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High level value chain mapping in the Baltic Sea Region: Guidance Manual

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Study carried out in the framework of the Interreg BSR S3 Ecosystem project



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Abbreviations

Abbreviation	Meaning
BSR	Baltic Sea Region
CBE	Circular bioeconomy
EC	European Commission
GVC	Global Value chain
MS	Member State of the European Union
R&D	Research and development
R&I	Research and innovation
S3 (or RIS3)	Smart specialisation

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1 Introduction: context and scope of the manual

The Baltic Institute of Finland contracted EFIS Centre to support the methodology development for a high-level interregional smart specialisation (S3) value chain mapping in the Baltic Sea Region (BSR). BSR was the first macro-region to adopt a common strategy, in 2009, the European Union Strategy for the Baltic Sea Region (EUSBSR). The BSR comprises eight countries: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland and Sweden. Norway, Belarus and Russia are also close collaborators with the BSR countries. The value chain mapping exercise is supporting the Interreg BSR Smart Specialisation Ecosystem ‘Platform’ project¹, which aims to build capacity across the macro-region for innovation-focused interregional collaboration. This study contributes to two key objectives:

1. Provide analytical insights on value chains in a selected focus area and foster motivation for the mobilisation of BSR interregional effort in S3 collaboration;
2. Provide an outline manual with key steps to take in undertaking a macro-regional value chain mapping exercise across any sector or domain targeted at BSR innovation/ S3 actors.

In a separate report, we have summarised the results and learning from a pilot value chain mapping exercise carried out in the area of circular bioeconomy (CBE). This area was selected for the piloting exercise taking into account recent policy developments at EU level such the adoption of the European Green Deal², a new Circular Economy Action Plan For a cleaner and more competitive Europe³ and the adoption of an EU Industrial Strategy⁴.

The approach to high-level value chain mapping that was piloted for CBE is experimental. Due to the time and resource constraints underpinning the Interreg project the pilot analysis performed by EFIS Centre adopted a **‘fast-track’ approach**. The main objective was to identify the current possibilities for carrying out such an exercise and the existing gaps in data coverage. The pilot exercise is intended to trigger further thinking and input from the BSR regions and innovation actors concerning additional market-led information which could be added to the mapping effort.

This guidance manual draws lessons from the pilot exercise and provides an outline method for high-level value chain mapping, guiding the reader through the three main stages in order to enable reproduction of similar exercises in the future. The conclusions bring together overarching recommendations for the value chain methodology, with a focus on those aspects that may bring the highest value added to S3 policy making – both at regional and macro-regional levels.

The intended audience of the manual are BSR national and regional policy makers (including those with responsibility for regional innovation / S3), innovation support organisations, business (cluster managers, business associations) and other relevant S3 stakeholders. Sector specialists from knowledge institutions, industry and public authorities would also benefit from the learning and insights detailed in this manual.

¹ <https://projects.interreg-baltic.eu/projects/bsr-s3-ecosystem-214.html>

² https://ec.europa.eu/info/publications/communication-european-green-deal_en.

³ <https://ec.europa.eu/environment/circular-economy>.

⁴ https://ec.europa.eu/info/sites/info/files/communication-eu-industrial-strategy-march-2020_en.pdf.

2 Inter-regional co-operation, smart specialisation and value chains

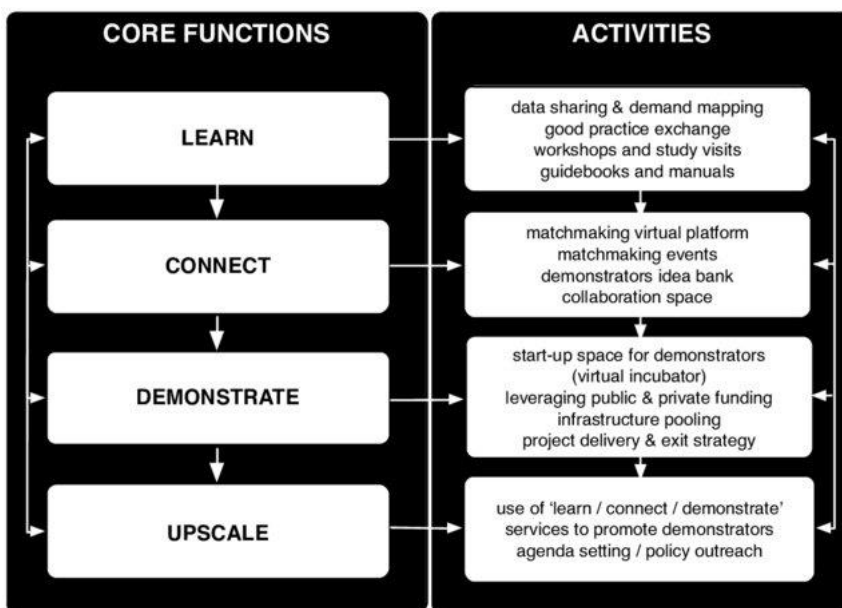
In the context of European innovation and industrial policies and smart specialisation strategies, a number of approaches have sought to encourage matching of specialisations and complementary expertise within inter-regional (pan-European) or macro-regional ‘innovation systems’ adopting a thematic perspective. Over the last decade, there has been a shift from the ‘traditional’ form of inter-regional co-operation through ‘exchange of experience’ type projects towards the development of joint action plans or strategic roadmaps leading to the identification of co-investment (or at least optimised use of investment funds within the group of regions involved) and pooling of resources (expertise, etc.) and industrial infrastructures (e.g. access to pilot plants, demonstration sites, testbeds, etc.).

Figure 1: Examples of relevant approaches to mapping inter-regional S3 collaboration potential

Initiative	Web-link
Vanguard Initiative	https://www.s3vanguardinitiative.eu/
Thematic Smart Specialisation Partnerships	https://s3platform.jrc.ec.europa.eu/de/thematic-platforms
European Strategic Cluster Partnerships	https://www.clustercollaboration.eu/eu-cluster-partnerships
Macro-regional strategies and S3	https://www.interreg-baltic.eu/about-the-programme/priorities/innovation.html

From 2013 or so onwards, the Vanguard Initiative led the way in piloting new approaches to inter-regional co-operation based on S3. The Vanguard Initiative seeks to lead by example in developing interregional cooperation and multi-level governance for supporting clusters and regional eco-systems to focus on smart specialisations in priority areas for transforming and emerging industries. An initial methodology was developed with the support of the European Commission (Reid & Miedzinski, 2014) for the process of developing smart specialisation partnerships (SSP) in advanced manufacturing for the Vanguard initiative.

Figure 2: core function and activities of a smart specialisation partnership

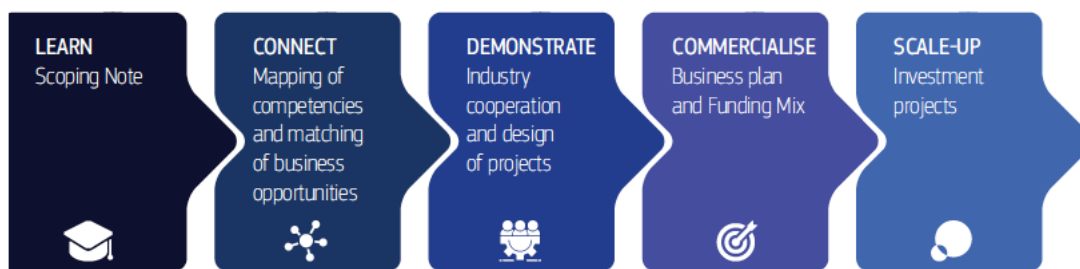


Source: Reid & Miedzinski (2014)

The experience of the Vanguard Initiative regions in piloting inter-regional SSP was the basis for the thematic smart specialisation platforms, developed and promoted by the EC's Joint Research Centre (JRC), in partnership with other EC DGs notably DG GROW and DG REGIO, in three areas: agri-food, energy, industrial modernisation. Currently more than 30 SPP (5 agri-food, 6 energy and 21 advanced manufacturing) are operational and have received support including in some cases funding from the EU. For instance, the Regional Co-operation Networks for Industrial Modernisation Initiative (ReConfirm⁵), is an EU-funded project designed specifically to assist European regions and industrial stakeholders in implementing their action plan under the Smart Specialisation Platform for Industrial Modernisation.

Rakhmatullin et al (2020) have summarised the experience of the SSP, to date, in a methodological manual for developing thematic interregional partnerships for smart specialisation. They propose an adapted version of original four step model piloted by the Vanguard Initiative by adding a commercialise step (business planning, etc.).

Figure 3: Work-flow steps in the Thematic S3 approach



Source: Rakhmatullin et al (2020)

The value chain concept has been integrated in this stream of work to varying degrees and from a number of angles. At the level of a business, a value chain describes the full range of activities that firms engage in to bring a product from its conception to end use and beyond. This includes design, production, marketing, distribution and support to the final consumer. The activities that comprise a value chain can be contained within a single firm or divided among different firms, across different geographies. Value chain activities can produce goods or services and can be contained within a single geographical location or spread over wider areas. Global Value Chains (GVCs) are value chains that can be divided among multiple firms and dispersed across wide swathes of geographic space (Brennan & Rakhmatullin, 2015).

Ali-Yrkkö & Rouvinen (2013) stress that GVCs lead to “deepening specialisation, which in turn leads to global welfare gains. It remains unclear, however, how these gains are distributed”, in particular, value creation and capture in GVCs is “less tied to tangible aspects, such as the assembly location, than conventional wisdom suggests”. Intangible aspects, both market and internal services as well as creation and appropriation of intellectual property, are often more important. Importantly, since these aspects are not captured well in available statistics, conventional measures of globalization are misleading. Ali-Yrkkö & Rouvinen (2013) argue that “*policymakers should focus more on the range of tasks and functions within national (regional) borders instead of companies and industries. The focus should be on relatively less mobile factors of production*”. To optimise ‘value capture’ in a region or nation, “*it pays to be the orchestrator and/or brand owner of a value chain, to control the customer/user interface, and/or to retain a gate-keeping position in the chain, e.g., via cornering the market for a key input*”.

Brennan & Rakhmatullin (2015) considered GVCs within the context of smart specialisation and proposed a methodological approach to analyse a country’s (region’s) position in GVCs. They proposed that gaining insight into GVCs requires five steps of analysis (the ‘M3DA’ process):

⁵ <https://s3platform.jrc.ec.europa.eu/reconfirm>

- i. Mapping as in plotting out their various stages across geographies and firms.
- ii. Digging into each stage in terms of terms of activities, resources, assets, capabilities, relationships and financial and operating data.
- iii. Determining the chain orchestration in terms of actors, linkages and flows.
- iv. Decomposing the activities at each stage into occupations and associated tasks.
- v. Ascertaining the participation possibilities by considering not only the status quo from i to iv above, but by also anticipating likely future chain trajectories.

They argued if regional authorities are to play a role in co-creating and developing European industrial value chains based on S3 priorities, it will require “ interregional knowledge building, mapping the matchmaking potential around GVCs between regional smart specialisation priorities, identifying some pilot examples of interregional value chains, key stakeholders, available equipment and facilities and relevant actors/skills in smart specialisation areas and applying the methodology described above with a view to identifying opportunities for matching of national and regional cluster organisations in identified value chains of smart specialisation areas”.

In two follow-on studies, Todeva & Rakhmatullin (2016a, 2016b) examined and tested theoretical approaches and mapping methodologies to analyse GVC connectivity in the context of Smart Specialisation. They propose two distinctive methodologies for top-down global value chain mapping of an established industry sector (such as the biopharma case examined in Todeva & Rakhmatullin (2016b)), and for a bottom-up mapping of capabilities within the GVC that operate at specific locations. They underline that the analysis of patterns of specialisation versus diversification and inter-industry connectivity provides a basis for selecting groups of firms for matchmaking and reinforcing inter-regional complementarities. The approach includes the following elements:

- **mapping of industry value chain groups** - provides evidence of dynamic capabilities at inter-sectoral and regional level;
- **mapping of regional concentration of capabilities across the EU at NUTS2/3 level** - enables regional authorities and cluster managers to scale up the matchmaking in established and emerging value chains;
- **comparative performance of value chain groups** – provides evidence of the distribution of profits and incentives within the value chains;
- **mapping specialised suppliers and lead R&D firms** - empower cluster managers, lead firms and small R&D firms – to connect to each other and generate synergies across complementary activities;
- **empowering triple helix actors, cluster partnerships and knowledge networks** – to create effective match-making events and scale up the impact of innovation;
- **using data to orchestrate the design of emerging value chain networks** and to optimise the entrepreneurial discovery and implementation process.

More recently, Mandras & Conte (2020) mapped GVCs in value added terms and their role at regional levels. They derived the distribution of VA trade by regions decomposing gross exports in terms of DVA (the ability of a region to add value to its exports) and FVA (an indicator that provides a first estimation of the vertical specialisation). They note that the “*mapping of value added is complementary to the pure industrial specialisation approach, allowing a better understanding of the innovation process itself and, consequently, a better design of more effective innovation policies for different level of governments, as well as analysis of the territorial implications of these policies when made operational. Since regions tend to specialise in specific business activities rather than specific industries, their effective participation into GVCs depends on the local know-how, R&D and innovation capabilities*”.

The methodological manual for thematic S3 (Rakhmatullin et al, 2020) builds on the GVC concept. They argue that “*When building an interregional thematic S3 partnership, this approach can reveal where the*

industry is positioned along the value chain and the extent of that positioning. Therefore, the analysis can pinpoint opportunities for maintaining/extending/deepening the region's positioning on the GVC. Furthermore, by applying a similar analysis to other locations (countries or regions), one can determine who else occupies significant parts of the industry value chain, and how strong their positions are, and whether those clusters of GVC activities in these other competing regions/countries are similar/complementary to their own activities. Taking account of the previously identified linkages, this can indicate whether there might be opportunities to capitalise on complementarities in other locations and the development of interregional/trans-European linkages. This also implies a focus on the extant clusters of the industry (global) value chains".

However, as Komninos et al (2018), the implementation of GVC analysis and of the steps proposed in the series of three JRC publications *"is hindered by the lack of data and therefore, their analysis focuses only on the mapping exercise"*. Moreover, *"these efforts highlight the need for the collection of detailed data and they also provide a more technical view into the GVC analysis which might be overwhelming for regional officers and policy makers to adopt within their RIS3 strategy. Detailed focus on a specific sub-industry that might constitute a segment of a value chain constitutes a relatively complex task that might seem as out of scope from regional authorities"*. Komninos et al (2018) suggest that, in more practical terms, three core questions need to be addressed:

- **How can I identify the region's/country's areas/sectors/capabilities that are part (or could possibly become) of an integrated value chain and what is the position of my region in this chain?** The main challenge is the identification of the specific activities that seem to create value through their connection to activities conducted in other regions.
- **How can I identify opportunities for repositioning in the value chain in order to create further value?** The strategic approach to value chains refers to assessing the value that is added in each activity of the chain and the ability to undergo specific transformations in order to reposition in the chain into an activity with higher value.
- **With which regions could I explore collaboration** and how could I build synergies within the framework of inter-regional initiatives?

At European level, in November 2019, the Commission (EC, 2019) published recommendations to boost Europe's competitiveness and global leadership in six strategic and future-oriented 'value chains'⁶:

- connected, clean and autonomous vehicles
- hydrogen technologies and systems
- smart health
- industrial internet of things
- low-carbon industry
- cybersecurity

Here the value chain concept is broadened and associated with *"both a set of interdependent economic activities creating added value around a product, process or service, and a group of interlinked economic actors, operating in a strategic network across firms of different sizes, including SMEs, sectors and borders"*. Strategic value chains (SVCs) should be of systemic importance and make a clear contribution to growth, jobs and competitiveness. According to the expert group, they are characterised by three dimensions:

⁶ Following the Covid-19 global health pandemic, the European Commission is reviewing a further refinement of its future approach to strategic value chains, linked to a wider effort to better position the EU in the global trading landscape.

- technological innovativeness, i.e. the value chain is based on the exploitation of strategic key enabling technologies, technological breakthroughs, major outcome of R&D or disruptive innovation (e.g. autonomous driving, low carbon technologies).
- economic and market potential, i.e. the value chain has considerable economic weight, actual or potential.
- societal and political importance, i.e. the value chain makes an important contribution to societal challenges and/or policy goals (e.g. climate change, ageing population).

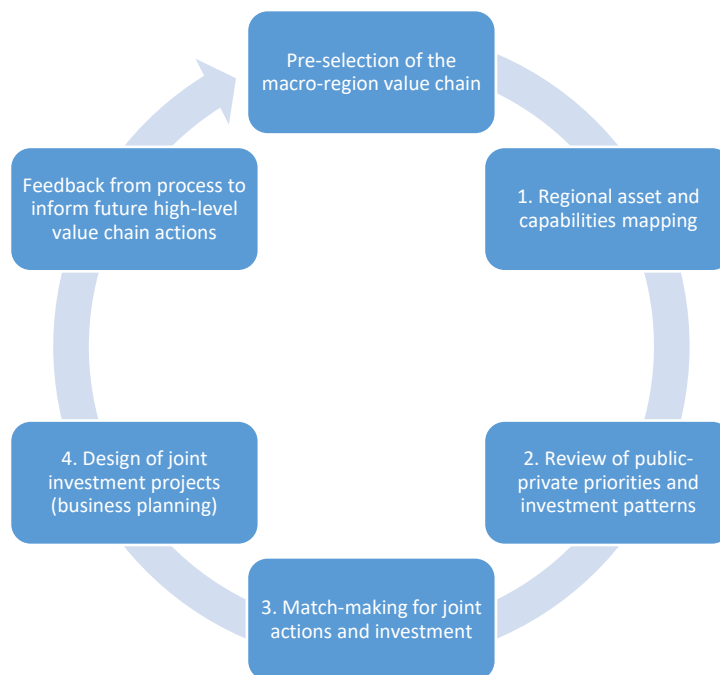
This SVC definition is closer to the ‘high-level’ value chain concept applied in the BSR pilot action.

3 Outline method for high-level inter-regional value chain mapping

The approach piloted for the CBE value chain in the BSR builds on these various existing concepts and the experience of testing tools and methods for regional benchmarking, mapping and matching within the S3 Thematic Partnerships, etc. The aim of the exercise was to test how to rapidly map out, using existing data (quantitative or qualitative) and mobilising the knowledge of key players in the regions in the specific value chain, potential areas of synergies in the BSR in selected strategic value chains.

For the purpose of this manual, we define (high-level) **value chain mapping as an analytical and visual tool that helps understanding with how a particular innovation ecosystem is organised spatially, as well as size wise and direction wise**. It should improve the understanding of value flows and aggregation in the economic and innovation system in an organised and integrated manner.

Figure 4: Outline steps in the high-level value chain mapping



The high-level value chain mapping method is designed in four main phases (see Figure 4) with a preliminary step related to pre-selection of the key value chains, at macro-regional level, and a final feedback loop to inform future exercises in other value chains.

- **Firstly, analytical mapping of regional assets and capabilities** within the specific high-level value chain.
- **Secondly, a review of S3 priority areas** relevant for the value chain and investment patterns in the macro-region.

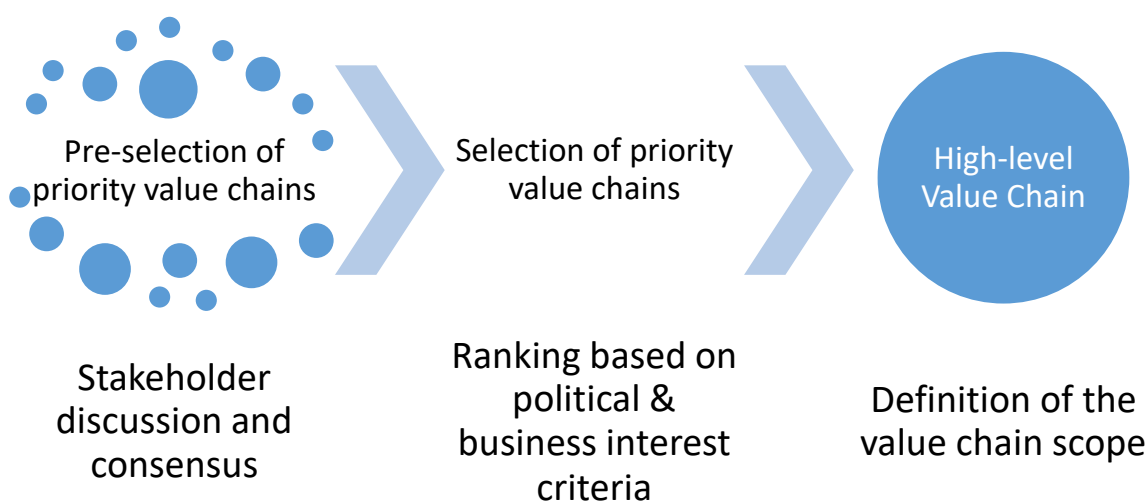
- **Thirdly, performing a matching assessment of the information gathered and placing it in a macro-regional context.** This step should assess linkages with EU level innovation and industrial value chains and ecosystem to identify specific macro-regional strengths vis-à-vis the EU level.
- **Fourthly, design of joint investment ideas (feasibility studies, business planning, drafting of memorandums of understanding, identifying public-private financing sources, etc.).** These investment ideas should be able to pass a ‘why at a (inter-) macro- regional level’ test. In other words, why does the investment idea require involvement of players from two or more countries in the regions, what does each public or private partner bring to the project in terms of complementary skills, resources (material or financial), technologies, etc.

To serve the purpose of enhancing S3 development, we adopt a **meso-level view**, not all possible individual players (e.g. businesses, etc.) in each region but rather key networks/clusters/centres, when mapping major components and relationships between them. This includes knowledge creating and diffusion actors (e.g. universities, research centres, research and technology organisations, centres of excellence, innovation platforms, research infrastructures and testbeds) and actors that play a role as ‘nodes or boundary spanners’ in regional innovation systems, such as cluster manager and other industry-led networks. This meso-level approach is coherent with the conclusions of Brennan & Rakhmatullin (2015), who note that *“Since the data required at the digging stage may be unavailable or indeed difficult to access, there is a need to identify conduits/boundary spanners who are connected to industry and have a deep knowledge of the industry cluster and its characteristics. These conduits/boundary spanners are likely to be found within national and regional development agencies and/or enterprise development agencies. For each location, one such individual might be assigned...so that opportunities for intra-regional industry GVC linkages can be precisely identified and pursued and that match-making takes place”*.

3.1 Selecting, scoping and defining the high-level value chain

The number of high-level value chains in a macro-region, such as the BSR, is potentially rather large given the number of industrial and trade service sectors (clusters) that are operating and present in at least a sub-set of the regions and member state (MS) that form the macro-region.

Figure 5: Pre-selection of high-level value chains at macro-regional level

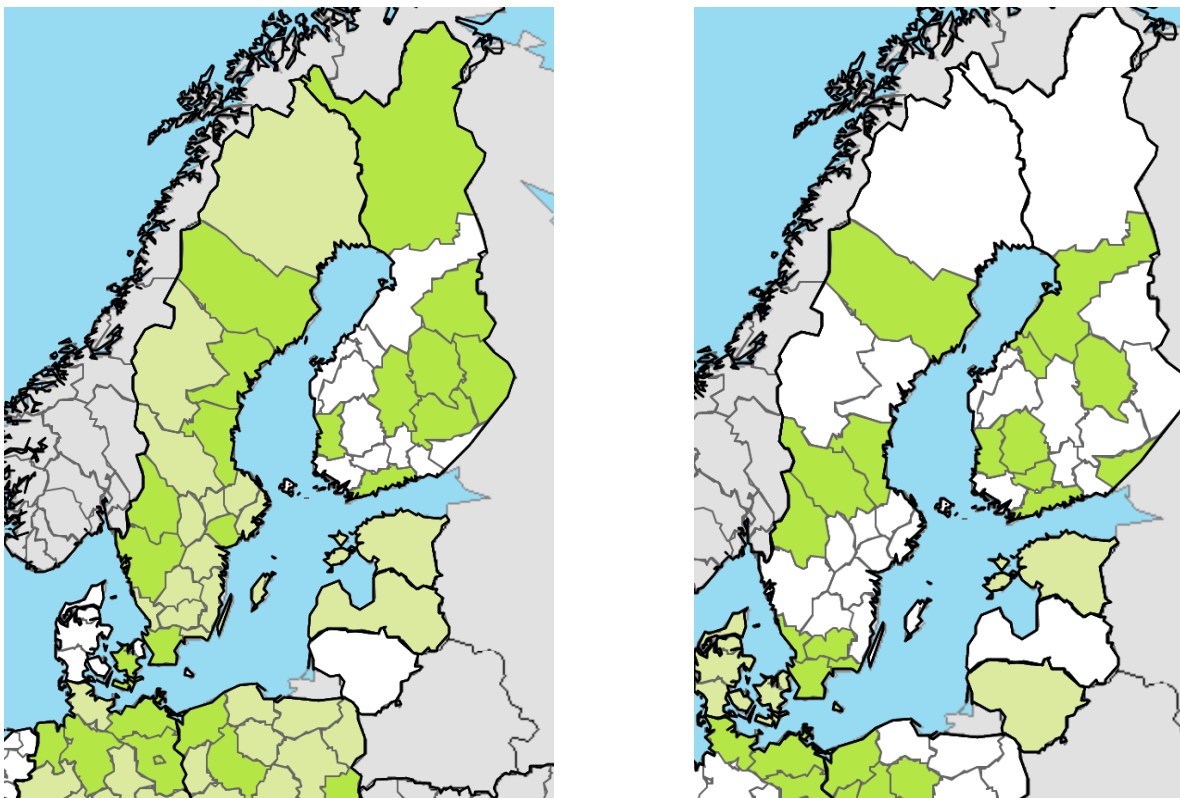


In the case of the CBE pilot action, the decision to focus on the value chain was driven by the high-level priority given to the circular and bioeconomy both at EU level and within the MSs and the majority of regions. A key element is the need, from the earliest stage in the process, for strong feedback and communication with a 'client group'. For instance, the outputs and findings of the current exercise are endorsed by the **BSR Directors' Network along with the representatives of the BSR S3 Ecosystem partner regions**. In the case of the BSR pilot action, the initial brief was to examine the potential for high-level value chain mapping, given innovation focus and industry-led performance, in three key areas: circular and bioeconomy, blue growth and digitalisation. The high-level mapping took these foundations as a starting point for the 'S3 hotspots' mapping in order to provide a macro-level insight into key assets, innovation actors and evidence of innovation performance.

In terms of identifying the relative focus on S3 priorities in each region, the **eye@RIS3 tool** (<https://s3platform.jrc.ec.europa.eu/map>) provides a quick means of checking current priorities. The two maps below Figure 6 show the relative importance of bioeconomy versus e-health as priorities for the BSR regions, underlining the relatively strong emphasis on the broad bioeconomy topic.

However, the data in eye@RIS3 begins to be dated (as the priorities reflect 2014-20 priorities) and hence, at the current time until it is updated for new 2021-27 priorities, the tool offers at best a first level insight into regional priorities that needs to be validated, updated and then developed at a more refined level of granularity.

Figure 6: Relative importance of bioeconomy versus e-health as a S3 priority in BSR



Source: eye@RIS3

Girejko et al (2019) outline a methodology for Transnational Smart Specialisation Strategy based on the work carried out under the GoSmart BSR project, including the checking and validation of common priorities by combining 'stated priorities' in S3 documents with location quotient (LQ) type analysis. The LQ is a way of quantifying how concentrated a particular economic branch, industry, or sector is in a specific region compared to a larger geographic unit (e.g. country, macro-region). The analytical review

results suggested that the initial smart specialisation priority areas cannot all be verified by the data. The authors suggest this is due to (i) political reasons or (ii) statistical restrictions.

In the CBE pilot carried out in the current project, the process for narrowing down the value chain topic began with round of consultations with the BSR director network and project partners structures and the compilation of an initial set of qualitative (and where available quantitative) information.

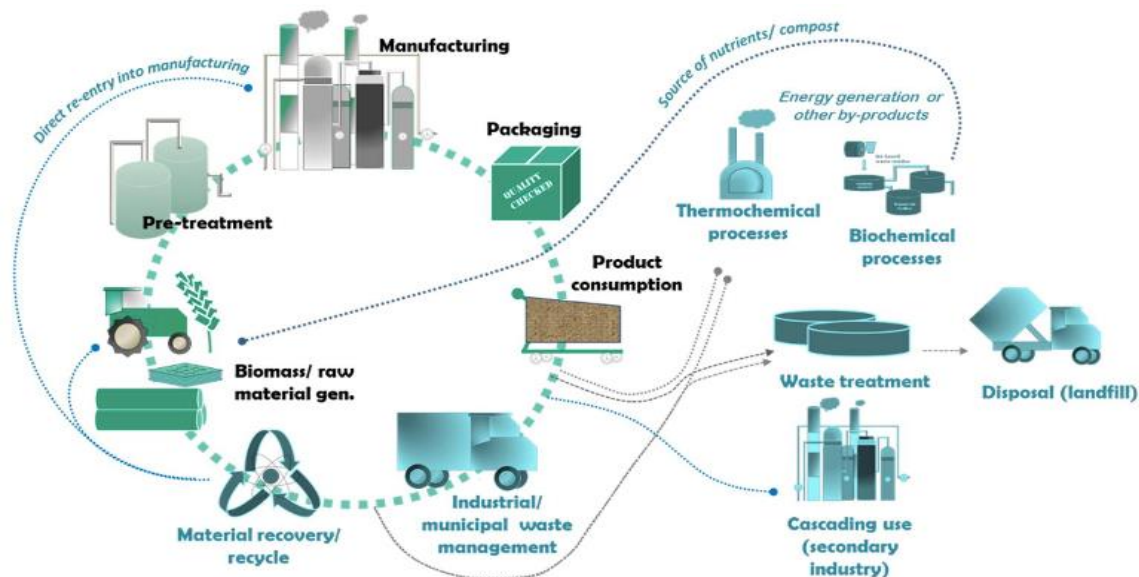
In terms of defining the specialisation fields/domains of most importance, the following core questions provide a helpful framework:

- Is the bio(-based) circular economy a field of priority in S3 strategies ?
- If yes, how is this field defined - broadly or more narrowly ?
- If more narrowly, what specific niche or sub-value chains of the bio-based or circular economy are of most relevance amongst the regions ?
- If no, what other specialisation fields are of most interest to the partner regions (given their regional priorities defined in RIS3 or other strategies) ?
- Are there cross-cutting or key technologies that are viewed as of critical importance for the priority specialisation field(s)?

This first round of consultation led to the decision to focus on the topic of circular bioeconomy which was considered to be particularly promising emerging area of activity in the BSR (and indeed, at Nordic and EU level) with a cross-sectoral dimension that made it highly relevant for the pilot exercise.

The scoping of the circular bioeconomy concept was done through a rapid scan literature review of the topic of circular bioeconomy leading to the adoption of a working definition based on existing literature (see results of the pilot value chain mapping for more details).

Figure 7: A visualisation of the circular bioeconomy value chain



Source: Lokesh, K. et al (2018)

This first step is important as it sets the parameters for the analysis, mapping and matching steps. At the same time, the analysis and mapping may lead to refinement of the initial concept or a focus on specific links in the value chain or specific sub-value chains.

3.2 Step 1 : regional assets and capability mapping

Once the high-level value chain has been selected, the first step is to review the known regional assets and capabilities in the selected domain. The analytical angles may cover the following areas (non-exhaustive) :

- Review of the most recent size, employment and other economic dimensions of the strategic priority area; aspects like presence of multinationals and human capital characteristics, etc. can be included;
- Economic specialisation analysis by applying location quotients to examine how concentrated an industry is within a region relative to other regions;
- Analysis of scientific and research potential through publication and patent analysis; data on Framework Programme participations and previous public sector (national and EU) investments addressing the priority area can be a good proxy for assessing comparative research potential;
- Technological specialisation analysis through mapping regional expertise and know-how in key technologies;
- R&I actor mapping, including also quadruple helix considerations:
 - Knowledge creating and brokering actors – research centres and infrastructures, RTOs, universities, centres of excellence, demonstration and piloting facilities
 - Innovation diffusion actors – clusters and industry-led networks
- Internationalisation potential determining trade patterns and global value chain links with other (regional) economies.

These broad groupings are coherent with Franco et al (2020) who isolated seven classes of structural factors that play a prominent role in determining regional innovation patterns and trends: (1) geo-demographic factors (for example, size of the market, age structure of the population); (2) human resources (for example, STEM graduates, skills profiles); (3) technological specialisation (for example, patenting activity); (4) sectoral specialisation; (5) company structure (for example, firm-size distribution); (6) trade openness; and (7) institutions and values (for example, multi-level governance, social capital, entrepreneurial attitudes).

Figure 8: indicative list of information and data sources

Topic	Data source
Regional economic and innovation profiles	
Regional Innovation Scoreboard	https://interactivetool.eu/RIS/index.html
Eurostat Regional Statistics	https://ec.europa.eu/eurostat/web/regions/data/database
Regional Competitiveness Index	https://ec.europa.eu/regional_policy/en/information/maps/regional_competitiveness/
Mapping R&I ecosystem actors	
Cluster mapping	https://www.clustercollaboration.eu/cluster-mapping
Digital Innovation Hubs	https://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool
Living Labs	https://enoll.org/network/living-labs/
EU industrial R&D investment scoreboard report	https://ec.europa.eu/info/news/2019-eu-industrial-rd-investment-scoreboard-report-2019-dec-18_en

Topic	Data source
Research infrastructures	CATRIS Portal https://www.portal.catris.eu/home (incorporating former MERIL database) EOSC Portal : https://marketplace.eosc-portal.eu/services Specific networks in BSR region: Baltic Tram (https://www.baltic-tram.eu), Baltic Sea Underground Innovation Network (http://bsuin.eu/), etc.
EIT Knowledge and Innovation Communities	https://eit.europa.eu/our-communities/eit-innovation-communities
Industrial infrastructures (pilot and demonstration facilities, testbeds, etc.)	Depending on the domain, there are various EU level actions mapping such facilities, e.g. in the bioeconomy field https://biopilots4u.eu/about
Scientific & technological specialisation	
Advance technologies for Industry (former KETS observatory)	https://ati.ec.europa.eu/ (national level)
Technological specialisation	OECD Patents by Region https://stats.oecd.org/Index.aspx?DataSetCode=PATS_REGION EPO PatStat https://www.epo.org/searching-for-patents/business/patstat.html (requires paid account)
Scientific specialisation	SCOPUS, Web of Science etc. (requires account). For guidance, see for instance : http://scientificprofile.s3platform.eu/
European Research Infrastructure for Science, technology and Innovation policy Studies (RISIS) - datasets	https://www.risis2.eu/risis-datasets/
Trade and GVC analysis	
Trade datasets and tools	DG JRC EU Trade tool: https://s3platform.jrc.ec.europa.eu/s3-trade-tool (data out of date) UNCTAD : https://unctadstat.unctad.org/EN/ (national level)
Company datasets – e.g. ORBIS	https://www.bvdinfo.com/en-gb/our-products/data/international/orbis (requires paid account)

Source: compilation authors

The Online S3 toolbox provides a useful range of tools for analysing such data : <http://www.s3platform.eu/toolbox/> and Rakhmatullin et al (2020) provide a summary of different analytical tools that can be applied.

In addition, to consulting the range of available European or international datasets that are available (see Figure 8), it is useful to collate and summarise on-going work in the regions or MS covered by the mapping exercise. For instance;

- Have any of the regions carried out value chain or cluster mapping exercises relevant fields?
- Given the priority specialisation field, what data exists at regional level on public-private investment in this field during the current period (2014-20).
- Which of the regions have begun work on refreshing their RIS3 (or similar regional strategic plans for innovation/development) ? Are there any early conclusions on new priority fields ?

The pilot exercise for CBE highlighted the difficulty of exploiting the more standard statistical datasets which often do not provide the right degree of granularity (e.g. when the field is an emerging value chain or a cross-sectoral/technological nature). Hence, the option of complementing the available data through a mapping survey completed by each region was used to capture additional information and data (see Annex 2 for the questionnaire).

3.3 Step 2: mapping of policy support and public-private investments in the value chain domain

The second step is to explore public policy measures, public-private partnerships and patterns of investment in the domain(s) of interest across regions to form an idea of where future value chains may regroup. Within this analysis the following exercises can be performed (non-exhaustive):

- Mapping of relevant policy support measures and analysis of the funding landscape (both public and private sources)
- Charting involvement in international partnerships and collaboration networks (such as Horizon 2020 or Interreg)
- Understanding regional priorities for co-operation from Smart Specialisation strategies and the extent to which partner regions are already engaged in existing S3-related projects and platforms

Figure 9: Sources of information on policy priorities and public-private investment

ESIF Programmes	Funding in broad categories available via https://cohesiondata.ec.europa.eu/ At national level, project databases can be consulted, e.g. in Finland : https://www.eura2014.fi/rrtiepa/?lang=en
Regional or national programmes or strategies	There is no single source although both the RIO and RIM platforms at European level do provide insight into national and regional policies and priorities. https://rio.jrc.ec.europa.eu/ https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/
R&I Regional Viewer	The R&I Regional Viewer provides a structured, regionalised visualisation (at Nuts levels 1, 2 and 3) of two sets of data: the Horizon 2020 funding awarded to the participants of projects sourced from the DG R&I Grant database (as of October 2019) and the allocated R&I-related investments under the European structural and investment funds (ESIF). https://s3platform.jrc.ec.europa.eu/synergies-tool
EIB/EIF – EFSI investments	https://www.eib.org/en/efsi/map/index.htm
Venture capital & private equity	https://www.investeurope.eu/ (general annual trends) National ventura capital and private equity associations may also be able to provide data.

Source: compilation authors

Again in the pilot exercise, while an effort was made to collate relevant documentation from regional and national sources the specific focus and scope of the CBE area required an expert consultation process via the mapping questionnaire (annex 2). The mapping questionnaire notably covers the following areas.

Figure 10: main topics addressed by the mapping questionnaire



Source: authors

3.4 Step 3: Matchmaking and development of ideas for joint investments

Based on the results of the previous steps, the identification of specific joint actions and investments to reinforce the macro-region potential in the specified value chain can then be developed. The process of developing such concrete investments was not covered by the pilot action, however, there are a number of sources of inspiration

The manual for S3 thematic partnerships (Rakhmatullin et al, 2020) provides a good summary of the steps related to developing and pitching ideas in the ‘connect phase’ to match business opportunities. Similarly, the RECONFIRM and Technical Assistance Facility (TAF)⁷ initiatives have piloted a number of methods for supporting the identification and validation of joint investment ideas.

A first step is for a number of regions to jointly agree to take forward identified opportunities to strengthen core element of the high-level value chain in the macro-region. This can be formalised in a **memorandum of understanding** that sets out the level of involvement of public-private partners from each region and the timetable for further development of the concept as well as potential investment sources. The outline template below has been used by RECONFIRM to help regions draw up a first-stage idea to pitch to other regions before moving to signing a MOU.

Figure 11: Outline template for an initial co-investment proposal

1	Introduction: proposed investment project
1.1	Context
	Briefly summarise the political, technological and economic context within the investment will take place.
1.2	Key activities conducted so far

⁷ <https://s3platform.jrc.ec.europa.eu/taf>

List in the form of a few bullets what has happened until now to establish the investment idea

1.3 Expected Investment volume

Specify expected volume of investment and if possible potential investment sources.

2 Challenges addressed and general market demand

2.1 Challenges that should be addressed by the project

Outline the key challenges that should be addressed by the investment

2.2 Value proposition

Outline how the investment will address the challenges. What barriers does it relieve and what gains does it create in respect to the challenges above.

2.3 Main customers

Specify the customers of the final investment result. Who will be served by the facility/services/products? Be as specific as possible, at least establish a priority list. Also assess why and how exactly these customers would benefit from the value proposition outlined above.

3 Interregional dimension

Specify the interregional dimension of your project and illustrate the rationale for such an interregional dimension. There needs to be a need for/or benefit of cooperation to have a successful interregional investment project.

4. Collaboration/Request for collaboration

Specify here what parts of your project cannot be best addressed by the promoter (lead region) and which other organisations/regions can cover them.

If not specified yet, clearly specify what inputs you need from others.

5. (Potential) revenue sources

Provide a first assessment/identification of what revenue sources the investment will generate. Who will pay for the final product/services and how much (on annual, etc.) basis?

6. (Potential) governance model

Think about the governance model. Who will be the project manager? Who else will be involved and how will they interact? What ambition do you have in the short and long run in terms of managing the project? A visual illustration of the governance model is usually of great help.

Source : adapted from RECONFIRM project

The TAF provides S3P-Industry platform project promoters the opportunity to work with business, corporate finance and legal experts from leading business advisory firms to improve their business plans and investment readiness of their projects. The TAF guidance note for applicants provides a useful framework for further development of joint investment ideas⁸.

⁸ <https://s3platform.jrc.ec.europa.eu/taf>

4 Conclusions from the pilot and recommendations for future action

The pilot value chain mapping exercise of CBE in the BSR has tested the opportunities and limitations for carrying out such exercises in greater depth and granularity. One of the **main challenges for the mapping exercise is to organise value chain information that adequately reflects the underlying complexity while being simple enough to analytically represent it** either via structured information or graphs. The mapping exercise generates a series of analysis, graphs and maps that represent various 'static' aspects of the value chain on a high level that - taken together - support further reflection about possible collaborative actions across the regions of the BSR.

It should be recognised that **high-level value chain mapping at macro-regional level has only an indicative and signalling value for policy making**. These results show trends in value aggregation in a very simplified manner. Actual value chains, especially in such highly interconnected fields as circular bioeconomy, are complex and have a multitude of contributing and contextual factors that explain the value aggregation across actors and activities.

It should be noted that **quantitative data analysis options for value chain mapping is currently very limited**. Structured databases (e.g. at EU level) in most cases do not include information on cross-sectoral priority areas which are usually of most interest for S3 policy making. Various databases are established at diverse points in time and their structure is rather path-dependent. Tracking information on new and emerging policy directions/cross-cutting interest areas is hindered. This is especially the case when pursuing a domain focus which is still largely embryonic in its development (i.e. the digitalisation of the circular bioeconomy). There is a significant need for EU level support to provide clear directions and advice to EU member states and regions concerning how to go about this task in the future.

Despite these limitations, there is **potential for exploring opportunities for innovative data linking and new approaches in data mining** in order to generate more granular value chain hotspot mapping. To retrieve policy-relevant conclusions a **good balance between quantitative and qualitative data is necessary**, which impacts the time and resources needed for future value chain mapping exercises.

Annex 1: further reading

Ali-Yrkkö, J., & Rouvinen, P. (2013). Implications of Value Creation and Capture in Global Value Chains: Lessons from 39 Grassroots Cases". ETLA Reports No 16. <http://pub.etla.fi/ETLA-Raportit-Reports-16.pdf>

Brennan, L., Rakhmatullin R., (2015), Global Value Chains and Smart Specialisation Strategy. Thematic Work on the Understanding of Global Value Chains and their Analysis within the Context of Smart Specialisation; EUR 27649 EN; doi:10.2791/44840

European Commission (2019) Strengthening Strategic Value Chains for a future-ready EU Industry - report of the Strategic Forum for Important Projects of Common European Interest. See: <https://ec.europa.eu/docsroom/documents/37824>

Franco, S., Gianelle, C., Kleibrink, A., & Murciego, A. (2020). "Learning from similar regions: how to benchmark innovation systems beyond rankings". In Quantitative Methods for Place-Based Innovation Policy. Cheltenham, UK: Edward Elgar Publishing. doi: <https://doi.org/10.4337/9781789905519.00013>

Girejko R., Kruse, M., Urban W., Wedemeier J. (2019) Methodology for Transnational Smart Specialisation Strategy.

Hegyí, F. B., Borbely, L. & Bekesi G. (2020) Factors of Leadership Attitude Enhancing Interregional Collaboration. Dynamic interregional strategic partnerships' leadership impact on motivation and commitment. EUR 30151EN, Publications Office of the European Union, Luxembourg, ISBN 978-92-76-17503-2, doi:10.2760/277185, JRC120216

Komninos, N., Panori, A., Kakderi, C., Reid A., Cvijanović, V., Roman M., Deakin, M. Mora, L., Tiemann, M. & Badii L. (2018) Online S3 mechanism for knowledge-based policy advice. ONLINE S3 (ONLINE Platform for Smart Specialisation Policy Advice) Project. DOI: 10.13140/RG.2.2.29801.60000/1

Mandras, G., & Conte, A. (2020). "Mapping global value chains". In Quantitative Methods for Place-Based Innovation Policy. Cheltenham, UK: Edward Elgar Publishing. doi: <https://doi.org/10.4337/9781789905519.00009>

Rakhmatullin R, Hegyi F. B., Ciampi Stancova K., Gomez J., & Mieszkowski K. (2020) Methodological Manual. Developing Thematic Interregional Partnerships for Smart Specialisation. A Practical Guide to Building and Managing Interregional Smart Specialisation Partnerships. EUR 30172 EN, Luxembourg: Publications Office of the European Union. ISBN 978-92-76-17907-8, doi:10.2760/564759, JRC116630.

Reid, A., Miedzinski, M. (2014) A smart specialisation platform for advanced manufacturing. Technopolis Group, Brussels. DOI: 10.13140/RG.2.2.12261.19680

Todeva, E., & Rakhmatullin R. (2016a) Industry Global Value Chains, Connectivity and Regional Smart Specialisation in Europe. An Overview of Theoretical Approaches and Mapping Methodologies, JRC Science for Policy Report, European Union, EUR 28086 EN; doi:10.2791/176781

Todeva, E., & Rakhmatullin R. (2016b) Global Value Chains Mapping: Methodology and Cases for Policy Makers, JRC Science for Policy Report, European Union, EUR 28085EN; doi:10.2791/273290

Annex 2: Example of a mapping survey questionnaire

Introduction

This survey is carried out as the next step in the development of a high-level Baltic Sea Region (BSR) value chain mapping exercise with a focus on the **circular bioeconomy**. The exercise forms a critical element of an Interreg BSR project⁹, exploring the potential for a stronger interregional approach to innovation across the BSR, by aligning smart specialisation and innovation priorities.

With the European Commission's focus on an EU 'Green Deal' and the associated linkages to this with the post-2020 Smart Specialisation agenda, there are significant opportunities for new, innovation-focused collaborative efforts, for the BSR.

This survey seeks to generate key insights into important projects, actions, plans and strategies across Baltic Sea regions, as well as details about key clusters, industry associations, networks, knowledge and technology institutions. We are also keen to learn more about the nature of your region's **innovation investment environment**, in the circular bioeconomy environment (e.g. public and private sector sources of funding / investment). Please inform us about emerging, new and on-going activities.

In addition, we are seeking to **identify key technologies** which are being developed and deployed in your region. These could provide important opportunities for diversification and upgrading of industrial strengths.

The combined analysis of the survey returns will contribute to the identification of opportunities for innovation-focused, macro-regional cooperation in the area of circular bioeconomy. This will help us to highlight and target new interregional opportunities for innovation / smart specialisation collaboration.

We recommend that the questionnaire is completed through a consultation process that gathers views of a core group of regional experts (e.g. cluster managers, companies, technology experts, policy experts, etc.) to discuss the challenges and priorities for the region in the field of circular bioeconomy and related technological and skills needs.

Circular bioeconomy can be defined as a sphere of bio-economic activities at the intersection of bioeconomy on the one hand side and circular economy on the other and it includes 1) bio-based products, 2) share, reuse, remanufacture, recycling, 3) cascading use, 4) utilisation of organic waste streams, 5) resource-efficient value chains, and 6) organic recycling, nutrient cycling¹⁰.

Where a recent analysis (survey, study) of regional technology know-how and needs exists, this can be used to inform the survey responses.

This template requires only one response per region (or per country, when the whole country belongs to the Baltic Sea Region area) comprising the Baltic Sea Region area.

We would be grateful if you could return us the survey by 20 March 2020. The analysis will be provided by 3 April 2020.

If you need clarification on questions or how to complete the survey, please contact Elina Griniece (griniece@efiscentre.eu).

We look forward to receiving your responses and to sharing with you the analysis and results of the exercise.

⁹ <https://projects.interreg-baltic.eu/projects/bsr-s3-ecosystem-214.html>

¹⁰ Carus, M. and L. Dammer (2018), „The “Circular Bioeconomy” – Concepts, Opportunities and Limitations“, nova paper #9 on bio-based economy 2018-01, p. 4., as in Pursula & Carus 2017, in: Newton et al. 2017.



Contact information

Region (Country):		
Person(s) responsible*		
Organisation		
Type of Organisation:	Select one	
Government department	<input type="checkbox"/>	
Public agency (e.g. regional development, enterprise or innovation agency)	<input type="checkbox"/>	
Cluster organisation	<input type="checkbox"/>	
Research and technology organisation	<input type="checkbox"/>	
Other (please specify):	<input type="checkbox"/>	
Email:		
Website:		

* i.e. the person who has completed the questionnaire and/or the designated representative of the regional authority

Regional strategic priorities in the field of circular bioeconomy challenges

Circular bioeconomy supports sustainability-driven innovation in creating new local value from waste and biomass. It focuses on helping develop sustainable and climate-neutral technologies and replacing non-renewable fossil and mineral resources with biomass and waste to obtain renewable products and nutrients. Innovations that form the potential for new value chains in circular bioeconomy cut horizontally through the traditional sectors.

1. What are the main challenges facing regional firms in adopting key technologies or introducing innovations in the area of circular bioeconomy? A number of options are suggested but please feel free to list others that you consider important. You should then rank the top 5 challenges for your region (1 - most important to 5 - least important).

Rank	Challenge
	Lack of ambition in the political goals for level of upgrade of underexploited bioresources
	Slow establishment of a stimulatory framework for the new biobased industries which allows introduction of products from new value chains based on biomass, waste and side stream conversion

	Lack of open access test facilities for facilitating the upscaling new processes and products
	Lack of investment and collaboration mechanisms between key matching infrastructures (e.g. biorefineries)
	Limited knowledge, skills and expertise in novel areas of bio-based economy (in public research, business sector, universities, policy makers and regulators)
	Limited business access to international markets and integration in value chains, especially for niche products with high value added
	Limited availability of various complementary actors in the regional business ecosystem

NB: please specify others if necessary

2. On what evidence is the selection and ranking of challenges based – e.g. background study, statistical survey of enterprises, workshop/discussion with cluster managers or representative companies, etc.? Please provide details of the evidence base and explain your ranking.

Strategies and policies addressing the circular bioeconomy

3. In your region, are there public or public-private strategies that address the challenges related to innovation and technological adoption in circular bioeconomy?

Strategy document	Title of document	Year adopted

Smart specialisation strategy		
Circular bioeconomy strategy		
Specific technology strategies		
Other strategies (please specify):		

4. Please summarise (briefly) the main regional priorities concerning circular bioeconomy and the application of key technologies and concepts (e.g. biorefineries, cascading use, utilisation of waste and side streams, nutrient cycling, bio-based products, etc.). Please specify if there is any emphasis in regional strategies on digitalisation as an accelerator of circular bioeconomy.

Policy measures in support of innovation and technological change in circular bioeconomy

5. Please list up to five major regional or national programmes/initiatives that support the development or deployment of new technologies and their application in circular bioeconomy? These can either be (co-)funded by public funds or supported through public-private partnerships.

Name of initiative	Annual funding	Source of funding	URL (if available)

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Regional expertise and know-how in key technologies: Existing expertise in relevant technologies

6. In which of the relevant technologies for circular bioeconomy is your region most advanced/specialised? Rank the 5 technologies in which you consider your region to be specialised in (relative to partner regions or from an EU wide perspective). (1 - most specialised to 5 - least specialised).

Key technologies for circular bioeconomy	Rank
E.g. Bioprocess development (e.g. synthetic and systems biology)	
E.g. Plant biotechnology	
E.g. Sustainable chemistry	
E.g. Thermochemical conversion	
E.g. Simulation and modelling	

NB: Add lines as required

7. Please comment your ranking and provide examples – you may alternatively or in addition provide a web link to a study or analysis of regional specialisation in these fields.

8. Please rank the level of importance and the actual level of application of the identified key technologies in regional businesses.

Key technologies for circular bioeconomy	Importance for regional businesses to adopt technologies <i>Rank 1 - critical to 5 - low priority;</i> <i>Otherwise: don't know</i>	Actual application of key technologies in regional businesses <i>1 - state of the art (3 - average with respect to other partner or EU regions) to 5 - not currently used;</i> <i>Otherwise: don't know</i>

*Add lines as required

9. You may comment or provide examples of specific issues in applying key technologies in regional firms. NB: You may provide evidence of your scoring or examples/issues.

10. Is support for development of these key technologies accessed outside the region? If so please comment on where and which type of support.

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15. If you wish to propose additional topics, please use the box below.

Type of joint actions or activities

16. Please identify and rank (from 1 - top priority to 5 - lowest priority) top five priority activities for inter-regional co-operation and where relevant comment on your ranking.

Type of activity	Ranking	Comment
Mapping specialist expertise in relevant technologies in each region		
Mapping leading regional firms in circular bioeconomy value-chains to identify potential synergies		
Partner search, matchmaking and brokerage services for partnership development		
Sharing of best practices with regard to the implementation of new technologies in circular bioeconomy		
Co-development of technological and innovation infrastructures (biorefineries, testing sites, pilot facilities, etc.)		
Create an inter-regional network of research and innovation centres that businesses can access (e.g. using an inter-regional innovation voucher)		
Co-investment in pilot applications, technology validation actions, etc.		

Cooperation on mobilising financial support for investments/projects e.g. pooling of regional funds through a joint programme initiative, development of an investment platform		
Others (please add details):		

NB: You can add more lines as required

Thank you for your time!