

CONSTELLATIONS OF CERIS3 EXCELLENCE - RIS3 CHAMPION NETWORK ATLAS

D.T3.1.2 Constellations of CERIS3

Excellence - RIS3

Champion Network Atlas

Final Version

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1. Executive Summary

1.1. Project Overview

S3HubsinCE aims to utilise the model of the digital innovation hub, and linkages between these hubs created through collaborative exchange on smart specialisation thematic priority areas, to create a common transnational support structure. This structure has a goal to generate stronger connections between RIS3 stakeholders to promote value creation and enhanced competitive advantage in Central Europe.

Ultimately it creates and tests a common method to help regional and national strategy-responsible institutions, understand how RIS3 value-creation can be fostered through a connected network of Digital Innovation Hubs (DIH).

The project focuses on:

- Transnational innovation network to enhance collaborative RIS3 exchange and identify RIS3 Champions
- DIH alignment through a common pilot-program, to promote market-focused RIS3 Excellence and RIS3 Value-Creation
- Future-orientated policy learning with closer-to-market activities.

1.2. Scope of Document & Summary

This document aims to give a comprehensive picture about RIS3 Champions, selected by each project partner. The report shall be demonstrating synergies between the transnationally selected RIS3Champions, with defining clusters based on their interest in thematic digitization areas, contributing to the transnational constellation of RIS3 actors on Central European level.

1.3. Audience

This document, on the one hand is directed to all project partnership members, because all members of the partnership engaged their RIS3 Champions (at least 5 Champions have been finalised by each PP) and their contributions have been integrated into the current material. On the other hand, it is a policy-maker oriented document in a reporting format which is used to evidence to the joint secretariat the depth of partners´ stakeholder engagement.

Besides, the involved RIS3 Champions might also benefit from the information/results and conclusions of the current report, since they can find synergies with other actors from the CE region, which might facilitate future cooperation between the actors.



1.4. Change Control Procedure & Structure

The Deliverable (D.T3.1.2) Responsible, Pannon Business Network (PBN), created this Atlas Report, and it is under standard project change control, whereby Partners are requested to give feedback on the stated definition or tools in writing to the Deliverable Responsible in a timely manner (within one week of the circulation of the draft version).

As per normal procedure, at any time partners believe a deliverable should change, the request should be brought to the work package leader and Lead Partner (in this case PBN, as Deliverable Responsible lead and TECOS, Work Package Leader), to consolidate feedback from other partners, and integrate and disseminate the final agreed changes.



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2. Introduction

The guidance document (D.T3.1.1)- released before (November 2020 by Forschung Burgenland Partner in joint collaboration with Mind Consult expert)- has provided the Partners of S3HubsinCE insight on how to identify RIS3 Champions for inclusion within the project. These organisations-types have been previously discussed, and included, theoretically within other work package aspects as Partners worked to develop an understanding of their region's innovation ecosystem needs. These organisations have also been included within the development of Pilot Actions, envisaged by the Partners.

The objective of this current Atlas Report is to provide an overview of the RIS3 Champions, identified and involved by the project partners based on the instructions and steps defined in the Guidance (D.T3.1.1) document. In this report the different clusters and their characteristics shall be scrutinised which have been established based on the information and input provided by the RIS3Champions.

2.1. Background

The background of this activity is interlinked in all aspects of the project's development, to date. As described in previous guidance documents, and previous presentations on S3HubsinCE, the project creates and tests a common method (or model) to help regional and national strategy-responsible institutions, understand how RIS3 value-creation can be fostered through a connected network of Digital Innovation Hubs. The S3HubsinCE PPs test this model and disseminate the results to strategy-responsible institutions who will benefit from this evidence to support the development of 2021 to 2027 subsidy programmes.

The model has been built on the principle that RIS3 value-creation emerges from close-to-market research & innovation activity, which promotes enhanced competitive advantage. The model is also built on the assumption that there are organisations in each region which deliver this competitive-edge, or competitive advantage associated to specific topic areas. Thereby, these organisations "champion" or embody regional innovation smart specialisation and are critical for its delivery. Figure provides an overview of the specific objectives of the project, and a summary statement of the project's key goal.



Figure 1 Overview of the Specific Objectives of the Project & Connection to RIS3 Champion Value Creation

Ultimately, the model developed, tested and disseminated by the partners works towards creating constellations of Central Europe Regional Innovation Smart Specialisation Strategic (CERIS3) Excellence, which promote macro-regional knowledge exchange within a Digital Innovation Hub (DIH) network to better coordinate support for organisations with high-potential to bring key impact to RIS3. The concept of a “constellation” was used to signify a parallel between the important significance given to celestial constellations when individual stars are viewed together. Figure 2 below, provides a stylistic image of this metaphor, with the project’s key goal and mission statement.



Figure 2 Stylistic Image of Constellations with Project Mission Statement (Source: Author of D.T3.1.1)

One of the other key principles embedded within this model, is that the Partners and their RIS3 Champion stakeholders, and fundamentally the development potential of their region are better, when working together in cooperation with strategic partners from across the territorial area. Figure 3 emphasizes these aspects again, with a reminder of the key unit which is being connected between each region - the Digital Innovation Hub stakeholder ecosystem of each PP.



Figure 3 Stylistic Portrayal of RIS3 Champion Support Structure via the Connected Network of Digital Innovation Hubs
(Source: Author of D.T3.1.1)

Within each work package, partners have developed their understanding of their stakeholder’s needs (AT1.2), their competencies to support these needs, their weaknesses which would benefit from transnational cooperation (AT1.1 and AT2.1). From this insight the Partners have developed targeted actions which aim to support organisations which are critical to the region’s RIS3 success (AT2.2). The focus of these exercises revolved around answering two questions, portrayed within Figure 3.

- Which organisations have the potential to be Central Europe’s RIS3 Champions?
- What support is needed to enhance the organisation’s RIS3 value-equation?



2.2. Definitions

2.2.1. RIS3 Champions

This subsection shortly introduces the definition of RIS3 Champions which guided the partners to engage their regional actors.

RIS3 Champions can be SMEs, Large Enterprises, Business Support Organisations, Higher Education/Training Centres and Schools, and Research Technology and Development Organisations. The key characteristic that these organisations much achieve is that they embody the “best-in-class” or good-practice example of an organisation that is at the cutting-edge of research and innovation, especially with regards to R&I operative work which current leads or is set to lead the region to a competitive advantage over the coming period. They can be advancing research in the area, advancing market-oriented activities, they can be advancing the connection between research and market-oriented activity, ultimately creating shared value for the region’s innovation strategy with their excellent operations.

As described previously, these organisations “champion” regional innovation smart specialisation, and are thus paramount to the successful and timely delivery of regional strategies to foster smart specialisation. However, these RIS3 Champions also have needs (identified in WPT1), which are limiting/hindering their competitive edge; these needs are the subject matter which is addressed in the S3HubsinCE Pilot Actions. The Pilot Actions, as a reminder, are built to deliver value-added benefit for critical RIS3 stakeholders.

Shortly RIS3 Champions are required to fulfil the following criteria:

- RIS3 Champions can belong to the following target group: SMEs, Large Enterprises, Business Support Organisations, Higher Education/Training Centres and Schools, and Research Technology and Development Organisations
- An organisation which is bringing value-adding benefits to the region’s innovation eco-system;
- An organisation which is recognised by other regional stakeholders as part of enhancing the region’s competitive edge;
- An organisation connected to one or more thematic focus areas (aka. Navigation Crew topics);
- An organisation, is ideally, connected to one or more project actions (Training & Mobility Actions, or Transfer & Cooperation Actions), therefore demonstrating that they would still benefit from advanced and/or transnational cooperation and support to enhance their value-proposition.

2.2.2. Constellation of CERIS3 Excellence

The Constellation of CERIS3 Excellence describes the network which is generated by the inherent connections which are created between RIS3 Champions, through the S3HubsinCE Partnership, via transnational actions which are generated between the Partners in pursuit of value-creation in the regional innovation ecosystem of each PP's territorial area.

A principle which is intrinsic within this project is that the connections generated between the RIS3 Champions can create value and competitive advantage for the entire programme area. The other principle within this network is that the connections, generated through Pilot Actions, target specific needs of the RIS3 Champions. Thus, actions generate value for critical RIS3 stakeholders and enhance regional competitiveness.

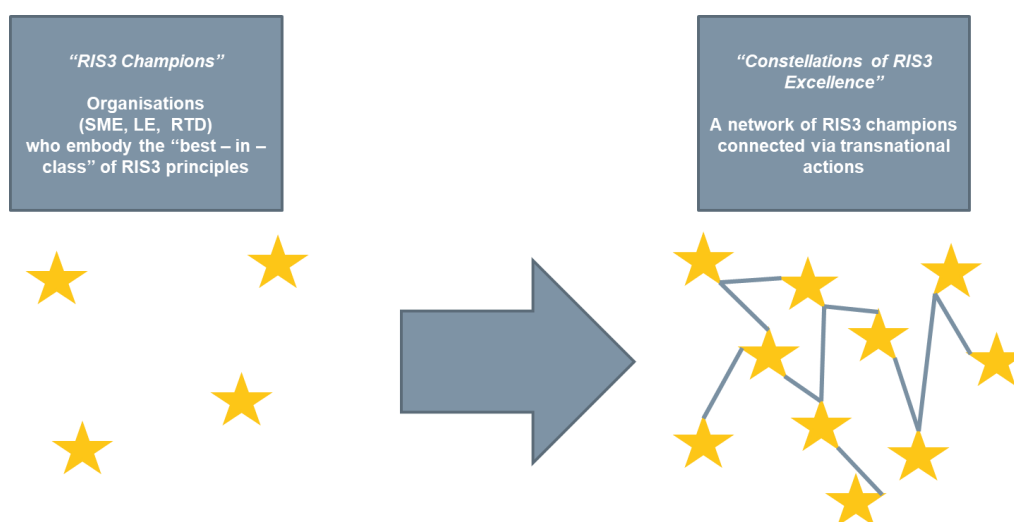


Figure 4 Definitions of RIS3 Champions and Constellation of RIS3 Excellence, Visualized
 (Source: Author of D.T3.1.1)

3. Methodology

3.1. The Identification Process and the contribution of RIS3 Champions

Project Partners identified their RIS3Champions following the instructions and steps defined in the Guidance (D.T3.1.1) document.

Namely, the Project Partners and their RIS3 Champions carried out the following activities described in Table 1. The common Atlas templates -finalised in the beginning of March by all PPs- can be considered the main input and contribution for preparing and releasing the current report.

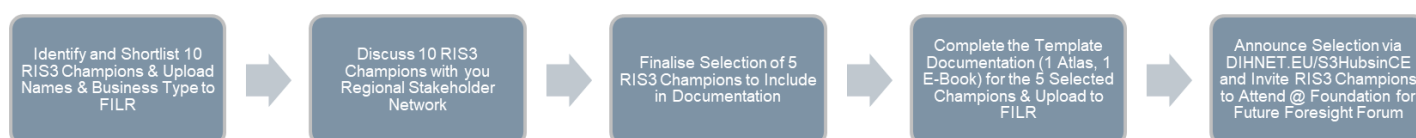


Figure 5 Basic Process Description for RIS3 Champion Selection

Action Step	Schedule	Involved Partner	Responsible Partner
Release the final version of the RIS3 Guidance document (D.T3.1.1)	4 th November 2020	Forschung Burgenland (after comments of all project partners)	Forschung Burgenland (D.T3.1.2)
Shortlist of 10 RIS3 Champions per Partner (10*10 Champions), and provide short description about them	mid-November 2020-mid December 2020	All Project Partners	PBN as responsible Partner of the current Report was continuously monitoring
Finalise List of minimum 5 RIS3 Champions/PP (10*5 Champions) → In order to do so, PPs were asked to organise meeting with relevant stakeholders where the final regional Champions have been selected	mid-December 2020 -end of January 2021	All Project Partners	



The evidence materials are uploaded by all Project Partners and monitored by PBN as responsible Partner			PPs' achievements and was regularly reminding PPs who had missing information
Project Partners together with their RIS3 Champions completed the ATLAS word template defined in the Appendix of D.T3.1.1→ minimum 50 filled templates in total	mid-January 2021- beginning of March 2021	All Project Partners with the support of their own RIS3 Champions	
Setting up a common, analysable dataset (excel) based on the RIS3Champions' replies	by Mid-March 2021	PBN (external expert) (based on the data provided in the templates filled by RIS3 Champions)	
Checking and analysing the dataset of 50 RIS3 Champions on project level	Mid-March 2021- 10th April 2021	PBN together with its external expert	
Draft version of the Atlas Report	16 th April	PBN released the draft version with PPs	
Final version of the Report (based on PPs' comments)	26 th April	PBN integrated PPs' feedbacks to the report and released the final version of the deliverable	

Table 1: Actions carried out in the preparation of the Atlas Report

3.2. Documentation

3.2.1. Atlas template filled by RIS3 Champions

As it was indicated in Table 1, Project Partners - in joint collaboration with their RIS3 Champions - were required to provide the filled templates to PBN, which can be considered the main input for the preparation of the current Report. This detailed template can be found in the first appendix, Section **Hiba! A hivatkozási forrás nem található.** of the D.T3.1.1 Guidance, so Partners (RIS3 Champions) were already aware the list of questions in the beginning of November 2020.

This template includes questions associated to gaining a detailed summary on:

- Company description: the key competency, key services/market sector.
- Key competitive advantage the RIS3 Champion brings to the innovation ecosystem of the region. Note: This is specifically described using a “challenge” and/or “solution” use case framework, as displayed in some of the inspirational documents. Therefore, the Champions are described by the challenge they solve as they bring competitive advantage to the region, and the solution of how they address the challenge.



- Key value-added benefit the RIS3 Champion gains (or seeks to gain) by being involved in the Constellation for CERIS3 Excellence.
- In addition, it requires basic administrative information, logos and pictures to illustrate this competitive advantage (these will be used by KTP in D.C4.3)
- Connected Navigation Crew(s)
- Prior participation in WPT1 (Needs Assessment questionnaire) and/or WPT2 Mobility and/or Transfer and Cooperation Action(s)

As Table 1 points out, these Atlas templates (all in all 51, since ECIPA has finalised 6 Champions) were finalised in the beginning of March 2021 by the Partners and their RIS3 Champions. Following the fulfilment of the templates, based on the replies of the RIS3 Champions - provided in the separate templates - PBN set up a common, analysable tool, and after having this tool the advanced analysis could be conducted.

The results, conclusions, and synergies of the RIS3 Champions analysis shall be detailed in the next main chapter



4. Analysis of the 51 RIS3 Champions selected by S3HubsinCE partners

Following continuous discussions with project partners and RIS3 Champions, the dataset-including all answers of every involved RIS3 Champion- could be finalised in the first half of March 2021. According to the dataset, every Project Partner (10) has chosen and has involved 5 RIS3Champions, except ECIPA Partner who have involved 6 RIS3 Champions. Therefore, in total 51 RIS3 Champions have been involved and provided contribution in the common template. The input of all RIS3Champions have been integrated into a common dataset, and numerous analysis have been conducted, and the main results and conclusions shall be demonstrated in this main chapter.

4.1 Organisation types of the involved RIS3 Champions

In the provided common template, RIS3 Champions were asked about their organisation types. As Figure 6 points out, SMEs have been overrepresented in the sample, since 41.2% of the entire group - 21 organisations out of 51- have considered themselves SMEs. They were followed by Higher Education and Research organisations with 14 actors. Apart from SMEs and Higher Education and Research organisations, Large Enterprises, Business Support Organisations, Technology Transfer university foundation and DIHs were also involved, their distribution was approximately 30% in total.

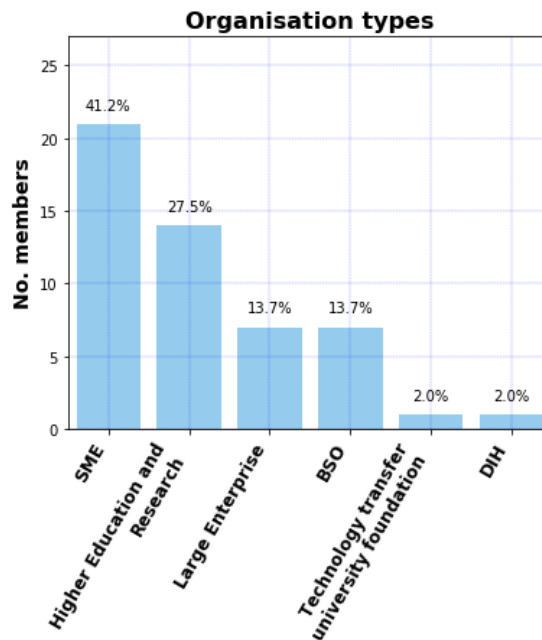


Figure 6: Distribution of organisation types of the RIS3 Champions



The distribution of the different organisation types has been also described on geographical level as well. Figure 7 clearly depicts the Central European regions of the involved RIS3 Champions. It can be perceptible from the map, that all Slovenian RIS3 Champions belong to the Higher Education and Research Institution category, since in their case 3 Champions have been chosen from the same institution, namely Jožef Stefan Institute, however three departments have been differentiated. Having scrutinised the map, and the geographical distribution of the different organisation types, it can be also noticed that the majority of the RIS3 Champions (7 out of 10) chosen from the two Austrian Partners, as well as the half of the German Champions (5 out of 10) belonged to SMEs.

Table 2 details the involving countries, the nominating partners and the NUTS2 Regions of the chosen RIS3 Champion according to the newest NUTS Classification of the European Union valid from 1st January 2021¹.

<u><i>Involved Country</i></u>	<u><i>Associated Project Partner</i></u>	<u><i>NUTS2 Regions of the RIS3 Champions (in national language)</i></u>
Austria	Forschung Burgenland	AT11-Burgenland (5 Champions)
Austria	Carinthia University of Applied Sciences	AT21-Kärnten (5 Champions)
Croatia	Croatian Chamber of Economy	HR05- Grad Zagreb (1 Champion) +HR06-Sjeverna Hrvatska (4 Champions)
Germany	Bwcon GmbH,	DE11- Stuttgart (2 Champions)+ DE13 Freiburg (1 Champion)+ DE12 Karlsruhe (1 Champion)+ DE14 Tübingen (1 Champion)
Germany	Fraunhofer Institute for Machine Tools and Forming Technology	DE30 Berlin (1 Champion)+ DED2 Dresden (2 Champions)+ DED4 Chemnitz (2 Champions)
Hungary	Pannon Business Network Association	HU22- Nyugat-Dunántúl (3 Champions) HU-11 Budapest (2 Champions)
Italy	Intellimech Consortium	ITC4- Lombardia (5 Champions)
Italy	Ecipa - Training and Service Agency	ITH3- Veneto (6 Champions)

¹European Commission's NUTS classification valid from 1st January 2021: <https://ec.europa.eu/eurostat/web/nuts/background>



	Limited Liability Consortium,	
Poland	Krakov Technology Park	PL21- Małopolskie (5 Champions)
Slovenia	Slovenian Tool and die Development Center	SI03 Vzhodna Slovenija (1 Champion)+ SI04 Zahodna Slovenija (4 Champions)

Table 2: Involved countries and NUTS2 Regions of RIS3 Champions

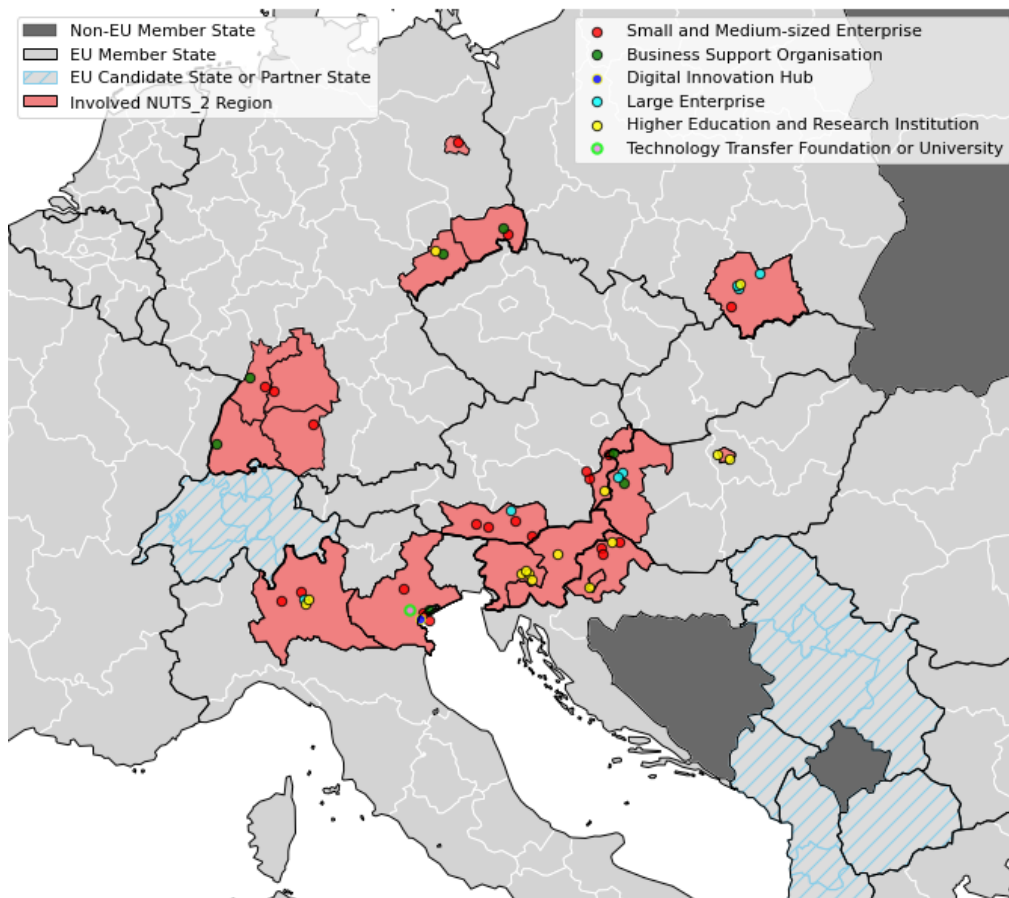


Figure 7: Geographical distribution of RIS3 Champions with organisation types



4.2 Sector of the RIS3 Champions

In the common template, RIS3 Champions provided information about their sector(s) using the official European Industry-standard classification system (NACE codes).² Certainly, RIS3 Champions had the possibility to write more than one NACE code in case they are operating in different fields. Since some Champions provided information about their operation area(s) in a deeper level, whereas some actors have not, in our analysis we demonstrated the sub-level of each sector, since it was available for every Champion.

Figure 9 undoubtedly depicts that approximately quarter of the involved RIS3 Champions are operating in the *Scientific research and development field (M72)* and also quarter of the RIS3 Champions have marked that they are operating in the *Computer programming, consultancy and related activities sector (J62)*. Nevertheless, Figure 8 and 9 are also revealing that several further sub-sectors have been marked mainly in the *Professional, scientific and technical activities (M)* main sector, but the involvement in the *Manufacturing (“C”)* and *Information and communication (J)* sector is also remarkable among the RIS3 Champions’.

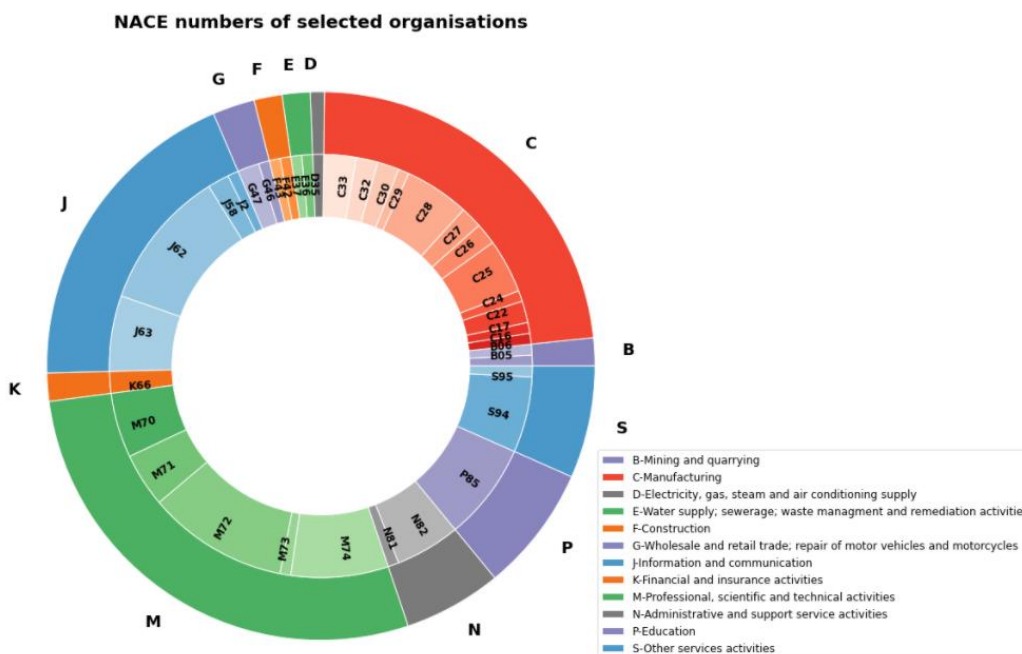


Figure 8: The distribution of sectors of RIS3Champions

²Official European Industry Standard Classification system: <http://www.export.gov.il/files/EEN/ListNACEcodes.pdf>

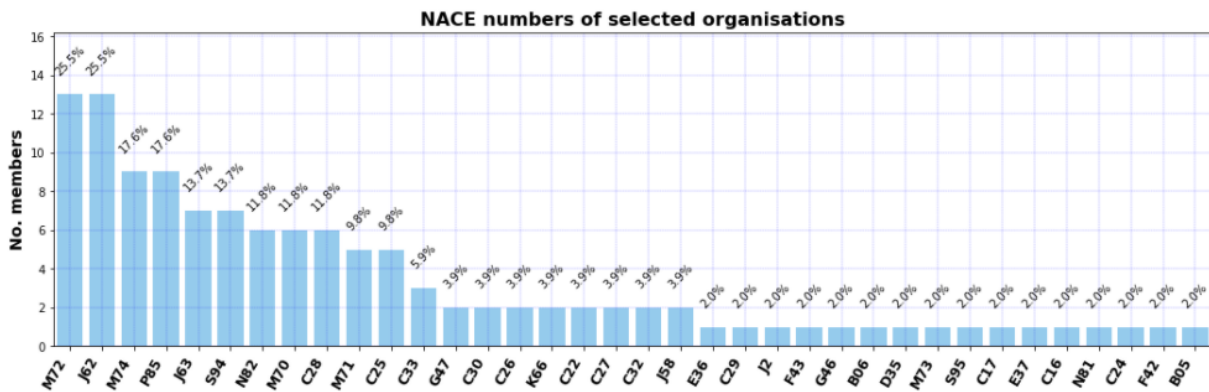


Figure 9: The distribution of sectors of RIS3Champions (2)

4.3 Navigation Crew orientation of the RIS3 Champions

In the common template, RIS3 Champions were requested to indicate their interest in Thematic Priority Areas (so called Navigation Crews, established by Project Partners in the first half of the S3HubsinCE project). The respondents had the possibility to choose between 10 such Navigation Crew topics, as many as they apply.

The listed Navigation Crew topics were the followings:

1. Data Analytics, Complex Simulation and Modelling
2. Machine Vision
3. Predictive Maintenance
4. Factory & Process Automation
5. DI&I: Machinery
6. Advanced & Smart Materials
7. Industrial Internet of Things (IIoT)
8. Digital Marketing
9. Innovation in a Circular Economy
10. Design & Engineering for Additive Manufacturing

The upcoming sub-section shall scrutinise the results in connection with the Navigation Crew interest of the involved RIS3Champions.

Figure 10 shows the distribution of the number of Navigation Crew topics selected by RIS3Champions. According to Figure 10, 14-14 actors out of 51 (27.5%) have selected 3 or 4 thematic areas from ten such areas. It is also worth mentioning that 5 Champions have selected only one area, whereas 9 institutions have marked two areas, which might reflect that these actors are focusing on 1-2 specific navigation crew topics. On the other hand, surprisingly, 1-1 RIS3 Champions have selected 7 and 9 Navigation Crew topics, which might suggest that these actors have interest and/or competence in almost all the Thematic Areas given.

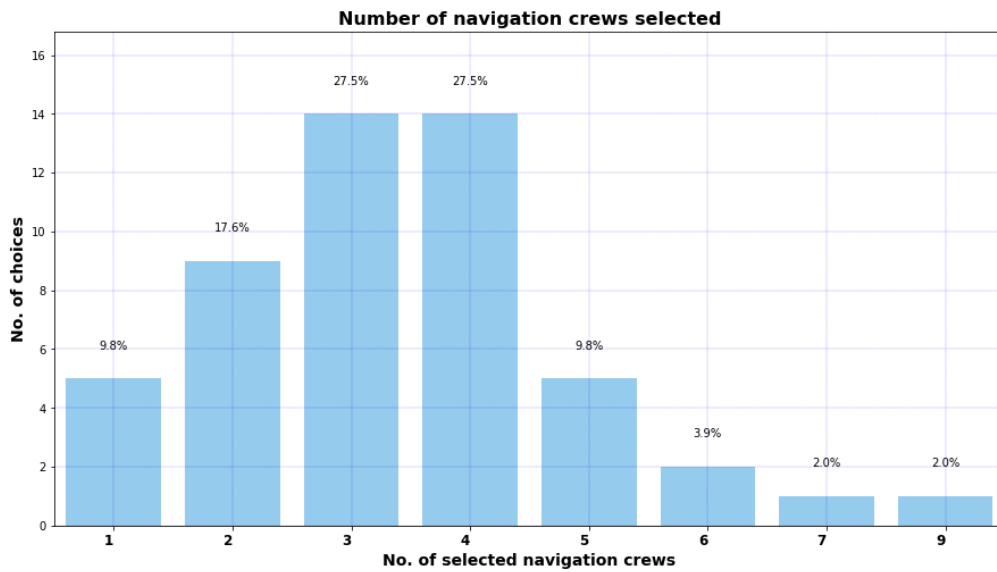


Figure 10: Number of Navigation Crews (out of 10) selected by RIS3 Champions

Apart from the number of navigation crews selected, the analysis was dealing with the distribution of preferences of each crew topic. Figure 11 clearly depicts that more than the half of the involved RIS3 Champions have expressed their interest towards three thematic areas, namely to Data Analytics, Complex Simulation (62.7%) and Modelling, to Industrial Internet of things (60.8%), as well as to Factory and Process Automation (54.9%). Apart from these three topics, it can be also highlighted that third of the involved Champions have marked Innovation in Circular Economy and Predictive Maintenance as thematic areas they are interested in.

On the other hand, Machinery and Machine Vision, are marked by the smallest number of Champions, but still 8-8 Champions indicated these areas as their interests.

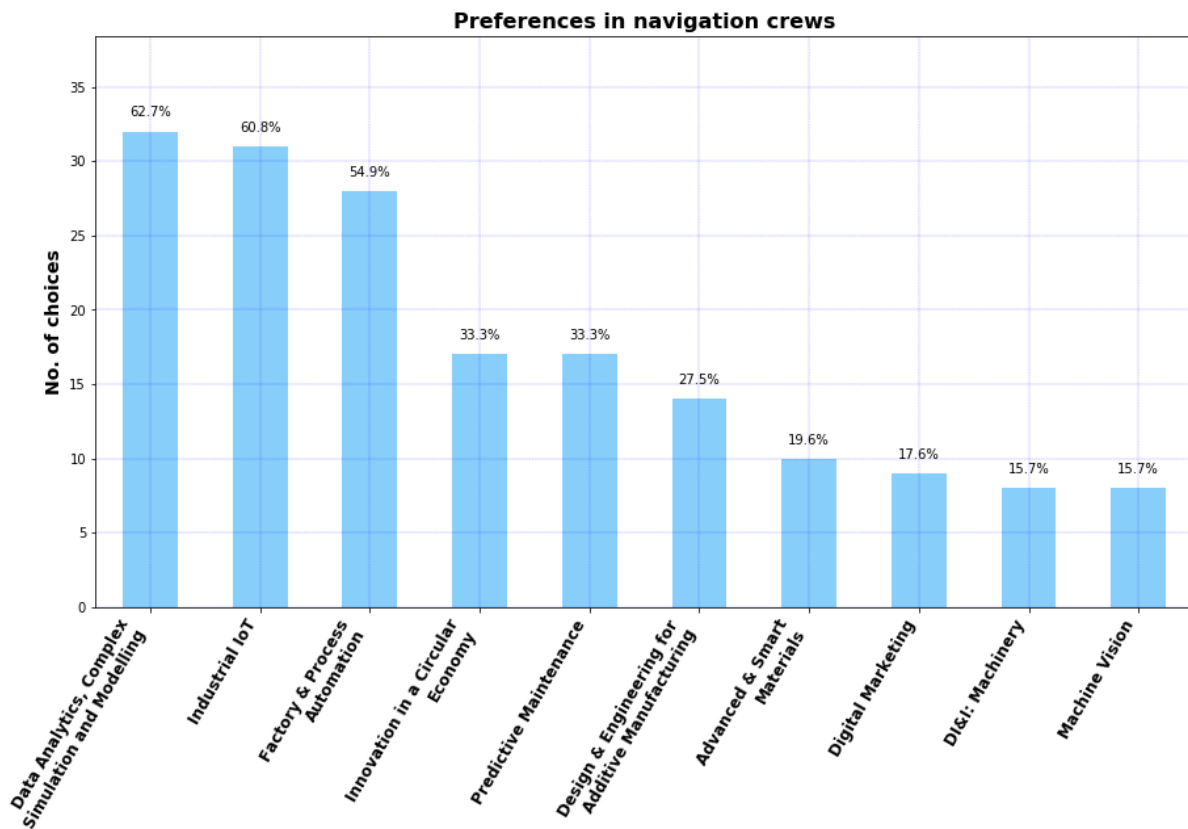


Figure 11: Preferences in navigation crews among RIS3 Champions

The interests towards the Navigation Crews have been further analysed and scrutinised what the connection is between the different organisation types and the selected Navigation Crew topic(s). Figure 12 illustrates that SMEs - who have the highest distribution in the sample - are mainly - more than half of the involved SMEs - interested in Data Analytics, Complex Simulation and Modelling topic, (12 out of 21 SMEs) but their interest is also significant in Factory and Process Automation as well as Industrial IoT too. (11-11 SMEs).

As far as the Higher Education and Research institutions are concerned, the thematic interest is very similar to SMEs. As it can be noticed from Figure 12, 12 (out of 14) Higher Education actors are interested in the Data Analytics field, whereas 11 HE organisations have also marked IIoT as their interest, but 10 such institutions consider Factory and Process Automation also as a significant thematic area.

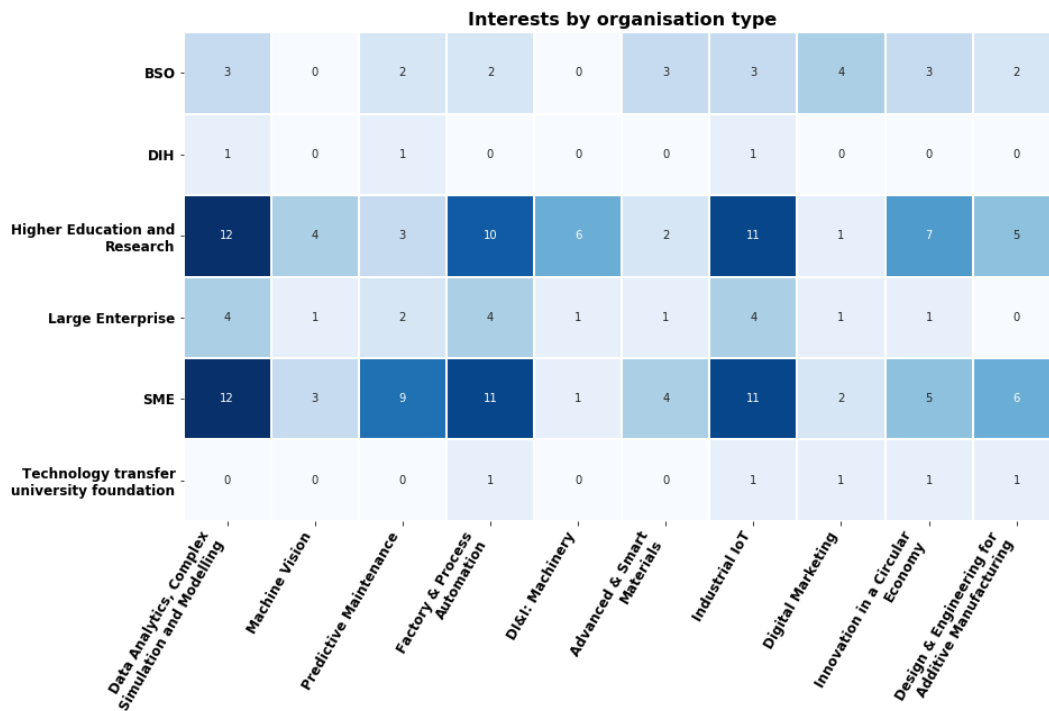


Figure 12: RIS3 Champions’ interests by organisation types

4.4. RIS3 Champions’ Involvement in prior work packages (WPT1 and WPT2)

In the template RIS3 Champions were asked to reply whether they have already participated/involved in prior work packages of the S3HubsinCE project. Namely, the question focused on Champions’ involvement in the Needs Assessment phase in the framework of WPT1 (D.T1.2.2 & D.T1.2.3), and/or Mobility and Transfer and Cooperation Actions conducted (being conducted) in WPT2 (D.T2.3.3 & D.T2.3.4)

Regarding the WPT1 involvement of the RIS3 Champions, 22 actors (43.1%) conducted the Needs Assessment questionnaire in WPT1.

Based on Figure 13, 52.9% of the 51 RIS3 Champions (so 27 of them) have participated /are participating in at least one Mobility and/or Transfer and Cooperation Actions.

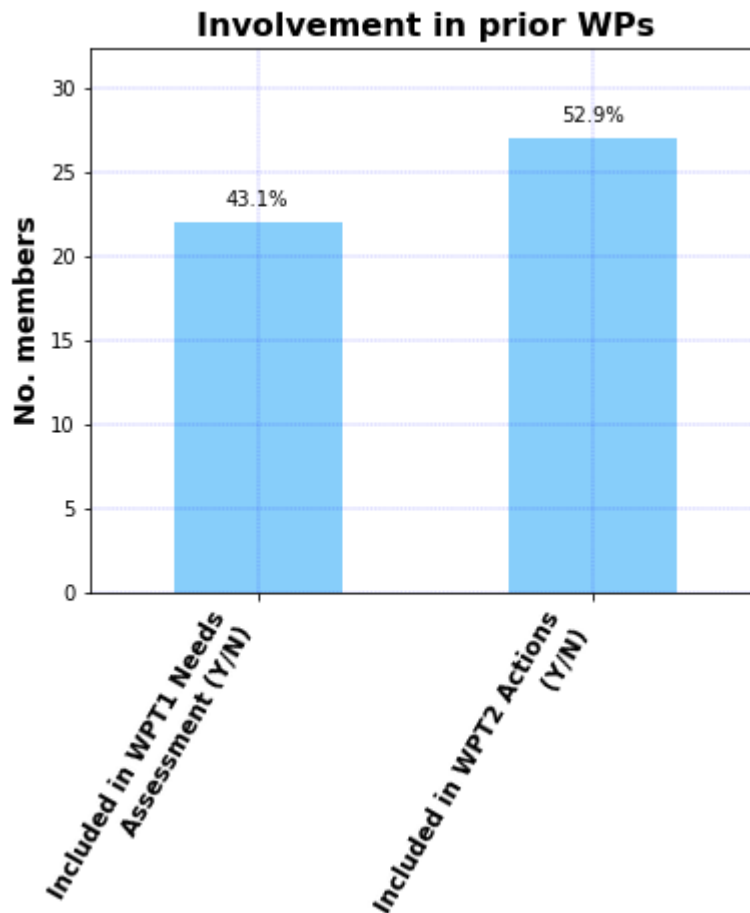


Figure 13: RIS3 Champions' involvement in prior WPs (%)

4.5. Cluster establishment and definitions:

Taking into consideration the replies of the RIS3 Champions towards Navigation Crew topics, five different clusters could be established. In the following sub-chapters (4.5.1 and 4.5.2) the characteristics of each cluster shall be further detailed.

The number of Champions within each cluster is not equal, their distribution has been conducted using so-called K-modes data analytics method:

The K-modes algorithm used for clustering the data points representing the project partners/stakeholders can be treated as an extension of the well-known K-means clustering algorithm. However, instead of using numerical data and computed distances based on these data the K-modes algorithm is able to treat categorical (not necessarily numerically given e.g.: male/female) data as clustering input. The method counts dissimilarities among each variables(e.g. "Industrial IoT" or "Predictive Maintenance" as marked preference), which means the total count of miss-matches of each variable pairs. The *modes* are vectors that represent the cluster centroids and the algorithm minimizes the number of dissimilarities among these vectors and each object of the data. By this means it is feasible to scout hidden structure of large amount of data represented by categorical variables. The number of



clusters to specify can be given based on the scree-plot by looking for an information extraction optimum or by manually selecting a cluster number to which the algorithm serves with the most interpretable result for the users specific task.

Figure 14 is showing the distribution of Champions in the different clusters (starting from Cluster 0 up to Cluster 4). It can be noticeable that 45% of the Champions (23 out of 51) belong to Cluster 0, whereas 21.5% of the actors (11 out of 51) belong to Cluster 4.

	0	1	2	3	4
0	23	6	7	4	11

Figure 14: The number of RIS3 Champions in each cluster

Figure 15-19 describe RIS3 Champions classified in each cluster:

Organisation Name	Country	Organisation Type
Ortner Reinraumtechnik	Austria	SME
Springer Maschinenfabrik GmbH	Austria	Large Enterprise
AR-Experts GmbH	Germany	SME
TruPhysics GmbH	Germany	SME
Joiint Lab, applied robotics research centre	Italy	Higher Education and Research
Miraitek S.r.L.	Italy	SME
V-tech, R&D department of Valtellina S.p.A.	Italy	Large Enterprise
NeroSuBianco / NSB	Italy	SME
Astor sp. z o.o.	Poland	Large Enterprise
Comarch	Poland	Large Enterprise
FITECh sp. z o.o	Poland	SME
UNIVERSITY OF LJUBLJANA, Faculty for mechanical engineering, LASIM laboratory	Slovenia	Higher Education and Research
TECOS, Slovenian tool and die development centre	Slovenia	Higher Education and Research
Jožef Stefan Institute, Department of Systems and Control	Slovenia	Higher Education and Research
Jožef Stefan Institute, Department of Intelligent systems	Slovenia	Higher Education and Research
Jožef Stefan Institute, Department of automation, Biocybernetics and robotics	Slovenia	Higher Education and Research
Advanced Manufacturing Laboratory	Hungary	BSO
IVY technology AMS Hungary Kft - Szombathely	Hungary	Large Enterprise
Biomatics and Applied Artificial Intelligence Institution, John von Neumann Faculty of Informatics, Óbuda University	Hungary	Higher Education and Research
Faculty of Organization and Informatics (FOI) – University of Zagreb	Croatia	Higher Education and Research
ICENT – Innovation Centre Nikola Tesla	Croatia	Higher Education and Research
Mobilisis d.o.o.	Croatia	SME
XALAX d.o.o.	Croatia	SME

Figure 15: RIS3 Champions in Cluster 0



Organisation Name	Country	Organisation Type
Wirtschaftsagentur Burgenland GmbH	Austria	BSO
Baden Campus	Germany	BSO
Steinbeis 2i GmbH	Germany	BSO
Uhlmann Pac-Systeme GmbH & Co. KG	Germany	SME
Fraunhofer Institute of Machine Tools and Forming Technology IWU	Germany	Higher Education and Research
Falco Furniture Cluster	Hungary	Large Enterprise

Figure 16: RIS3 Champions in Cluster 1

Organisation Name	Country	Organisation Type
Lindner-Recyclingtech GmbH	Austria	SME
H&P Trading GmbH	Austria	SME
Mechanical Engineering Network Saxony VEMASinnovativ	Germany	BSO
ATC, additive manufacturing research centre	Italy	Higher Education and Research
UniSMART – Fondazione Università degli Studi di Padova	Italy	Technology transfer university foundation
Łukasiewicz Research Network – Krakow Institute of Technology	Poland	Higher Education and Research
Work-Ing d.o.o.	Croatia	SME

Figure 17: RIS3 Champions in Cluster 2

Organisation Name	Country	Organisation Type
WILD Hi-Precision GmbH	Austria	SME
DIGALOG Industrie-Mikroelektronik GmbH	Germany	SME
Schick Tanz GmbH Sohlund/Spree	Germany	SME
Smart² materials – solutions - growth	Germany	BSO

Figure 18: RIS3 Champions in Cluster 3

Organisation Name	Country	Organisation Type
Bitmovin GmbH	Austria	SME
Güssing Energy Technologies GmbH	Austria	Higher Education and Research
rmDATA GmbH	Austria	SME
Skyability GmbH	Austria	SME
AI Sent S.r.L	Italy	SME
42Bit SRL	Italy	SME
Bluewind SRL	Italy	SME
Ecipa Nordest Hub	Italy	DIH
ICT for Manufacturing Processes		
Veneto Network		
(IMPROVENET)	Italy	BSO
Werner Kenkel Bochnia sp. z o.o	Poland	Large Enterprise
Gépipari Tudományos Egyesület-Scientific Association for Mechanical Engineering	Hungary	Higher Education and Research

Figure 19: RIS3 Champions in Cluster 4



4.5.1. Geographical distribution of the clusters

In the analysis the geographical distribution of the clusters is also described which shall be detailed in this sub-chapter.

It can be seen on Figure 21 that each (7) country's RIS3 Champions are represented in Cluster 0. Within this cluster it can be highlighted that all Slovenian RIS3Champions belong to Cluster 0. It is also interesting that four out of the five Croatian Champions are also member of this cluster.

As far as Cluster 1 is concerned, here merely six Champions have been identified as members, but interestingly enough four of them come from Germany, as Figure 22 demonstrates on the map.

Regarding Cluster 2, seven RIS3Champions have been clustered here. As Figure 23 reflects, the geographical distribution of this cluster is rather diversified, since members here come from five countries, and Austria and Italy give 2-2 Champions to this cluster.

When it comes to Cluster 3, Figure 24 also shows that the number of Champions is the fewest in this cluster, only four actors belong to this group. As it is noticeable from the map of Cluster 3 (Figure 24), this is the German-speaking cluster since three members come from Germany and one from Austria.

Finally, in Cluster 4, 11 RIS3 Champions have been selected. This cluster is overrepresented by Italian actors, (seen in Figure 25) since five members of this group have been chosen either IMECH or ECIPA from Italy. Apart from the Italian members 4 Austrian and 1-1 Polish and Hungarian RIS Champion have been clustered here.

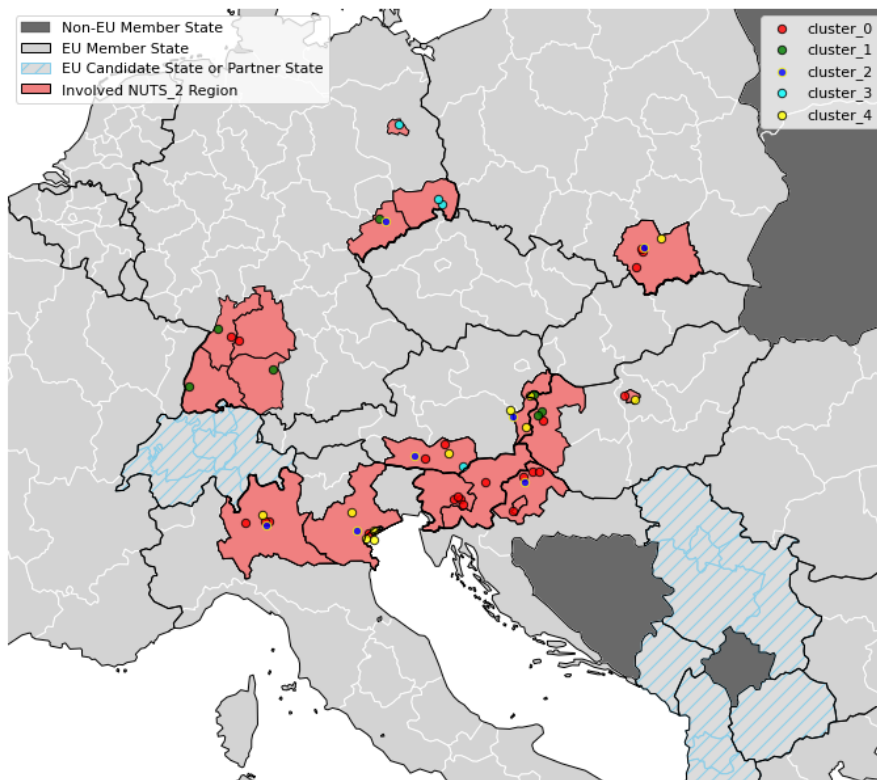


Figure 20: The geographical distribution of RIS 3 Champions (clusters)

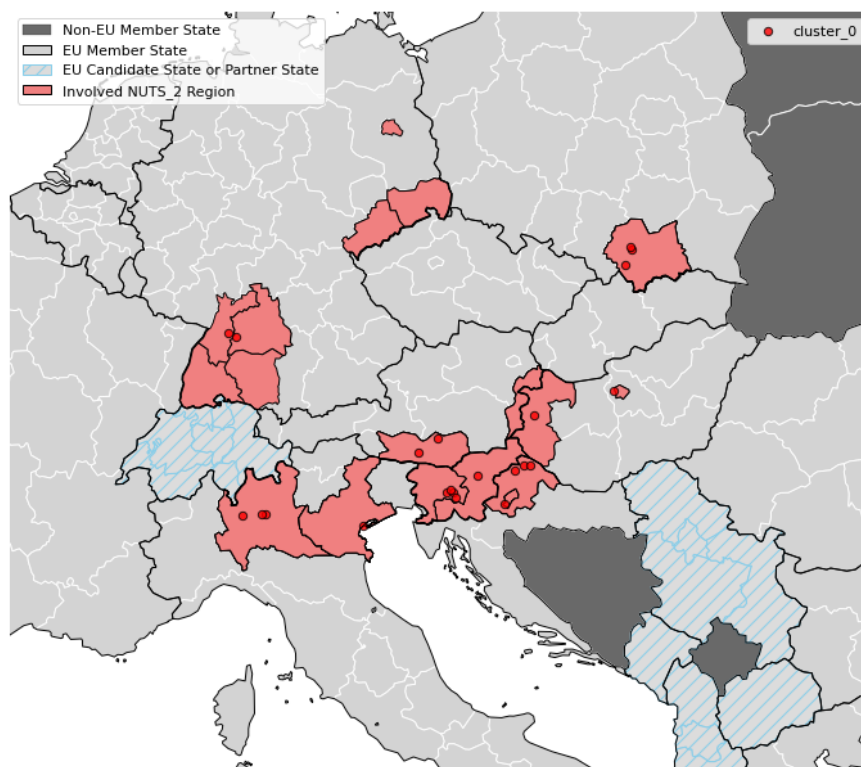


Figure 21: Geographical distribution of Cluster 0

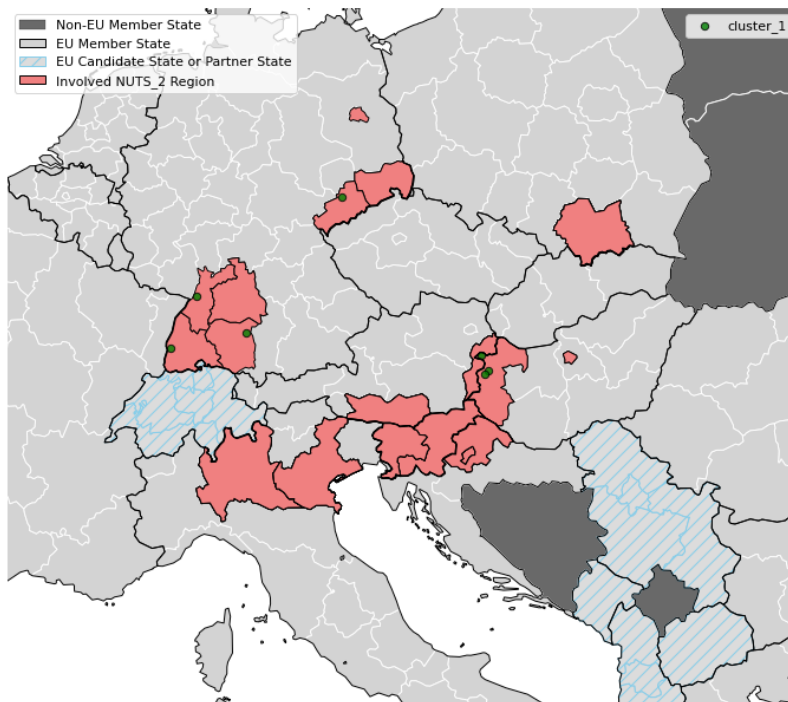


Figure 22: Geographical distribution of Cluster 1

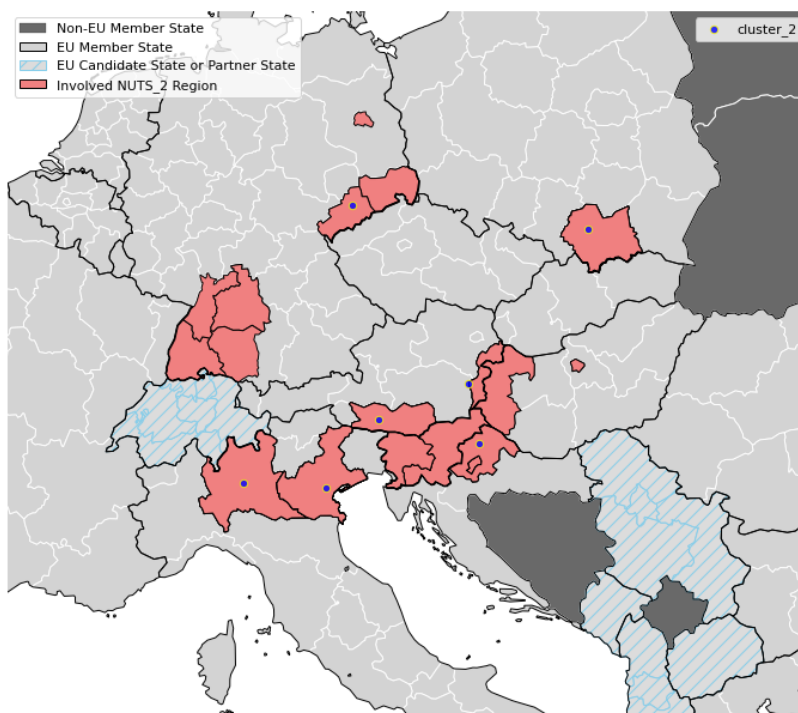


Figure 23: Geographical distribution of Cluster 2

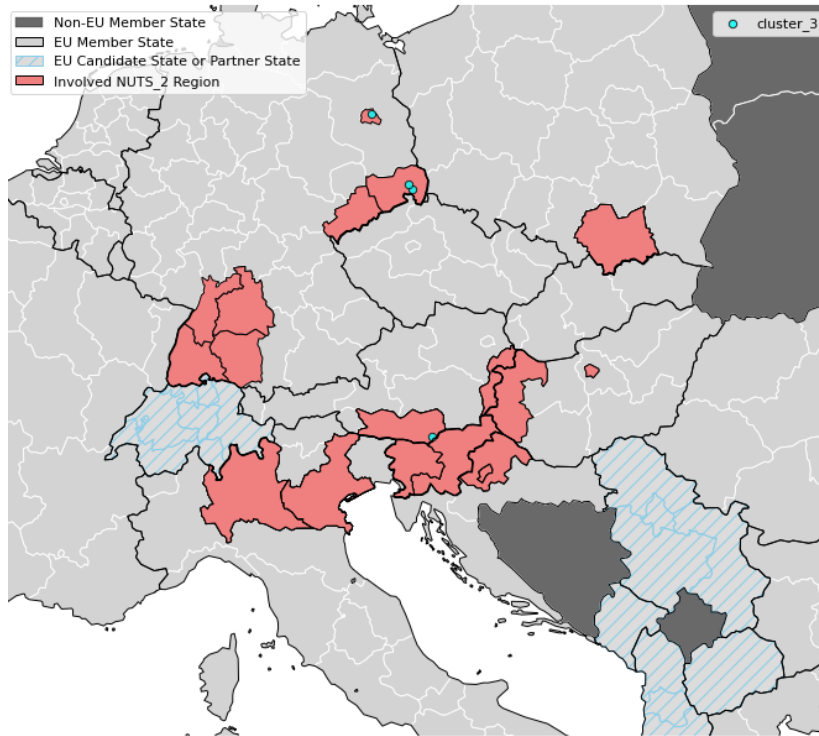


Figure 24: Geographical distribution of Cluster 3

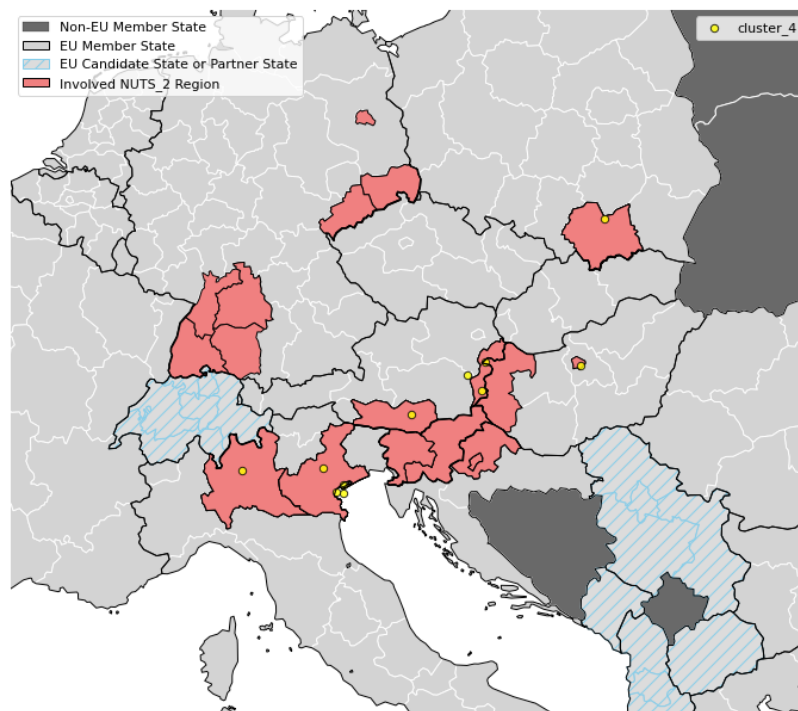


Figure 25: Geographical distribution of Cluster 4



4.5.2. Characteristics of the clusters

The members of the different clusters have not only been illustrated on geographical level, but also they have been differentiated based on their interests towards navigation crew topics. Furthermore, it has been also analysed which organisation types- and in what extent- are represented within each cluster.

As Figure 26 reveals, the specific interest of the thematic areas of the clusters can be clearly differentiated. Figure 26 is demonstrating the distribution of each cluster's members in percentage and their interests in different navigation crew topics. The numbers- found in Figure 26- means percentage, the darker the number is the higher the distribution of RIS3Champions towards a specific Navigation Crew in each cluster. Since Champions had the possibility to choose more than one Navigation Crew topic, the sum of their distribution exceeds 100%. (e.g: Cluster 0→ 83% of the Cluster members have chosen Data Analytics as their interests, 21% of Cluster 0 members have chosen Machine Vision and Predictive Maintenance as their priority areas etc.)

Figure 27 has been prepared with the same logic as Figure 26, but on this figure the distribution of organisation types within clusters has been scrutinised. The darker the number is- appearing on Figure 27- the higher the distribution of a specific organisation type in each cluster. (e.g: Cluster 0→4,3% of the Cluster are BSOs, and 39% of Champions belong to Higher Education institutions within this cluster etc.)

Based on the figure, it is noticeable that the vast majority of the members in Cluster 0 (19 out of 23 cluster members 83%) have selected Data Analytics, Complex Simulation and Modelling, as well as Industrial IoT as their interests. Apart from these thematic areas, the interest to Factory and Process Automation can be also considered remarkable. Having checked the organisation type distribution of this cluster, it can be seen on Figure 27 that none of the organisation types are really overrepresented, but Higher Education institutions have the highest distribution in this cluster. Taking into account the preferences by the members of Cluster 0, it might be considered as an Industry 4.0 cluster, involving mainly Higher Education institutions and SMEs.

Regarding Cluster 1, the main interests of the members are noticeable at the Digital Marketing and Innovation in Circular Economy topics, since 83% of the cluster members have indicated these areas as their main topics. For this cluster members digital marketing solutions should be fostered in parallel with Innovation in Circular Economy. When the organisation types are checked within this cluster it can be noticed on Figure 27 that half of the members are classified as Business Support Organisations and there is 1-1 Higher Education Institution, Large Enterprise and SME within this cluster.

When Cluster 2 is scrutinised, it is undoubtedly visible on Figure 26 that all members in this cluster have marked Design and Engineering for Additive Manufacturing as one of their



interests. Besides, Factory and Process Automation and Innovation in Circular Economy can be also considered as main areas of this cluster. According to the organisation type classification within this cluster, it might be observed that 43% of this cluster is consisted by SMEs, but other organisation types (BSO, HER) are also represented here. Based on this methodology, this cluster might be labelled as mainly SME manufacturers with 3D Printing and Automation interests.

As far as the smallest Cluster (nr 3) is concerned, the members are unequivocally concentrating their operation towards Advanced and Smart Materials, since all members (4 Champions) have identified this topic as their interest. Apart from smart materials, the inquiry towards Additive Manufacturing is also significant in this cluster, since only one champion has not selected this area within this group. It is also interesting that 3 out of 4 members are SMEs, the remaining one is a BSO. According to the statistics, this group can be considered a 3D printing and smart material-oriented group consisting German and Austrian, mainly SME members.

Regarding the members in Cluster 4, it can be clearly defined that their main areas are Data Analytics and Predictive Maintenance, since almost every member from this cluster have chosen these thematic areas as their main interests. Considering their choice, this cluster can be classified as a Data Analytics oriented group, where approximately half of the members (6 out of 11) are SMEs.

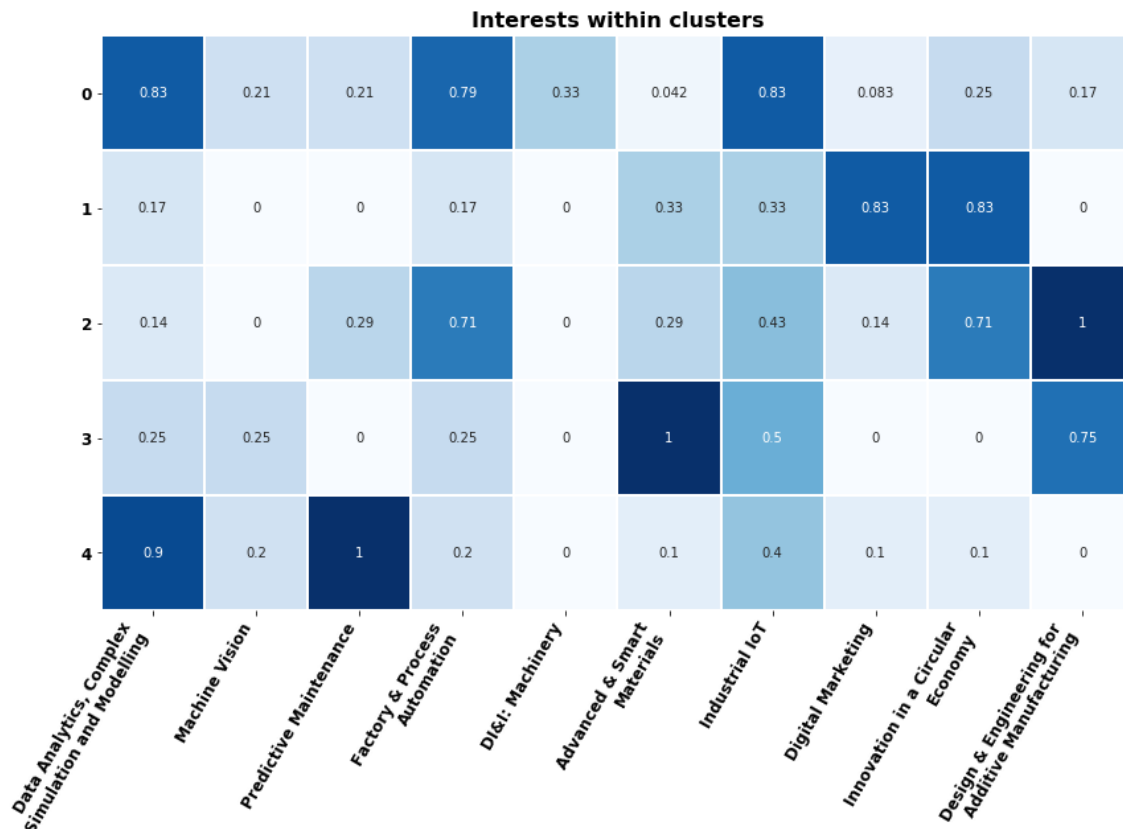


Figure 26: Navigation Crew interest within the clusters

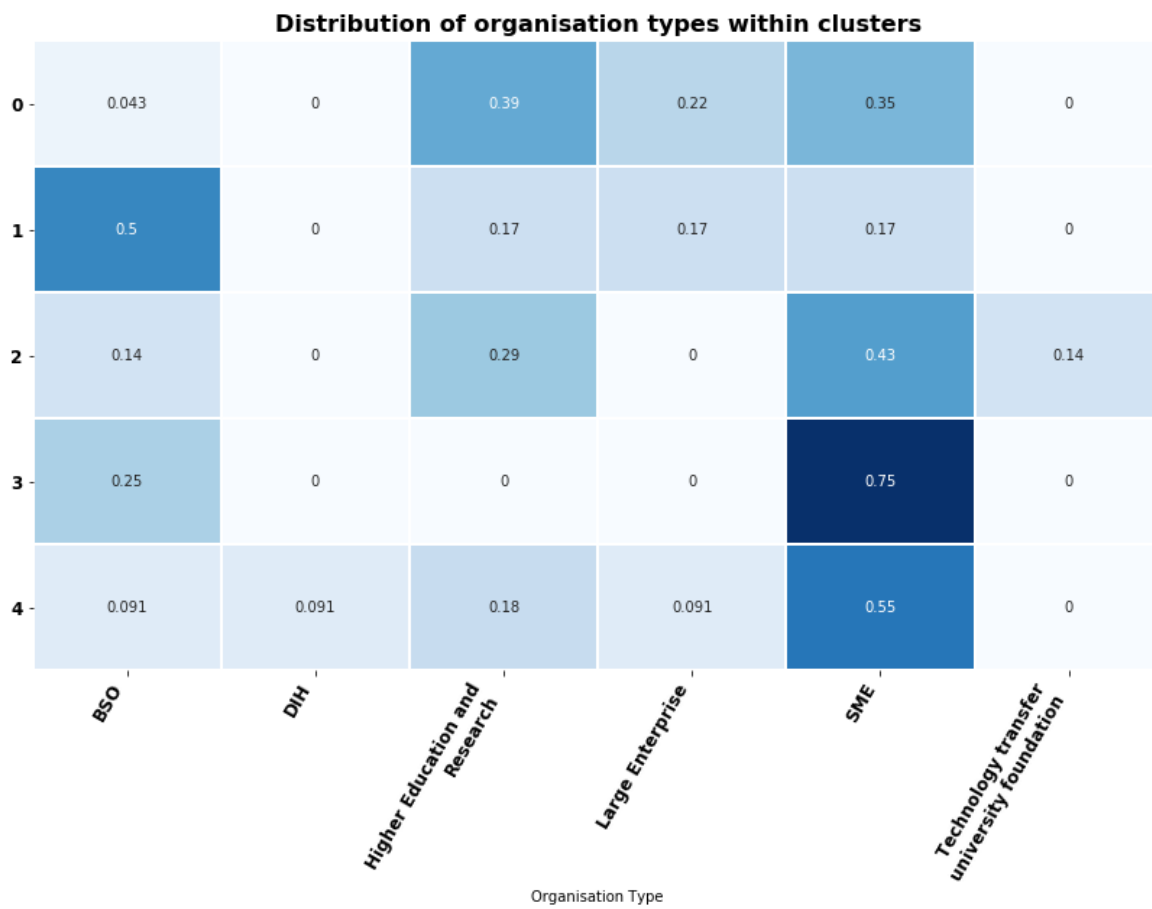


Figure 27: Distribution of organisation types within clusters



5. Conclusion

Taking into consideration the replies of all RIS3 Champions, it can be undoubtedly stated that the organisation types of the Champions are rather heterogeneous, although SMEs are overrepresented in the sample.

As far as the NACE sectors are concerned, RIS3 Champions are operating in numerous fields: Professional, scientific and technical activities (M) can be considered the main sector, but the involvement in the Manufacturing (“C”) and Information and communication (J) sector is also remarkable.

According to the statistics in connection with the Navigation Crew orientation, more than the half of the involved RIS3 Champions have expressed their interest towards three thematic areas, namely to Data Analytics, Complex Simulation (62.7%) and Modelling, to Industrial Internet of things (60.8%), as well as to Factory and Process Automation (54.9%).

When we scrutinise the navigation crew orientation of the separate organisation types, it can be noticed from the data that SMEs- who have the highest distribution in the sample- are mainly interested in Data Analytics, Complex Simulation and Modelling topic, (12 out of 21 SMEs) but their interest is also significant in Factory and Process Automation as well as Industrial IoT too.

As far as the Higher Education and Research institutions (second highest number) are concerned, the thematic interest is very similar to SMEs.

Regarding the RIS3 Champions’ participation in prior WPs, it can be stated that 52.9% of the 51 RIS3 Champions (so 27 of them) have participated /are participating in at least one Mobility and/or Transfer and Cooperation Actions. Regarding the WPT1 involvement of the RIS3 Champions, 22 actors (43.1%) conducted the Needs Assessment questionnaire in WPT1.

Taking into consideration the replies of the RIS3 Champions towards Navigation Crew topics, five different clusters could be established. The specific interest of the thematic areas of the clusters can be clearly differentiated:

- Taking into account the preferences by the members of Cluster 0, it might be considered as an Industry 4.0 cluster, involving mainly Higher Education institutions and SMEs.
- Regarding Cluster 1, the main interests of the members are noticeable at the Digital Marketing and Innovation in Circular Economy topics.
- Cluster 2 this cluster might be labelled as mainly SME manufacturers with 3D Printing and Automation interests.
- Cluster 3 can be considered a 3D printing and smart material-oriented group consisting German and Austrian, mainly SME members.
- Regarding the members in Cluster 4, it can be clearly defined that their main areas are Data Analytics and Predictive Maintenance



6. Abbreviations

Abbreviation	Explanation
PP	Project Partner
S3	Smart Specialisation Strategy
AF	Application Form
DIH	Digital Innovation Hubs
JRC	Joint Research Centre
CERIS3	Central Europe Research & Innovation Smart Specialisation Strategy
DEP	Digital Europe Programme
T&M	Training & Mobility (Actions)
T&C	Transfer & Cooperation (Actions)
TBD	To Be Determined