 RIS3 methods developed to guide this process of entrepreneurial discovery under the post-linear era of research and innovation.

Keywords
Entrepreneurial Discovery Process, European Commission, Online S3 Project, Open Consultation, Regional Innovation, RIS3, Smart Specialisation

1. Introduction

Smart specialisation is an entrepreneurial discovery process that makes it possible to identify where regions can benefit from specialising in particular areas of science and technology **[6; 7; 8; 9]**. The European Commission (EC) suggests that the development of Research and Innovation Strategies for Smart Specialisation (RIS3) should concentrate resources on the most promising areas of comparative advantage, e.g. on clusters, existing sectors and cross-sectoral activities, eco-innovation, high value-added markets or specific research areas. This calls for regions to assess their assets, single out competitive advantages and highlight the cohesive qualities of territories **[1; 5]**.

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The RIS3 Key and Self-Assessment Guides both advise regions on how to prepare for smart specialisation, by identifying existing strengths and the potential for future development efforts, spotting remaining gaps and bottlenecks in the innovation system and mobilizing the relevant institutions involved in the entrepreneurial discovery process **[9; 10; 12]**. This paper sets out the results of the Online S3 project's open consultation[1] on these guides and the 29 RIS3 methods developed to support this process of entrepreneurial discovery under the post-linear era of research and innovation. As a methodological review of RIS3, the findings of this consultation reveal the following:

- while the RIS3 Key and Self-Assessment Guides are all conducted in the post-linear era and offer a radical break in the production of knowledge, characterised by the transition from mode 2 to the triple helix model of research and innovation **[14]**, the guidance notes emerging to advise on such developments, also highlight something else: a shift from the triple to quadruple helix as the methodological basis to underpin such a strategic development;
- the European Commission now recommends adopting a quadruple helix approach for the second round of RIS3 assessments **[9; 10]**. For those involved in RIS3 design, this requires an understanding of the distinction between the triple and quadruple helix models, as a broad-based research and innovation strategy for new knowledge production;
- against this backdrop, it is equally important the European Commission is aware of how those involved in such knowledge production perceive these models and whether they see the direction of travel in entrepreneurial discovery as making a significant methodological contribution to the institutional framework for smart specialisation. Furthermore, if this development also offers a platform for sustainable and inclusive growth.

Such awareness is what this post-linear reflection is designed to capture. In offering such a reflection, it draws upon the results of an open consultation on the 29 methods the Online S3 project advances to advise stakeholders on how to prepare for the second round of RIS3 assessments.

2. The Online S3 project's open consultation

Online S3's open consultation involves:

- the publication of the 29 methods currently available to support the design and implementation of RIS3;
- a review of the methods by way of target interviews and questionnaire surveys with selected academics, analysts and specialists (approximately 20);
- four workshops with user-groups involved in the design and implementation of smart specialisation strategies;

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[1] Online S3 is a Horizon 2020 research project. This project aims to develop an e-policy platform augmented with a toolbox of applications and online services that can assist European national and regional authorities in elaborating and revising their smart specialisation strategies. More information can be found on CORDIS, the European Commission's primary portal for results of EU-funded research projects: http://cordis.europa.eu/project/rcn/203172_en.html

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- a social media campaign.

This open consultation deploys the software provided by Medium.com. This grants the stakeholder community using the 29 methods full access to the material. It also invites the user-community to review the methods and, for this evaluation, to proceed not only by way of interviews, questionnaires and workshops, but also through a social media campaign.
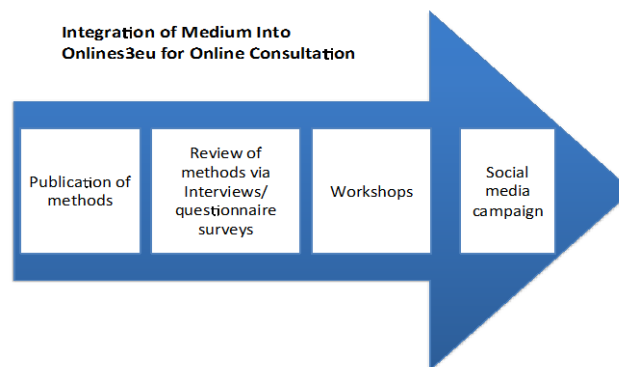
Figure 1 Main components of the open consultation

2.1 Publication of the methods

The publication of the 29 methods follows the consultation protocol offered by Medium (see https://consultation.onlines3.eu). This is set out in Figure 2.
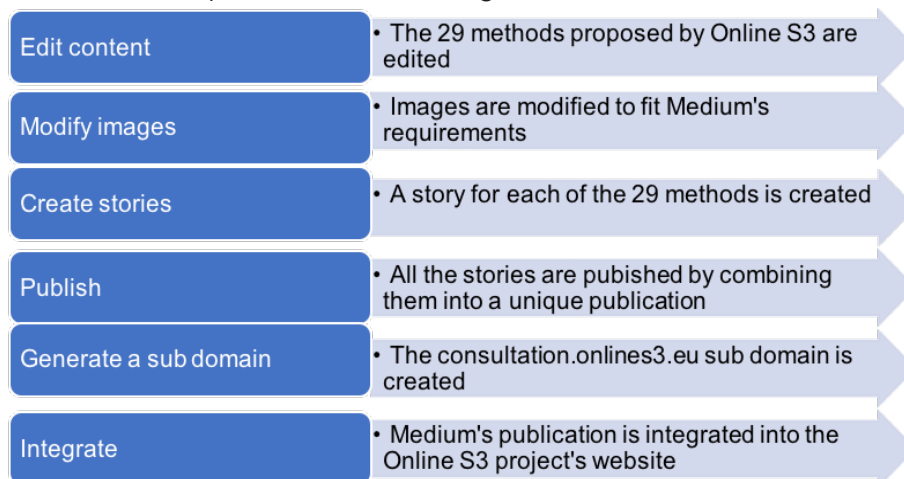
Figure 2 Online open consultation of the Online S3 methods

2.2 Interview/questionnaires

First pilot as a series of interviews with selected academics, analysts and specialists, initial feedback on the publication of the 29 methods indicated the material lent itself to a questionnaire survey as the most appropriate means to undertake the methodological review.

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As an integral part of this methodological review, the questionnaire survey provides the opportunity to reflect on the process of entrepreneurial discovery under the post-linear era of research and innovation, and the production of knowledge relating to the helices of smart specialisation strategies **[11; 13]**. The reasons for this are as follows:

- while the initial RIS3 self-assessments were all conducted in the post-linear era of research and innovation and do represent a radical break in the production of knowledge, the guides emerging also highlight a shift from mode 2 to the triple and quadruple helix as a basis for such strategic developments;
- this suggests the first round of RIS3 assessments were to some extent "caught in the transition";
- the European Commission now recommends the quadruple helix should be adopted as the constituency of stakeholders for RIS3 strategies and the second round of assessments ought to be conducted on this basis;
- for those involved in RIS3 design, this means there is a pressing need for any further development to be fully aware of the differences, arguments for and against the triple and quadruple helix as a broad-based research and innovation strategy for new knowledge production;
- it is also equally important the European Commission is fully aware of the views and opinions on the value of these models. In that respect, whether stakeholders support the direction of travel this takes on and if this movement offers a platform for sustainable and inclusive growth.

This "full awareness" is what the questionnaire survey is designed to capture, solicit views and opinions on. This provides the means for the stakeholder community to deliberate the terms of reference for the second round of RIS3 assessments and compile reports on the strengths and weaknesses of the user-centric drive towards the mode 3 research and innovation it promotes under the auspices of the quadruple helix **[2; 3; 4]**. With this in mind, the questionnaire addresses:

- the RIS3 KEY for Self-Assessment **[12]**;
- the European Commission's Guide to Research and Innovation Strategies for Smart Specialisations **[9; 10]**;
- the Online S3 user-centric drive towards RIS3 Assessment **[15]**.

The initial results of a bibliometric analysis found 145 scientific experts involved in smart specialisation research, who were invited to complete the questionnaire. To date (April 2017), 17 completed surveys have been returned. As it has not yet been possible to conduct a detailed analysis of the questionnaire responses, the following shall only report on the initial headline results of the questionnaire survey:

- 75% found the RIS3 KEY Guide either extremely helpful, or very helpful, because it mobilizes all the stakeholders who are most capable of championing research and innovation under the triple helix model of regional innovation systems;
- 75% found it very important for the scientific, knowledge production and creative sectors to be the champions of regional innovation;
- 60% found it very important for these sectors to cluster together as enterprises able to leverage technological breakthroughs across regions;
- 70% propose to adopt these technological breakthroughs as policy priorities of any smart specialisation strategy;

- 60% said it is either very important or important for any such technological breakthrough to be the subject of a governance regime of a joint board acceptable to all stakeholders;
- 65% said this joint board should be responsible for designing a research and innovation strategy for smart specialisation;
- 75% said it is very important the joint board provide a clear statement about the future challenges the research and innovation strategy has to meet;
- 75% of those surveyed believe their regions have the scientific knowledge and creative skills to meet these challenges;
- 70% see the triple helix as a marked improvement on previous models of regional innovation, strong in terms of linkages between university and industry, but with weaker connections to government. However, the responses are divided (60/40) in terms of whether-or-not civil society can strengthen this. This aside, 70% of respondents suggest the public should have greater influence over a broad-based innovation policy, but the rate of innovation in Europe may not be sufficient to allow for this;
- any proposal to leverage such an intervention by way of the quadruple helix, also produces a 60/40 split in favour of this model, despite 80% of respondents suggesting it is only this broad-based innovation policy that can widen the participation which is sought;
- with regards to the inclusion of civil society in the Guidance Notes, 70% believe this constituency is added in order for innovations to meet the grand challenges of civil society and achieve this by extending demand beyond industry and business. That is extended out into the research and education sector, business, government and public institutions of a quadruple helix, which is able to bridge technological gaps in the co-design of research and innovation strategies. Able in that sense to offer a platform which gains public trust in research and innovation and clears the democratic deficit otherwise associated with such strategies;
- whilst acknowledging this, a 50/50 split exists in recognising the virtues of such an inclusive growth strategy, but this aside, there is a general agreement that inclusive growth offers the best prospect of broadening participation as part of an open research and innovation strategy, which is sufficiently comprehensive to meet the social challenges that Europe faces;
- 70% suggest the quadruple helix offers a more coherent governance system for smart specialisation and 60% of the respondents are familiar with the 29 methods Online S3 selects to promote this. The majority of the respondents see this coherence as being linked to the broadly participative nature of the methods, which are connected to the RIS3 steps the user-community is not only now familiar with, but know about. This alignment makes it possible for users to participate in a process of co-design that not only bridges the technological gap in research and innovation, but which also allows the community to restore public trust in such actions.

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Table 1 The 29 methods proposed by Online S3

PHASE	DESCRIPTION	METHOD
1. Governance	The term "governance" refers to government and stakeholder engagement. Governance implies also a quadruple helix approach as the key process of innovation production. This step should be placed at the start of RIS3, setting the framework of the entire process.	1.1. RIS3 vision sharing 1.2. Stakeholder engagement 1.3. RIS3 debate at a glance 1.4. RIS3 legal and administrative framework related to ESIF
2. Analysis of context	"Analysis" is an established and standard term of background information necessary for any strategic planning process. "Context" refers to regional/national specific conditions and existing institutional setting to be taken into account.	2.1. Regional asset mapping 2.2. Research infrastructure mapping 2.3. Clusters, incubators, and innovation ecosystem mapping 2.4. Benchmarking 2.5. Regional scientific production profile 2.6. Specialisation indexes 2.7. SWOT analysis
3. Strategy formulation	"Strategy" formulation (instead of policy formulation) denotes the character of RIS3 as strategy and as a project-oriented intervention. "Shared vision" makes clear the participatory approach in defining the vision and setting objectives.	3.1. Collaborative vision building 3.2. Scenario building 3.3. Delphi - Foresight
4. Priority setting	Definition of activity, focus and priorities of smart specialisation.	4.1. EDP workshops 4.2. Extroversion analysis 4.3. Related variety analysis
5. Policy mix	"Policy mix and action plan implementation" denote the sequence of actions for implementing the strategy. "Action plan" stresses the need for a structured project-driven approach to RIS3 implementation.	5.1. RIS3 intervention logic 5.2. RIS3 action plan co-design 5.3. RIS3 budgeting 5.4. RIS3 administrative framework conditions 5.5. RIS3 calls consultation 5.6. RIS3 innovation maps 5.7. RIS3 open data tool
6. Monitoring and evaluation	"Monitoring and evaluation" (instead of evaluation) refers to the data collection process: the need to create a repository of data to monitor the key processes of smartness.	6.1. RIS3 monitoring 6.2. Definition of RIS3 output and result indicators 6.3. Balanced scorecard 6.4. RIS3 beneficiaries and end users' satisfaction online survey 6.5. RIS3 social media analysis

2.3 Workshops

The workshops have the following aims: (1) raise awareness of the 29 methods (see Table 1); (2) review the status of the methods from the user-perspective; (3) capture the outcomes of this review as a summative evaluation of the methods; (4) solicit the thoughts, views and opinions of the users on the strengths and weaknesses of the methods; (5) reflect on the

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potential there is for Online S3 to develop the methods as good examples of entrepreneurial discovery and to take advice from the user-group on what they consider necessary for the methods to be user-centric.

Workshop events
- Central Macedonia (Thessaloniki): 10th December 2016 and 10th January 2017
- Scotland (Edinburgh): 26th January 2017
- Slovakia (Bratislava): planned but not convened[2]
- Slovenia (Ljubljana): 19th January 2017

Table 2 Stakeholder representation at the workshops

	STAKEHOLDERS				
WORKSHOPS	University	Industry	Government	Civil Society	**TOTAL**
Greece	0	15	7	0	22
Scotland	0	5	6	0	11
Slovenia	5	15	1	0	21
Slovakia[3]	3	3	6	0	12
TOTAL	**8**	**38**	**20**	**0**	**66**
	12%	**58%**	**30%**	**0%**	**100%**

User-group representation
Representing the four stakeholder groups at the workshops proved challenging. An analysis of the workshops indicates only University, Industry and Government were represented. From the 66 who attended the workshops, 12% are from Universities, 58% from Industry and 30% from Government (see Table 2). From this, it is evident that Online S3's commitment to the quadruple helix is slightly compromised by the over representation of Industry and Government as stakeholders relative to those of Civil Society and to a lesser extent Universities.

Results of the workshops
The results of the workshops are shown in Table 3. Analysing the results by score, the average is 4/5 (very useful), with only 35% of the methods commanding a higher score. In contrast to this, 32% of the methods also fall below the average. This suggests the user-community is generally supportive of the methods.

Table 4 provides an extract of the specific comments. Here, criticisms of the methods include their design, vis-a-vis the form they take. As one participant representing the Scottish Government and attending the Edinburgh Workshop said: "the fact they are full of technical jargon and excessively lengthy" is not helpful. In addition to this comment, the user groups from each of the workshops made the following observations:

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[2] This user-group workshop for the Online review of S3 methods did not convene due to developments of RIS3 by the nation-state. In an attempt to fill this gap, Slovakia choose instead to post feedback via the consultation tool hosted on Medium.

[3] Slovakia's figures are drawn from the online consultation they participated in.

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- currently, there are too many methods;
- the descriptions tend to be technically over-specified and too complex;
- simplification of the methods would be helpful, as too would a much clearer statement of who they are intended for;
- this means segmenting the methods by user-profile, role and function;
- these profiles, roles and functions also require to flag up the added value to the users, either in scientific and technical terms, potential for wealth creation, investment in and commercial exploitation of innovations to meet social challenges;
- without this, there shall be no "buy-in";
- it would be a good idea to write the methods descriptions not from the expert's point of view, but specify them from the perspective of the user, as this would make it easier to navigate a critical path from one to the other;
- this means turning the situation around by: (1) keeping the technical matters in the "back office"; (2) pushing what you want the method to communicate up into the "front-of-shop", where it can be both seen and heard; (3) shifting attention away from the problem and to the solution;
- any such user-centric message also requires not to be so text-driven, but offer a rich "multi-media" experience, vis-a-vis better balance between the written text, visual images and symbols available to communicate the value-adding potential of the solution each of the methods offers;
- in this way, the methods ought to be more radical and represent user-centric communications as social innovations;
- any wider dissemination should seek to streamline the methods so the critical nature and pivotal status of these social innovations can be seen as not only being smart in terms of the priorities they set, but in relation to how these preferences sustain the entrepreneurial discovery process;
- this user-centric message needs to be inclusive and consistent across each of the methods. Indeed, as one participant went on to suggest, only by communicating the methods in this way it shall become possible for the social media adopted (Medium) to create the very stories that allow for the publication of them as methods, which others can also speak about as part of an online consultation.

Table 3 Summative evaluation of the 29 RIS3 methods

METHOD	AVERAGE SCORE	Not useful	Not very useful	Neutral	Useful	Very useful
1.1. RIS3 vision sharing	4					
1.2. Stakeholder engagement	4.3					
1.3. RIS3 debate at a glance	4.3					
1.4. RIS3 legal and administritive framework related to ESIF	3.7					
2.1. Regional asset mapping	4.7					
2.2. Research infrastructure mapping	4.3					
2.3. Clusters, incubators, and innovation ecosystem mapping	4.3					
2.4. Benchmarking	4.3					
2.5. Regional scientific production profile	4					
2.6. Specialisation indexes	3.7					
2.7. SWOT analysis	3.7					
3.1. Collaborative vision building	4					
3.2. Scenario building	3.7					
3.3. Delphi - Foresight	4					
4.1. EDP workshops	4.7					
4.2. Extroversion analysis	4					
4.3. Related variety analysis	3					

Table 4 Extract of detailed comments

METHOD	WORKSHOP			
	Greece	Scotland	Slovakia	Slovenia
1.1. RIS3 vision sharing	*Very useful but it has description and operation difficulties*	*Requires case study examples to clarify the method*		
1.2. Stakeholder engagement	*Very useful both the methodology and the instrument (opinion of experts is required)*	*Sections 1.1 and 1.2 could be merged. People not necessarily running these methods in the correct steps/logical orders*		
1.3. RIS3 debate at a glance	*Very useful methodology but it has description and operation difficulties*			
1.4. RIS3 legal and administrative framework related to ESIF				*Concern about translation and linguistic issues*
2.1. Regional assets mapping			*When mapping the research infrastructure in various countries, there should be included also the data about overall yearly budget spent on supporting programs by each institution*	

3. Social media campaign

Table 5 sets out the social media strategy deployed for the online consultation. From this overview, it is evident that generating comments from the user-community, which constitute a mutual exchange, is far more challenging than achieving reads and likes. Given that Medium is the default social media for the consultation, the plan for future deliberations on Online S3 shall proceed by way of LinkedIn and Twitter.

Table 5 Social media campaign

SOCIAL MEDIA	VIEWS	LIKES	COMMENTS
Medium	1,000	17	12
LinkedIn	7,000	25	8
Twitter	80		
Facebook	700	15	5
YouTube	21	2	

4. Conclusions

The RIS3 Self-Assessment Guide helps regions to prepare for smart specialisation by identifying existing strengths and the potential for future development efforts, identifying remaining gaps and bottlenecks in the regional innovation system and mobilizing the relevant institutions involved in the entrepreneurial discovery process. This paper has reported on the results of the Online S3 project's open consultation on the 29 methods of entrepreneurial discovery under the post-linear era of research and innovation.

The outcome of this methodological review informs stakeholders within this community on how to prepare for the next RIS3 assessments and report on the strengths and weaknesses of the user-centric drive towards mode 3 research and innovation in smart specialisation.

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