

***Policy and capacity building recommendations  
for South East Europe***

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Contributors:	<b>ICI (RO), UoM (GR), ZSI (AT), MESS (SI), UL (SI), BASSCOM (BG), ISHAS (HU), ISI (GR), IMP (RS), UoME (ME)</b>
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## ABBREVIATIONS

<b>Abbreviation</b>	<b>Meaning</b>
APA	Area of Policy Attention
BSO	Business Support Organisation
DC	Digital Content
EC	European Commission
EU	European Union
ICT	Information and Communication Technologies
IR	Intellectual Rights
RDI	Research, Development and Innovation
RFE	Regional Foresight Exercise
RFM	Regional Foresight Methodology
SEE	South East Europe
TEL	Technology-Enhanced Learning
VC	Venture Capital
WS	Workshop

## Executive Summary

Policy reform and gradual change of mentality towards more transparent and participatory processes in the decision-making system in South East Europe is an intriguing and also sensitive topic. The FORSEE project designed a unique foresight methodology and subsequently an implementation process to showcase that regional collaboration, joint creative thinking and common vision building is indeed possible among countries in the SEE region. A pilot regional foresight exercise was conducted with 8 participating countries (including Austria, Bulgaria, Greece, Hungary, Montenegro, Romania, Serbia and Slovenia) in the field of ICT, and specifically in the Digital Content domain, to set up and demonstrate a collaborative platform for the implementation of foresight exercises that could be repeated in the future with different actors in other fields.

Common vision building exercises for the SEE region are frequently criticised for irrelevance or even short-sightedness by those that remain sceptical about the purpose and potential of SEE regional collaboration. However, several benefits can be reaped from joint decisions for action among cooperating countries in any region of the world, and the same is true for South East Europe. This region includes several small economies with different levels of development that could increase their effectiveness in managing global competition and achieving socio-economic development through regional cooperation. The immediate benefits include exploitation of complementarities between countries, development of synergies based on competitive advantages, creation of a harmonised regional market for products and services, decrease in the duplication of efforts and more efficient allocation of resources for activities that address common needs and problems. Even in dynamically evolving sectors, such as the ICT, the idea of building partnerships and working towards a common goal generates indisputable benefits against fierce global competition, as all alliances do. Change and growth for smaller economies could go through a 'partner country' with a bigger and stronger economy to which a degree of relevance exists at some level. Several cases support this model, including the example of cooperation between Germany and central European economies, with apparent mutual gains. This kind of cooperation is naturally built on a win-win basis and therefore, requires that small economies not only identify a leading-economy they aspire to partner with, but also create a value proposition for their 'partner'. The identified leading-economy does not have to be one of the world's 'champion' economies. Sometimes, it can be the neighbouring economy that is already a few steps ahead..

Building on this rationale, the FORSEE pilot Regional Foresight Exercise (RFE) set up and demonstrated a systematic, transparent and participatory process for common vision building and orchestrated policy-making for the SEE region. The pilot RFE aims to offer specific expertise to policy-makers and to other key decision-makers from the industry and the academia in the SEE region and in the EU. It has also created a network of regional stakeholders and provided a platform for mutual learning and capacity building. The resulting policy and capacity building recommendations from this pilot exercise conducted in the DC domain are presented in the current document.

The enclosed policy and capacity building recommendations propose on the one hand, actions and measures for strengthening Research, Development and Innovation (RDI) activities in the DC domain across South East Europe, and on the other hand, activities that will support the embedding of a foresight culture in the region.

The policy recommendations supporting RDI in the DC domain are primarily addressed to the SEE national authorities (ministries, governmental agencies, inter-ministerial bodies, etc) responsible for the development of RDI policies in the ICT field. These ministries embody the so-called ‘assumed sponsors’ of the pilot exercise. However, the inherent multi-disciplinarity of DC, as thematic focus of the exercise, prescribes that several other ministries, such as those responsible for cultural content, public sector content and services, economy and entrepreneurship, regional development, education, etc., and other actors need to take part in the policy-making and implementation process, even at national level. Therefore, for each policy recommendation presented in this document, a principal actor has been identified that is foreseen to assume not only or not necessarily the role of the owner, but most importantly the role of the coordinator of the envisaged policy action. In most cases, it is proposed that a number of other relevant stakeholders for each proposed action are also involved in the design and implementation of specific measures.

The distinctive characteristic of the FORSEE approach is the regional (i.e. transnational) nature of the exercise, which makes the endeavour much more demanding than a national or local foresight exercise. The complexity of designing concrete policy recommendations at a regional level is further increased because of the disparities among national policy-making systems in the 8 participating countries. In each state, decisions and action plans’ implementation are handled in many different fashions. It is therefore expected that each competent national body would decide on the concrete way of translating the enclosed policy recommendations into concrete actionable steps. Each recommendation is primarily aimed at highlighting that policy actions are needed to address a specific issue or challenge, while serving a common vision. It requires a significant degree of coordination among peer decision-making and operational bodies within a state or even at transnational level.

The scope of the proposed policy actions addresses the realisation of a selected common vision for the evolution of SEE by the year 2025<sup>1</sup>. Alike any other foresight exercise, the FORSEE pilot RFE aims to support strategic thinking and decision-making through the development of a range of possible futures by exploring and assessing options involving key stakeholder groups, choosing the most desirable future and proposing policies and other actions to achieve the preferred outcomes. The selected preferred future that resulted from the pilot RFE (entitled “SEE SMART COALITIONS”) assumes that regional development in the DC domain is built on DC openness, which depends on a harmonised legal and regulatory environment that supports unrestricted access to publicly funded data and information for DC creation and consumption. In this vision, transparency and demand-side driven

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<sup>1</sup>This time interval was decided with the purpose of providing the SEE DC actors the opportunity to exploit the results of the 2014-2020 RDI programmes at national and EU levels and to contribute to their correlated implementation in the SEE region.

innovation are the cornerstones of public policies, empowering the civil society and the local industry - primarily innovative SMEs. Most importantly, the envisaged future prioritises regional collaboration for the aggregation of content and promotion of a SEE regional identity through geographic, historic, cultural and touristic content, pursued by SEE governments and organisations to attract the world's attention and boost national economies.

It is important, however, to emphasise that as a pilot exercise, the FORSEE RFE should not be assumed to exhaust the topic of DC future orientation for the SEE region. The DC domain as the thematic focus of the pilot exercise was selected because it demonstrated a proper interest by the stakeholders' particular promise and potential in terms of transnational collaboration. In this context, the policy recommendations presented in this document are not thoroughly tackling all major issues that have been identified by the experts involved in the pilot exercise. Only a limited number of identified challenges linked to the envisioned future have been selected, and only on these issues policy actions and measures are articulated. The recommendations are structured under 4 broad Areas of Policy Attention (APA). This grouping effort aims to improve stakeholders' reception and support actors in understanding their individual role in unfolding the vision. The selected APAs are not considered to be unique or optimum for the presentation of policy recommendations that support RDI in the DC domain; they constitute a selection with adequate relevance to the ideas collected and developed during the pilot exercise.

In the first APA on 'DC creation & use', five recommendations are described:

**I.1: Open licenses and models for DC access and reuse**

FORSEE proposes that SEE states adopt and harmonise open licenses and models for access and reuse of digital content at the appropriate granularity level across the region.

**I.2: Responsibility and liability for DC quality and preservation**

FORSEE proposes that it is necessary to introduce policies and specific supporting mechanisms to ensure long-term quality and preservation of digital content, along with proper assignment of responsibility and liability for involved actors in the value chain within the whole digital content life-cycle (i.e. creation/provision/preservation/use/re-use).

**I.3: DC interoperability standards**

FORSEE suggests that SEE states need to adopt and harmonise standards for digital content interoperability both at a regional and at an EU level.

**I.4: Intellectual rights, data ownership and privacy protection,**

FORSEE recommends that new and harmonised laws and regulations should be adopted regarding intellectual rights in commercial and non-commercial uses, data ownership, privacy preservation, and protection of civil/consumer rights.

**I.5: Civil involvement in DC creation and citizens' empowerment**

FORSEE suggests that specific measures need to be taken to promote the participation of civil society in open digital content creation and use and special attention is paid to actions that support citizens' digital empowerment.

In the second APA on 'Technological areas supporting RDI', two recommendations are presented:

**II.1: Infrastructure for enhanced DC accessibility**

FORSEE suggests that network infrastructure in SEE needs to be improved in order to enhance DC accessibility for all. Specific measures are proposed to ensure that every citizen has access to reliable and affordable high speed internet connectivity and to guarantee access to online services and resources for daily activities and personal enhancement, including necessary interactions with the state, local government, financial service providers, utilities, and education organisations.

**II.2: Technical and semantic interoperability**

FORSEE recommends that technical and semantic interoperability should be established at a sectoral level in SEE region (e-government, e-health, business registers, tourism, agriculture, etc.).

In the third APA on 'Education & skills development', two recommendations are presented:

**III.1: A DC skilled workforce & a media literate population**

FORSEE proposes that SEE education systems need to be equipped with well trained educators and adapted learning processes, curricula and assessment methods in order to support the development of DC skilled experts and digital media literate populations.

**III.2: National & regional knowledge platforms for DC sharing**

FORSEE suggests that SEE actors should promote setting up, populating and maintaining demand-driven, interoperable knowledge platforms (portals) in diverse sectors (e.g. business, academia, public administration, researchers, society, individuals etc) and explore SEE and EU-wide interconnection of these knowledge platforms.

Finally, in the fourth APA on 'Economic & business environment for DC innovation', five recommendations are proposed:

**IV.1: Supporting frameworks for start-ups and niche SMEs**

FORSEE recommends that dynamic framework conditions should be established to increase the number of start-ups and SMEs applying for financial support. FORSEE suggests that measures could be designed to sustain 3-year support to SMEs in order to enter the market, raise SME's visibility and enhance entrepreneurial proficiency through education, training and access to high level information, skills and expertise.

**IV.2: Risk funding & private investment for DC RDI support**

FORSEE proposes that industrial stakeholders, including SMEs, should be encouraged to combine public support with private financing. The action may be implemented by raising awareness and enhancing knowledge on funding opportunities and financing strategies for SMEs and VCs, promoting synergies with relevant EU activities and proliferating funding instrument combinations that accelerate investments into relevant RDI follow-up activities.

#### **IV.3: Exploitation of EU investments in DC platforms and infrastructures**

FORSEE suggests that specific actions need to be designed in order to stimulate interest, build capacities and support SEE actors in competing for EU RDI funds. Specific measures need to be employed to facilitate the internationalisation of SEE innovation projects.

#### **IV.4: Creation and distribution of the localised DC**

FORSEE recommends that SEE states should prioritise and incentivise the creation and distribution of digital content with local, national and SEE-regional relevance. It is suggested that the establishment of regional alliances among peer bodies and organisations is promoted, with particular focus on building a regional SEE identity in the DC domain, which corresponds to setting-up appropriate framework conditions for regional cooperation.

#### **IV.5: DC industry & academia cooperation at national and regional level**

FORSEE proposes that measures are taken to improve the quality and effectiveness of framework conditions that support cooperation between the DC industry & the academia at national and regional level.

## 1 Introduction

The policy recommendations presented in this document were developed through a participatory process implemented on the basis of a regional foresight methodology that was designed in the framework of the FORSEE project.

### 1.1 The context of the SEE regional pilot foresight exercise

The ‘FORSEE - Regional ICT Foresight exercise for Southeast European countries’ project targets ICT Research, Development and Innovation (RDI) policy formulation in South-East Europe (SEE) and aims to introduce a sustainable mechanism for ICT foresight in the region. The project builds on the view that establishing platforms for open and participatory vision building is key to orchestrating efforts needed to accelerate socio-economic development in SEE countries that strive to tackle the challenges of the global networked economy and to participate on equal footing in the European Research Area. In an integrated Europe, local and global competition further increases the motivation to engage in regional foresight, create networks of regional stakeholders and provide a platform for mutual learning and capacity building. Despite the growing regional disparities in SEE, embedding informed decision-making in the policy development process remains crucial. Participatory forward looking exercises performed regularly in the region would enable SEE countries to anticipate trends and developments, join forces with their neighbours in weathering global competition, bridge the local industry with the academia and improve the use of scientific resources to create business opportunities that respond to national or regional needs.

FORSEE ultimately aims at ‘embedding a foresight culture in the SEE region’, making such forward looking exercises an integral part of policy-making processes in every field. The project’s main objective is to demonstrate how the region can identify the shortcomings of the ICT RDI sector by developing a regional collaboration platform that utilises proposed tools and cooperation processes to explore synergies and complementarities between research resources in participating countries. The benefit for the region stems from increased efficiency drawn from regional cooperation, which can be attributed to minimising duplication of efforts and wasting scarce resources for activities that address common needs and problems in South East Europe.

FORSEE endows the region with a methodological approach, the Regional Foresight Methodology (RFM) and the results of a pilot regional exercise as a proof of concept that demonstrates the validity of the approach. The project also establishes the foundations for concrete interaction among governmental bodies, scientific communities, enterprises and civil society that participate in inclusive dialogues, synthesise views and invest in regional ownership in the planning and decision-making process. In other words, the FORSEE project provides a tangible sustainability plan for a permanent mechanism called the virtual SEE Regional Foresight Centre.

The FORSEE project is coordinated by the University of Patras, Department of Electrical Engineering & Computer Technology (ApEL Lab). The FORSEE partnership consists of the following organisations that provide their capacities (including human resources, organisational structures and stakeholder communication & management) and ensure that wide participation and political support is geared to the FORSEE objectives:

1. National Institute for Research and Development in Informatics (Romania)
2. Ministry of Education, Youth and Science (Bulgaria),
3. University of Macedonia (Greece),
4. Centre for Social Innovation (Austria),
5. Ministry of Education, Science and Sports (Slovenia),
6. University of Ljubljana (Slovenia),
7. Bulgarian Association of Software Companies (Bulgaria),
8. Institute for Sociology, Centre for Social Sciences, Hungarian Academy of Sciences (Hungary),
9. Industrial Systems Institute/ RC Athena (Greece).
10. Mihajlo Pupin Institute (Serbia),
11. Ministry of Science and Technological Development (Serbia),
12. University of Montenegro (Montenegro).

In its three years of implementation, the FORSEE project, has established a wide circle of collaborating entities and individuals. A Regional Taskforce in the role of the main operational body has been created to coordinate the achievement of all FORSEE objectives, especially regarding the implementation of the pilot regional foresight exercise. The Regional Taskforce is a transnational structure acting as an assembly of representatives of National Taskforce teams that operate in each country, which include project representatives and selected experts.

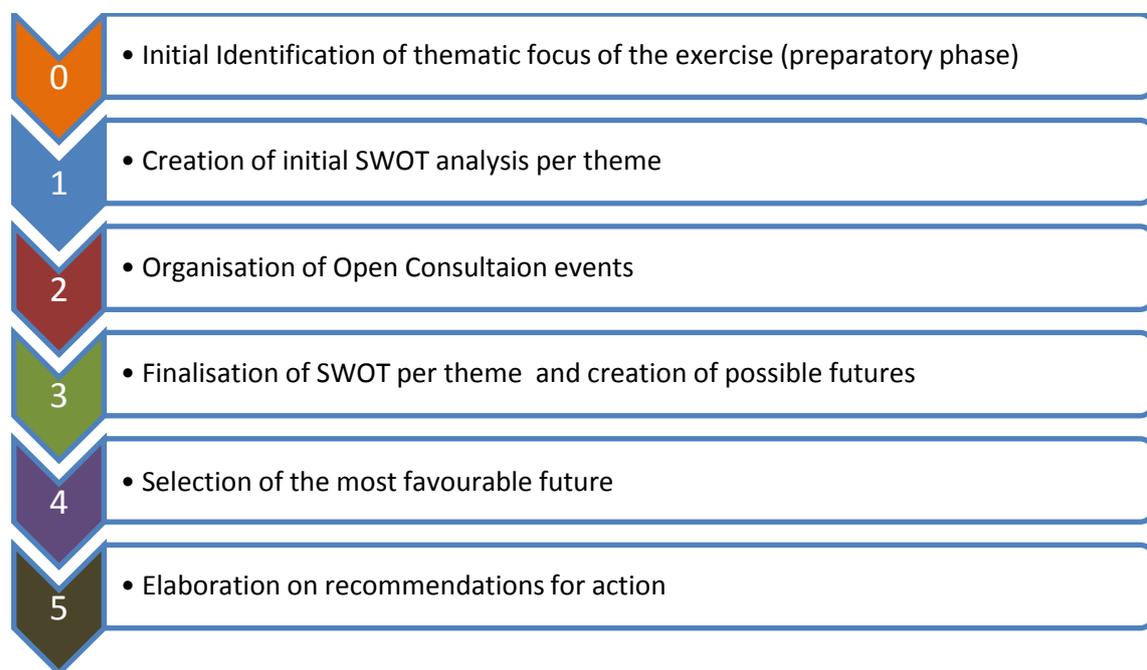
Further to its core implementation team, FORSEE has approached and involved a wide range of SEE stakeholders in different project phases and particularly in the pilot Regional Foresight Exercise, including:

- Individuals , such as independent experts and persons actively involved in the ICT research policy-making, but also in the other social spheres/industries
- Administrative actors, such as governmental bodies (e.g. ministries and agencies), related to ICT Research, Development and Innovation (RDI) activities
- Private sector actors, such as chambers of commerce and industry, industrial associations, branch associations, foundations, enterprises involved in the field of ICT Research, Development and Innovation (RDI)
- SMEs, i.e. representatives of micro, small and medium-sized enterprises, operating in the field of ICT RDI, and
- Educational and research organisations with a focus on RDI.

## 1.2 The methodological approach

The FORSEE Regional Foresight Methodology (RFM) was devised by a methodology team comprised of ICT and foresight experts. The RFM considers issues of regional relevance and sets the key scoping elements of the exercise and related processes. The RFM is, on the one hand, modular in the sense that some tasks are identical for all participants, namely analyses of the regional themes, while other tasks are to be performed by a group of country teams and, on the other hand, generic enough to allow for local customisations based on the specificities in each country's policy-making modus operandi and availability of resources.

The following flowchart illustrates the FORSEE methodology at a generic level:



**Figure 1: Overview of FORSEE Regional Foresight Methodology (RFM)**

The RFM includes a preparatory phase that allows in cases like the FORSEE pilot exercise to investigate and select the thematic focus of the exercise. When a real-life foresight exercise is launched by a Sponsor, the theme could be prescribed or, in cases when the focus of the exercise is very broad (like S&T), the theme could be specified during the exercise. In the FORSEE case, where the focus is the broad field of ICT, a preparatory phase is required in order to identify and consider topics that show particular promise for joint vision building and action taking. The following short descriptions of the RFM building blocks explain the methodological approach:

### 1. Creation of initial SWOT analyses per theme/ topic

Assuming that the thematic focus of the exercise has been decided, an *initial SWOT analysis* is conducted to acquire deeper understanding in the selected fields. This improved understanding of strengths, weaknesses, opportunities and threats will be put through a consultation process to be enhanced and verified by relevant stakeholders. It

is assumed that throughout the exercise a separate workgroup coordinates activities for each theme in all subsequent phases.

## **2. Organisation of Open Consultation events**

Given the regional character of the exercise, a National Open Consultation event takes place in each country in order to increase stakeholder awareness and stimulate participation in the exercise, discuss theme-specific issues and engage stakeholders in future-oriented discussions. The results of national events are fed into a Regional Open Consultation event that aims to elevate the discussion onto a regional level.

## **3. Creation of the Final SWOT and design of possible futures**

The results of Open Consultation events are used to finalise the SWOT analysis in each theme. Understanding gained from the analysis and collection of future aspirations of stakeholders leads to the next step of the process, which focuses on the design of 2-4 possible futures per theme. In this context, the RFM prescribes the organisation of a regional expert workshop, the so-called 'Futures' Workshop.

## **4. Selection of the most favourable future**

Following the 'Futures' Workshop where experts devise a set of plausible and feasible images of the future in the pre-set time horizon of the exercise, a consultation process with regional stakeholders is needed to verify the results and indicate the desirability of envisioned developments. A regional expert workshop is designed at this stage, the so-called 'Choices' Workshop, which uses the input from regional stakeholders and experts to refine the identified future images and define a set of criteria for the performing the selection of the most favourable future per theme.

## **5. Drawing of recommendations**

The objective of the final phase is to develop tangible recommendations that may be translated into actionable steps at a national and regional level. Recommendations are tailored to the prescribed target audience and address issues such as "when" and "what" needs to be done and "by whom" to drive the realisation of the selected vision. Regional stakeholders and experts review the future state selected as most favourable and provide ideas for actions and measures required for its realisation. The thematic SWOT analyses are exploited in this phase to understand the starting point of this endeavour towards the desired future. Recommendations are processed and refined during the final regional expert Workshop, called the 'Policy Recommendations' Workshop. The thematic Workgroups conducting the exercise use the results to develop the final outputs of the exercise.

The RFM was translated into a day-to-day process defining specific implementation steps of the regional pilot exercise that focused on the evolution of the Digital Content domain in SEE by the year 2025. This pilot exercise led to the Policy Recommendations presented in Section 2 of the current document.

### 1.3 A vision for Digital Content development in South East Europe

The vision developed for the SEE region during the FORSEE pilot regional foresight exercise is described by the future state entitled “**SMART SEE COALITIONS**” selected as most favourable for establishing a promising collaborative environment for SEE countries that will improve the region’s competitiveness and underpin economic growth, bringing about a major change to the mentality and every-day life of SEE citizens. The selected vision is elaborated in Annex I, but a brief description is provided below for easy reference:

#### SMART SEE COALITIONS

*By 2025, the SEE region has prioritised DC openness. Following EC guidelines and international trends, SEE governments have the appropriate regulatory conditions in place to support unrestricted<sup>2</sup> access to publicly funded data and generative technologies for DC creation and consumption. Transparency and demand-side driven innovation<sup>3</sup> are the cornerstones of public policies. Emphasis is placed on social innovation – new civil society groups and communities are formed, novel business strategies and ideas strive to meet social needs of all kinds. Based on the understanding that a significant change in the dynamics of the DC sector is shifting the balance and power from traditional content and media side (content creators) toward the distribution side (content aggregators), innovative SMEs have emerged, providing novel services to consumers in the region, re-using and re-configuring existing content, or acting as local intermediaries of global players. Generative platforms and infrastructures are exploited and the society has access to value-added content goods and services. SEE companies have managed to mobilise local creative talent and fully exploit new business opportunities in their national DC markets. Some of them have extended their reach to the region, but only a few have managed to attract international attention. The SEE DC industry grows by actively adopting international trends and channelling its creativity and innovation towards SEE customers. Joint ventures on SEE region content aggregation have been promoted. A common vision for the promotion of a SEE regional identity through geographic, historic, cultural and touristic content has been pursued by governments and organisations in order to attract the world’s attention and boost national economies. This ecosystem provides ideal conditions to consolidate and exploit the benefits of smart specialisation strategies implemented in the last decade. Smart coalitions based on complementarities are being set up between SEE states and peer organisations to effectively address the regional DC agenda.*

<sup>2</sup>Unrestricted in the sense that there is going to be a legal and regulatory set up that would overcome barriers in order to still enable widest possible access and reuse of data and technologies.

<sup>3</sup> Innovations of commercial and societal value that meet the needs of those users that will set upcoming trends in demand

#### **1.4 Formulation of policy and capacity building recommendations**

The vision for the evolution of the DC domain in the SEE region by the year 2025 was communicated through different channels, including electronic newsletters, national workshops, expert meetings, social media postings and in front of the audience attending the FORSEE Closing Conference on 27<sup>th</sup> of March 2014, in Vienna, Austria. During the final stage of the pilot regional exercise approximately 40 esteemed experts from 8 participating countries were interviewed to provide ideas for policy recommendations that would propel materialisation of this vision. This group of experts encompassed DC domain expertise, foresight understanding and policy advice experience. The experts were selected from SEE academic communities, the industry and civil society organisations. Ideas on needed policy interventions and measures that would support RDI in the DC domain towards the selected vision for 2025 were collected in all participating countries and then assembled, processed and structured into a single document. The purpose of this activity was to provide a useful and exploitable input for the regional experts' workshop, the 'Policy Recommendations Workshop', which took place on the 30<sup>th</sup> of January 2014, in Vienna, Austria.

Apart from a number of issues with horizontal relevance, assembled ideas for policy recommendations were structured under 4 broad Areas of Policy Attention (APA) with the sole purpose of facilitating the work of experts invited to the 'Policy Recommendations Workshop'. The structuring effort also considered how stakeholders' reception of such policy and capacity building recommendations could be improved, and how they would be more helpful to actors seeking to understand their role in unfolding the vision. The selected APA are undeniably neither unique, nor optimum for the presentation of policy recommendations that support RDI in the digital content domain, but constitute a selection with adequate relevance to the ideas collected during the expert interviews.

During the 'Policy Recommendations Workshop', 25 participating experts from the SEE region formed 3 breakout groups. Each group discussed the ideas belonging to a specific Area of Policy Attention (APA)<sup>4</sup> and prioritised them according to their assumed contribution to the preferred evolution. Each group elaborated on the top 5 ideas from their prioritised list, describing the issue, the policy recommendation, the measures underpinning the recommendation, the timeframe and the actors involved in the implementation process. The prioritisation process does not diminish the importance of other ideas that were not tackled during the workshop. The process merely reflects the partnership's decision to ensure higher quality in a smaller number of recommendations instead of a more superficial coverage of a larger number of issues, given the resources' and timing limitations of the pilot exercise. After the workshop, these elaborated policy proposals were further processed and are presented in the following section.

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<sup>4</sup> The 2<sup>nd</sup> breakout group handled two Areas of Policy Attention (APAs) instead of one. The reason was that the Workshop setup could best accommodate 3 groups and the specific two APAs were considered to be relatively linked together more than others (APA II. TECHNOLOGICAL AREAS SUPPORTING RDI and APA III. EDUCATION & SKILLS DEVELOPMENT). The group made a decision to elaborate on the top 2 ideas from each of these areas of attention.

## 2 Policy Recommendations for supporting DC RDI

This section presents 14 policy recommendations developed to propose actions and measures for supporting Research, Development and Innovation activities in the DC domain across the South East European region. The objective of these policy recommendations is to stimulate gradual progress towards the realisation of the envisioned future, **SMART SEE COALITIONS** (see Annex I), in a time horizon up to the year 2025. Policy recommendations have been structured in 4 major areas that require policy attention to allow policy-makers, as well as interested stakeholders and decision-makers, to easily refer to their own area of interest and competence.

The **Areas of Policy Attention (APA)** and corresponding titles of issues tackled by each policy recommendation are listed below:

### APA I. DC CREATION & USE

- I.1: Open licenses and models for DC access and reuse
- I.2: Responsibility and liability for DC quality and preservation
- I.3: DC interoperability standards
- I.4: Intellectual rights, data ownership and privacy protection
- I.5: Civil involvement in DC creation and citizens' empowerment

### APA II. TECHNOLOGICAL AREAS SUPPORTING RDI

- II.1: Infrastructure for enhanced DC accessibility
- II.2: Technical and semantic interoperability

### APA III. EDUCATION & SKILLS DEVELOPMENT

- III.1: A DC skilled workforce & a media literate population
- III.2: National & regional knowledge platforms for DC sharing

### APA IV. ECONOMIC & BUSINESS ENVIRONMENT (FOR DC INNOVATION)

- IV.1: Supporting frameworks for start-ups and niche SMEs
- IV.2: Risk funding & private investment for DC RDI support
- IV.3: Exploitation of EU investments in DC platforms and infrastructures
- IV.4: Creation and distribution of the localised DC
- IV.5: DC industry & academia cooperation at national and regional level

## 2.1 APA I: DC CREATION & USE

### I.1: Open licenses and models for DC access and reuse

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**Issue:** The open environment for creating, distributing, enjoying and re-using digital content envisioned for the year 2025 requires adaptation of the regulatory environment at the regional (supra-national) level. In fact, Directive 2013/37/EU, the new Public Sector Information (PSI) Directive, which allows for the release of PSI for reuse under a licence or without conditions (art.8), will be in force by the end of 2015 and therefore requires immediate transposition by the EU member states at national level. Issues that need to be addressed include licence proliferation and incompatibilities, different levels of granularity (e.g. file, database, video/music clip, etc.), multitude of technologies supported (data formats, off-line/ on-line technology, etc.), and compatibility with constantly changing internet economy business models.

**Policy recommendation:** Encourage adoption of harmonised open licenses and models for access and reuse of digital content at the appropriate granularity within the whole SEE region.

#### Proposed Measures:

- A. Define appropriate and typical DC access/ re-use use cases, licensing models and appropriate legislation regimes for various types of stakeholders and their content (books, music, videos, research data, e-learning content, GI, etc.).
- B. Define data types and appropriate granularity of DC through identification of main national stakeholders (DC private/ public owners/ holders), listing of appropriate data types, and defining/adopting typical internal acts enabling legal regime for access/ re-use of DC within identified actors.
- C. Assure interoperability and harmonise licensing models, data types and granularity for access/ re-use across the SEE region through intergovernmental working groups at SEE level.

#### Actors responsible for driving change:

**Overall champions:** SEE national bodies responsible for digital law and regulation.

- A. **Main actors:** SEE ministries responsible for EU PSI Directive and transposition and Digital Agenda policies  
**Supporting actors:** Academia, industry, civil society, ministries responsible for national archiving policies, public sector data, geographic data, cultural data
- B. **Main actors:** SEE national data holders and owners, both public and private  
**Supporting actors:** SEE ministries responsible national archiving policies
- C. **Main actors:** Governments of SEE countries  
**Supporting actors:** Intergovernmental bodies at SEE level

#### Timeframe for implementation:

- A. **Start activity:** immediate (2014). **End activity:** 2017
- B. **Start activity:** immediate (2014). **End activity:** 2017
- C. **Start activity:** immediate (2014). **End activity:** 2017

## I.2: Responsibility and liability for DC quality and preservation

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**Issue:** It is hard to achieve long-term availability of digital content in an open and quickly changing environment, spanning beyond contractual commitments and business operations. However, this is the building block of new business models for provision of complex content services and applications that curate, combine, and aggregate (re)sources. Loss of availability<sup>5</sup> of open digital content (e.g. weather information, geographical maps with different infrastructural layers and actual statistical data and data from public registers) can result in unprecedented cascading effects across all actors and stakeholders.

**Policy recommendation:** Introduce policies and supporting mechanisms that ensure long-term quality and preservation of digital content together with proper assignment of responsibility and liability for involved actors in the value chain within the whole digital content life-cycle (i.e. creation/provision/preservation/use/re-use).

### Proposed Measures:

- A. Ensure quality of DC creation (data/ metadata) by developing appropriate standards, rules and procedures, establishing peer review actions, certification and accreditation bodies, and defining suitable redress mechanisms for digital content error corrections or any other problem with respect to ensuring validity, correctness, usability and availability of digital content throughout aggregation value chains.
- B. Ensure responsibility and liability of digital content providers through development of QA manuals, standards, and certification and through development of harmonised legislation on liability of providers for availability and quality of content.
- C. Ensure preservation of digital content through legislation for DC archiving and deployment of infrastructure that ensures long-term storage, preservation, access and re-use of digital content in the service oriented environment. Legislative action needs to be implemented with regards to the deposit of digital content.

### Actors responsible for driving change:

**Overall champions:** SEE national bodies responsible for digital legislation and regulation.

- A. **Main actors:** DC creators and providers  
**Supporting actors:** SEE DC industry
- B. **Main actors:** SEE ministries responsible for legislation, DC creators and providers  
**Supporting actors:** Public sector and SEE DC industry
- C. **Main actors:** SEE ministries responsible for archiving policies/ national parliaments  
**Supporting actors:** SEE DC industry

### Timeframe for implementation:

- A. **Start activity:** immediate (2018). **End activity:** 2024
- B. **Start activity:** immediate (2018). **End activity:** 2024
- C. **Start activity:** immediate (2018). **End activity:** 2024

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<sup>5</sup>Changes in storage format and/ or obsolescence, rate of creation of new data and datasets, maintenance of accessibility to data through links and search results, comparability of semantic and ontological definitions of datasets are the key challenges to be addressed.

### I.3: DC interoperability standards

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**Issue:** For a DC SEE market to flourish by the year 2025, digital content should be free of incompatibilities and closed formats, enabling extensive re-use across different value chains. Interoperability becomes the main prerequisite, since its absence constitutes the main barrier for widespread aggregation of multiple digital content sources, especially considering all levels of the European Interoperability Framework (EIF). SEE harmonisation, integrated within EU and global DC interoperability initiatives,<sup>6</sup> would underpin transparency and efficient public sector interactions (internally or with citizens), while at the same time it would facilitate the cross-border nature of the envisioned DC regional ecosystem.

**Policy recommendation:** Encourage adoption of harmonised standards that promote digital content interoperability within the whole SEE region.

#### Proposed Measures:

- A. Develop and adopt industry standards – taking into consideration global standards – for DC interoperability by supporting standardisation, reference implementation and interoperability compliance testing activities. Where possible, adopt European standards (e.g. EDM – Europeana data model) for cultural resources metadata.
- B. Promote and provide DC related interoperability schemas in the National Interoperability Framework of each state through the adoption of specifications for DC services (service level management, types and formats of data, etc.) and establishment of actions ensuring interoperability enforcement. Focus to be placed also on LinkedIn Data (i.e. URI schemes, persistent identifiers, RDF-like formats).
- C. Harmonise digital content interoperability frameworks across the SEE region through transnational working groups.

#### Actors responsible for driving change:

**Overall champions:** Industry and civil society.

- A. **Main actors:** Industry associations and civil society  
**Supporting actors:** Formal and informal standardisation bodies
- B. **Main actors:** SEE ministries responsible for National Interoperability Framework in line with EU initiatives  
**Supporting actors:** DC stakeholders incl. industry, academia & civil society
- C. **Main actors:** EC and SEE ministries responsible for National Interoperability Framework  
**Supporting actors:** DC stakeholders incl. industry, academia & civil society

#### Timeframe for implementation:

- A. **Start activity:** 2016. **End activity:** 2018
- B. **Start activity:** 2016. **End activity:** 2020
- C. **Start activity:** 2016. **End activity:** 2020

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<sup>6</sup> The EC has invested considerably to increase public services efficiency and transparency and to define better strategies for trust and interoperability (see ISA - 'Interoperability Solutions for European Public Administrations' program for the period 2010-2015 at <http://ec.europa.eu/isa/>).

#### **I.4: Intellectual rights, data ownership and privacy protection**

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**Issue:** Existing Intellectual Rights<sup>7</sup> (IR) laws and regulations cannot cover and protect the new dynamic open digital world, where digital content comes in different shapes, from diverse sources, bearing distinct restrictions (e.g. privacy, IPR, ownership, trade secrets, etc.). New models need to cover value chains that allow mash-ups of open and closed content in a multi-national and cross-border setup. Appropriate handling is required for a variety of emerging digital service value chains in different domains of economic activity (e.g. tourism, health, education, culture, location based services, etc.), which pose different restrictions in terms of service creation (e.g. combining open and closed sources, public and private sources) and consumption (e.g. commercial/non-commercial use).

**Policy recommendation:** Encourage adoption of new and harmonised laws and regulations regarding intellectual rights in commercial and non-commercial uses, data ownership, privacy preservation<sup>8</sup>, and protection of civil/consumer rights.

**Proposed Measures:**

- A. Define IR models for derivative digital content of mixed source (e.g., open and closed, private and public) through consultations with stakeholders regarding cases and patterns for commercial and non-commercial uses.
- B. Harmonise intellectual rights across the SEE region through transnational working groups.

**Actors responsible for driving change:**

**Overall champions:** Civil society and industry

- A. **Main actors:** SEE ministries responsible for IR and data protection policies  
**Supporting actors:** Academia, industry, civil society, other ministries (e.g., Ministry of Health)
- B. **Main actors:** SEE ministries responsible for IR and data protection policies and national bodies (e.g., Regulators and Data Privacy Agencies)  
**Supporting actors:** Various Rights Protection organisations (BSA chapters and others)

**Timeframe for implementation:**

- A. **Start activity:** Immediate (2014). **End activity:** 2017
- B. **Start activity:** Immediate (2014). **End activity:** 2020

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<sup>7</sup> Although the term is more commonly referred to as "intellectual property rights", the FORSEE partnership has agreed to use the term "intellectual rights", which more aptly describes the nature of the protections afforded by most nations, since most modern copyright systems do not treat copyrighted or patented materials in the same way as real property.

<sup>8</sup> While the EU's "Right to Be Forgotten" proposal is intended to give Internet users more control over their data, critics have charged that the new right would pose significant unintended risks for free expression online.

## **I.5: Civil involvement in DC creation and citizens' empowerment**

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**Issue:** Civil society involvement in digital content creation, distribution, and consumption is a global phenomenon. To exploit the potential of SEE by the year 2025, active participation of citizens in the open digital content ecosystem is an ex ante conditionality, not only from social (e.g. empowerment, active citizenship, governance), but also from cultural (e.g. language, customs and music), research (e.g. research data, open science), educational (Open Educational Resources (OERs) and/ or Massive Open Online Courses (MOOCs)) and economic (e.g. user generated content, social networking) point of view.

**Policy recommendation:** Promote participation of civil society in open digital content creation and use and aim at citizens' digital empowerment.

### **Proposed Measures:**

- A. Increase civil involvement in open digital content value chains through activities supporting awareness raising, social acceptance, and increased participation.
- B. Aim at digital empowerment through activities stimulating contribution of time and skills of citizens for digital content creation, promoting development of digital content that is relevant for the societies as a whole, and fostering a participatory culture.

### **Actors responsible for driving change:**

**Overall champions:** Civil society

- A. **Main actors:** Non-Governmental Organisations and civil society  
**Supporting actors:** SEE governments
- B. **Main actors:** SEE ministries responsible for Digital Agenda policies, civil society, non-Governmental Organisations.  
**Supporting actors:** Community based organisations and vocational education institutions

### **Timeframe for implementation:**

- A. **Start activity:** Immediate (2014). **End activity:** 2016
- B. **Start activity:** 2015. **End activity:** 2019

## 2.2 APA II: TECHNOLOGICAL AREAS SUPPORTING RDI

### II.1: Infrastructure for enhanced DC accessibility

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**Issue:** Affordable web access brought large populations to the Internet, narrowing the digital divide, but recently, the emergence of digital content services (e.g. video-on-demand, online medicine and Internet classrooms) has raised the risk of a ‘content divide’. Less developed, scarcely populated or isolated areas could become excluded from access to new media, methods and tools for DC creation and use. The ‘all digital environment’, envisioned for the year 2025, requires universal, affordable and easy to use connectivity, provided to all citizens at an adequate level of quality for seamless use of current and future digital services and online resources. Adequate connectivity and net neutrality<sup>9</sup> will support SEE citizens in their necessary daily interactions with the public and private sphere and will empower them by stimulating creativity and inclusion.

**Policy recommendation:** Improve infrastructure to enhance DC accessibility for all. Ensure that every SEE citizen has access to reliable and affordable high-speed internet connection in order to guarantee their access to online services and resources needed for daily activities and personal enhancement, including necessary interactions with the state, local government, financial service providers, utilities, health and education organisations.

#### Proposed Measures:

- A. Implement EU recommendations for internet connectivity, ensuring universal coverage of internet access for SEE citizens. Promote revisiting the current definition of the term ‘broadband’ (including, but not limited to, minimum speed requirements) to meet the anticipated increase in the demand for high-speed, low latency connectivity at all places. Promote more accurate monitoring and benchmarking of broadband connectivity and geographical coverage (in terms of speed, affordability and reliability) across European countries (EU and non EU member states to include all SEE countries).
- B. Put in place appropriate regulation for guaranteeing Quality of Service and security in broadband communication services provided to citizens and businesses, covering the entire geographical area of the SEE region.
- C. Ensure that access to high-speed broadband internet is provided at no cost at public spaces (such as public e-libraries) to guarantee access to online services and resources to those who cannot afford it, eliminating social exclusion and discrimination.
- D. Increase the availability of scientific data and information that is critical to innovation processes by providing access to an RDI cloud, reinforcing the capacity of researchers and innovators to exploit existing and create new knowledge.

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<sup>9</sup> The European Commission, with the help of the Body of European Regulators for Electronic Communications (BEREC) is actively committed to preserving the Open Internet and achieving Network Neutrality. In April 2014, the European Parliament passed the Net Neutrality Law to bring fair access to bandwidth and content access across the 28 member states.

**Actors responsible for driving change:**

**Overall champions:** SEE ministries responsible for telecommunications policies

- A. Main actors:** EC & SEE ministries responsible for telecommunications policies  
**Supporting actors:** business community, civil society organisations for internet users
- B. Main actors:** SEE national telecommunications regulatory authorities  
**Supporting actors:** Telecommunications industry
- C. Main actors:** SEE ministries responsible for telecommunications policies  
**Supporting actors:** Local & regional (sub-national) governments, telecommunications industry
- D. Main actor:** SEE ministries responsible for telecommunications policies  
**Supporting actors:** academia, telecommunications industry

**Timeframe for implementation:**

- A. Start activity:** immediate (2014). **End activity:** milestone in 2020 – continuous
- B. Start activity:** immediate (2014). **End activity:** milestone in 2020 – continuous
- C. Start activity:** 2015. **End activity:** milestone in 2018
- D. Start activity:** 2015. **End activity:** milestone in 2020

## II.2: Technical and semantic interoperability

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**Issue:** Semantic Interoperability is an essential feature for federated information architectures to work in heterogeneous settings over time. In the envisioned future of digitally aggregated SEE resources, interoperating entities include libraries, museums and all large scale archives offering digital/ web services, digital repositories, e-Science, e-health and e-Learning platforms. However, integrating diverse digital collections into a unified information infrastructure, accessible and discoverable through simple interfaces still remains a central R&D issue. While contemporary metadata standards of authoritative and hierarchical nature are being criticised for failing to consider cultural and linguistic diversities and the plurality of local perspectives, a collaborative information organisation approach, referred to as folksonomy has emerged. The SEE region needs to address the challenge of technical and semantic interoperability at a regional level, providing seamless access to digital resources to all citizens and supporting the evolution of the DC domain.

**Policy recommendation:** Establish technical and semantic interoperability at sectoral levels in SEE region (e-government, e-health, business registers, tourism, agriculture, etc.).

### Proposed Measures:

- A. Introduce appropriate financial measures to support RDI projects concerning semantic interoperability and the design and development of common exchange languages and formats for DC. Ensure support for practical implementations and actual use of the developed solutions.
- B. Devise appropriate financial measures to support linguistic interoperability (multilingualism) at SEE level. Assign greater priority to RDI projects concerning DC resource annotation in regional languages. Through joint financing there will be development of a multilingual terminological resource (WorldNet-like), in order to provide language-independent descriptors for indexing the DC.
- C. Launch appropriate financial and technical measures to support the creation and maintenance of a common registry containing businesses developing semantic interoperability solutions.

### Actors responsible for driving change:

**Overall champions:** EU, SEE national governments

- A. **Main actors:** DC producers and owners  
**Supporting actors:** SEE ministries responsible for economic and financial policies
- B. **Main actors:** EU  
**Supporting actors:** SEE ministries responsible for economic and financial policies
- C. **Main actors:** SEE ministries responsible for telecommunications policies  
**Supporting actors:** Local & regional (sub-national) governments

### Timeframe for implementation:

- A. **Start activity:** immediate (2014). **End activity:** milestone in 2018 – continuous
- B. **Start activity:** 2015. **End activity:** milestone in 2018 – continuous
- C. **Start activity:** immediate (2014). **End activity:** milestone in 2018 -continuous

## 2.3 APA III: EDUCATION & SKILLS DEVELOPMENT

### III.1: A DC skilled workforce & a media literate population

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**Issue:** The increasing employment of novel and sophisticated technologies and the wide availability of open digital content require highly skilled SEE workforce that will successfully exploit future opportunities. To this end, education systems should be re-configured according to impending societal and business needs in order to support life-long learners who will be skilled in using and creating digital content and to equip public sector employees with the necessary digital media literacy.

**Policy recommendation:** Ensure that SEE education systems have well-trained educators and adapt learning processes, curricula and assessment methods in order to support the development of DC skilled experts and digital media literate populations.

**Proposed Measures:**

- A. Increase the current percentage of skilled professionals in the field of DC. Adapt formal education techniques to enable skills development and promotion of life-long learning addressing the anticipated need for a wide range of DC professionals.
- B. Increase the percentage of digital-media literate population<sup>10</sup> in SEE and ensure that the majority of citizens are competent in understanding, using and managing constantly generated and renewed digital content. Educate educators on digital media literacy and incorporate the concept within formal education experiences.
- C. Take into consideration societal and business needs when re-configuring SEE education systems to increase the use of DC and to develop DC skilled professionals. Incentivise public / private organisations to produce and consume DC.
- D. Increase the current percentage of DC policy experts within national governments to ensure that SEE public data are opened for access by a skilled workforce and companies specialised in data processing and analysis.

**Actors responsible for driving change:**

**Overall champions:** Higher education organisations

- A. **Main actors:** Higher education organisations, SEE governments  
**Supporting actors:** ICT skills certification bodies, ICT vocational training organisations
- B. **Main actors: SEE governments**  
**Supporting actors:** ICT vocational training organisations, civil society

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<sup>10</sup> Digital literacy is the ability to effectively and critically navigate, evaluate and create information using a range of digital technologies. It requires one "to recognise and use that power, to manipulate and transform digital media, to distribute pervasively, and to easily adapt them to new forms". Digital literacy does not replace traditional forms of literacy. It builds upon the foundation of traditional forms of literacy. Digital literacy is the marrying of the two terms digital and literacy; however, it is much more than a combination of the two terms. Digital information is a symbolic representation of data, and literacy refers to the ability to read for knowledge, write coherently, and think critically about the written word. (source: wikipedia)

- C. **Main actors:** SEE governments  
**Supporting actors:** Higher education organisations, civil society, local communities
- D. **Main actors:** SEE governments  
**Supporting actors:** ICT vocational training organisations, ICT skills certification bodies

**Timeframe for implementation:**

- A. **Start activity:** 2017. **End activity:** milestone in 2018
- B. **Start activity:** 2016. **End activity:** milestone in 2020
- C. **Start activity:** 2018. **End activity:** milestone in 2025
- D. **Start activity:** 2016. **End activity:** milestone in 2020

### III.2: National & regional knowledge platforms for DC sharing

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**Issue:** Knowledge transfer and extensive information exchange aspired for the future ‘all digital’ world calls for easy-to-use, multifunctional environments that will underpin the availability of digital content at a national, regional, and, on the long run, European level. Such exchange would include different types of content (e.g. good practices, public documents, business, statistical, scientific or research data etc.) that can be re-used, adapted and reconfigured by interested parties. The formation and maintenance of such knowledge platforms at all three levels could foster SEE collaboration and provide incentives for all data publishers to conform to established standards and ensure high quality of digital content.

**Policy recommendation:** Promote setting up, populating and maintaining demand-driven, interoperable knowledge platforms (portals) in diverse sectors (e.g. business, academia, public administration, researchers, society, individuals etc) and explore SEE and EU-wide interconnection of these knowledge platforms.

**Proposed Measures:**

- A. Promote and support the set-up of knowledge platforms that provide open access to all kinds of content. Launch promotional campaigns and provide incentives to the industry, the academia and public sector organisations. Stimulate the engagement of all actors in populating platforms with relevant content.
- B. Adopt a bottom-up approach and promote setting-up a common framework for surveying and identifying the actual needs of the market regarding the types of knowledge platforms actually needed in the market (demand-driven action). Support the development of new or adaptation of existing knowledge platforms according demand-side requirements.
- C. Interconnect knowledge platforms at SEE and European level, aiming both to promote exchange of regional information and expertise (including guidelines, scientific publications, case studies, re-usable numeric data, etc.) and seeking to provide an online space where knowledge and experience is available for developing smart coalitions.

**Actors responsible for driving change:**

**Overall champions:** Universities, SEE governments

- A. **Main actors:** SEE governments  
**Supporting actors:** Researchers, universities, DC industry, public organisations
- B. **Main actors:** DC industry, universities, data publishers  
**Supporting actors:** SEE governments
- C. **Main actors:** SEE governments, EC  
**Supporting actors:** SEE researchers, universities, data publishers, existing knowledge platform owners

**Timeframe for implementation:**

- A. **Start activity:** 2015. **End activity:** milestone in 2018
- B. **Start activity:** 2015. **End activity:** milestone in 2025
- C. **Start activity:** 2020. **End activity:** milestone in 2025

## 2.4 APA IV: ECONOMIC & BUSINESS ENVIRONMENT FOR DC INNOVATION

### IV.1: Supporting frameworks for start-ups and niche SMEs

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**Issue:** Providing entrepreneurial support geared to assist SMEs in a highly challenging business environment is increasingly vital in a volatile domain such as the DC. A strong focus on supporting start-ups and SMEs in the DC domain until they become ready for the market is justified, paving the way to economic growth through innovation and enhanced competitiveness. However, there is a thin line that needs attention, as continuing to provide financial support to SMEs after their entry to the market may prove counterproductive, affecting their competitiveness in a negative manner.

**Policy recommendation:** Ensure the creation of dynamic framework conditions to increase the number of start-ups and SMEs applying for support, sustain the support for about 3 years to enter the market for a number of beneficiaries, raise SME's visibility and enhance entrepreneurial proficiency through education, training and access to high level information, skills and expertise.

#### Proposed Measures:

- A. Foster a business environment conducive to a fast increase of the number of start-ups and SMEs applying for support. Find new providers of finance and engaging investors actively involved in the development of the start-ups and SMEs. Promote sustainable Private Public Partnerships to cooperate and join forces in areas where they have mutual or complementary interests but cannot act as efficiently alone. Improve the regulatory framework to ease barriers. Encourage and support the awareness campaigns at universities and training institutions
- B. Increase the number of successful beneficiaries in the market in a 3-year period since receipt of support. This requires an effective monitoring system to periodically monitor the performance of the beneficiaries and to provide support if needed by improving access to information and tailored mentoring/ coaching. Support the emergence and maintenance of innovative research in DC applications. Enlarge and diversify the entrepreneurial education. Developing an efficient innovation ecosystem of DC entrepreneurship.
- C. Encourage an increasing number of SMEs to become extrovert, develop networking strategies and target regional and international markets. Promote participation in international/ regional Venture Capital & Risk financing events, fairs and entrepreneurship competitions.
- D. Encourage the provision of affordable quality training and best practice exchange for young highly educated entrepreneurs and SME personnel, and raise awareness in cooperation with education organisations, industry and civil society actors.

#### Actors responsible for driving change:

**Overall champions:** Ministries and agencies related to creative industries

- A. **Main actors:** VCs & business angels; private actors (multinationals)  
**Supporting actors:** Clusters, chambers of commerce
- B. **Main actors:** Ministries of Economy, Beneficiaries

**Supporting actors:** VCs

C. **Main actors:** Chambers of Commerce, Beneficiaries, multinational companies

**Supporting actors:** VCs

D. **Main actors:** Beneficiaries, Innovation Intermediaries, clusters

**Supporting actors:** Universities (increase of awareness)

**Timeframe for implementation:**

A. **Start activity:** immediate (2014). **End activity:** milestone in 2015

B. **Start activity:** 2015. **End activity:** milestone in 2018

C. **Start activity:** 2017. **End activity:** milestone in 2020 – continuous

D. **Start activity:** 2015. **End activity:** milestone in 2020 – continuous

## IV.2: Risk funding & private investment for DC RDI support

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**Issue:** Maximising the benefits of an open DC environment entails risk taking and the availability of risk funding is key to align a company's willingness to take risks with its ability to do so. The SEE countries have a limited track record in leveraging private investment for RDI support, without which entrepreneurship is stifled or becomes state-dependent. Especially in the DC domain, where companies compete in an open and quickly changing environment, addressing the need for efficient combination of public and private funding for risk taking is a key factor for successful business development based on innovation.

**Policy recommendation:** Encourage industrial stakeholders, including SMEs, to combine public support with private financing by raising awareness and enhancing knowledge on funding opportunities and financing strategies for SMEs and VCs, promoting synergies with relevant EU activities and proliferating funding instrument combinations that accelerate investments into relevant RDI follow-up activities.

### Proposed Measures:

- A. Raise the awareness SMEs and VCs in order to increase the visibility and attractiveness of opportunities brought by RDI. Accelerate the organisation of campaigns focusing SMEs, of specialised fairs and road shows. Foster the awareness of VCs by implementing brokerage events and highly professional portals.
- B. Support the increase of the number of Venture Capital (VC) investments in SEE in DC in order to provide a more integrated approach to RDI activities. Encourage a dynamic promotion of the most relevant EC activities and match-making actions. Harmonise funding sources and crowd funding.
- C. Strengthen multinational investments and joint ventures in sustainable development of business model for collaboration between multinationals.

### Actors responsible for driving change:

**Overall champions:** SEE national legislative bodies and economic government agencies

- A. **Main actors:** VCs; RDI organisations; multinational companies  
**Supporting actors:** Networks, liaisons, dedicated projects; Business Support Organisations (BSOs), clusters
- B. **Main actors:** VCs, business angels  
**Supporting actors:** Local players
- C. **Main actors:** Multinationals  
**Supporting actors:** Beneficiaries

### Timeframe for implementation:

- A. **Start activity:** 2015. **End activity:** milestone in 2015
- B. **Start activity:** 2015. **End activity:** milestone in 2017
- C. **Start activity:** 2015. **End activity:** milestone in 2025

### IV.3: Exploitation of EU investments in DC platforms and infrastructures

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**Issue:** The EU has set ambitious goals and financial support mechanisms for RDI in order to enhance its global RDI capacity and competitiveness. Unfortunately, most SEE countries are not near the forefront of EU excellence in order to fully exploit these resources and their national innovation support systems are not well designed to complement EU resources. To turn the situation around, it is necessary to implement effective national RDI support actions, leveraging EU investments in technologies, IT platforms and infrastructures.

**Policy recommendation:** Develop collaborative solutions that support SEE efforts to compete for EU RDI funds, stimulate interest and enhance SEE actors' capacities to successfully apply for EU RDI funding and facilitate the internationalisation of SEE innovation projects.

**Proposed Measures:**

- A. Improve skills required for successful project funding applications by SEE actors. Focus and co-ordinate actions to develop and sustain a supporting & coaching culture, networking, promotion and brokerage activities between SEE and foreign partners.
- B. Provide structured opportunities to increase participation in broader areas of activities by SEE actors/ participants and number of project leaders from the region. Create community maps to support different on-going projects connecting. Develop clusters of projects/ partners which encourage human potential, facilitate flows of tacit knowledge, build relationships and gain visibility
- C. Create a proper framework supporting and increasing the number of regional oriented projects to complement national and EU activities in order to enable national stakeholders to gradually link and integrate into EU level RDI projects and programmes. Take a competitive advantage by promoting regional collaboration in projects. Create community maps to support different running projects. Develop clusters of projects / partners which encourage human potential and facilitate flows of tacit knowledge.

**Actors responsible for driving change:**

**Overall champions:** NCPs of business support/ coaching organisations; SEE clusters

- A. **Main actors:** NCPs of business support/ coaching organisations,  
**Supporting actors:** R&D ministries; beneficiaries (universities & SMEs); research centers
- B. **Main actors:** SEE clusters  
**Supporting actors:** Project clusters; partners' network
- C. **Main actors:** SEE clusters, NCPs of EC funding programmes  
**Supporting actors:** Project clusters; partners' network

**Timeframe for implementation:**

- A. **Start activity:** 2015. **End activity:** milestone in 2020
- B. **Start activity:** 2015. **End activity:** milestone in 2020
- C. **Start activity:** 2015. **End activity:** milestone in 2020

#### IV.4: Creation and distribution of localised DC

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**Issue:** The vision of DC domain evolution in SEE for 2025 highlights the opportunity to draw benefits from building coalitions and aggregating content at a regional level. The vision aspires to enhance the growth potential of SEE DC actors from local, through regional, to EU and global level. Content aggregation could generate numerous benefits, including business opportunities in an enlarged market for the DC industry (also for domains like tourism, health, and transport), internationalisation prospects for organisations and proliferation of content for SEE citizens. To realise this vision, it is necessary to promote the creation of alliances among peer organisations at SEE level aimed at introducing common standards and a regional approach on providing geographic, historic, cultural, linguistic, touristic, or socio-economic content.

**Policy recommendation:** Support the creation and distribution of digital content with local, national and SEE-regional relevance by promoting the establishment of regional alliances among peer bodies and organisations focused on building a regional SEE identity in the DC domain, which corresponds to setting-up appropriate framework conditions for regional cooperation.

##### **Proposed Measures:**

- A. Launch nationally co-funded RDI programmes that support the creation and distribution of digital content with local, national and SEE-regional relevance addressed to public and private sector beneficiaries.
- B. Encourage and support the organisation of events focussing on building up a SEE regional identity with specific focus on setting up SEE-relevant frameworks for cooperation in the DC domain, including common standards and a regional approach on providing geographic, historic, cultural, linguistic, touristic, or socio-economic content and delivering services to the market.
- C. Introduce transnational cooperation programmes and provide financial support to projects focusing on DC aggregation at a national and regional level and also exploiting research results, technologies and frameworks developed through EU funded projects in the DC domain.

##### **Actors responsible for driving change:**

**Overall champions:** SEE ministries responsible for research, culture, tourism, economy

- A. **Main actors:** SEE ministries responsible for research and innovation  
**Supporting actors:** Professional associations, NGOs, DC industry
- B. **Main actors:** SEE ministries responsible for culture, education and research  
**Supporting actors:** Universities, professional associations, DC industry
- C. **Main actors:** SEE ministries responsible for research and regional development  
**Supporting actors:** Professional associations, NGOs, DC industry

##### **Timeframe for implementation:**

- A. **Start activity:** 2015. **End activity:** 2016
- B. **Start activity:** 2015. **End activity:** 2017
- C. **Start activity:** 2015. **End activity:** 2020

#### IV.5: DC industry-academia cooperation at national and regional level

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**Issue:** Close collaboration between industry and academia has never been customary in the SEE region. Companies could benefit from innovative ideas, improve understanding of state-of-the-art technologies, valuable knowledge and ground-breaking methods. Academia could enhance curricula and students' expertise by offering opportunities to gain practical experience and improved business understanding through internships and collaborative projects. Researchers would also be given the opportunity to transfer theoretical ideas into practical projects and to utilise them for social innovation and real-life problem solving. Although both sides realise what can be gained from such cooperation in principal, the mentality and framework conditions in SEE do not facilitate building bridges.

**Policy recommendation:** Improve the quality and effectiveness of framework conditions supporting cooperation between the DC industry & academia at national and regional level.

**Proposed Measures:**

- A. Adapt the regulatory framework to stimulate intense cooperation between DC industry & academia, including support for achieving the free mobility of personnel between them (e.g. by allowing teaching staff to take sabbaticals in the industry, not only in academic and research organisations) and harmonisation of national frameworks to facilitate and encourage regional cooperation.
- B. Design national DC-related RDI programmes that require joint participation of academic and industry actors (co-funded by the industry) aimed at improving the exploitation of research results in the market. Cooperate with SEE states to design RDI programmes that require bi- and multilateral cooperation of organisations from different states on DC topics that are mutually interesting.

**Actors responsible for driving change:**

**Overall champions:** SEE ministries responsible for research

- A. **Main actors:** SEE ministries of research and education  
**Supporting actors:** SEE ministries responsible for economy, commerce and competitiveness, IT professional associations, agencies of regional development, DC industry
- B. **Main actors:** SEE ministries of research and education  
**Supporting actors:** SEE ministries responsible for economy, commerce and competitiveness, IT professional associations, agencies of regional development, DC industry

**Timeframe for implementation:**

- A. **Start activity:** 2015. **End activity:** 2016
- B. **Start activity:** 2016. **End activity:** 2020

## **3 Recommendations on embedding a foresight culture in SEE**

### **3.1 Background**

Foresight can be a useful tool for policy formulation for the SEE region, despite the fact that the SEE countries can only exceptionally push the frontiers of S&T progress.

In principle, there are a number of factors that seem to contradict this claim. One key issue concerns whether there is readiness on behalf of the national governments to cooperate and take joint actions for the achievement of a regional goal through foresight. Then, foresight is quite costly both in terms of time and money.

In advanced countries foresight programmes are being conducted regularly, and their outcomes (reports, Delphi-survey results, etc.) are readily available. Still, only a region's – or country's – own programme can position them in the global context and stir up dialogues on how to react to major S&T, business, societal and environmental trends.

Similarly, strengths and weaknesses of a given region (group of countries) would not be discussed by other programmes, let alone broad socio-economic issues. Process benefits cannot be achieved without conducting an actual foresight exercise either. Without these, a region would not be able to enhance the international competitiveness of the countries therein.

The need for strategic thinking in the SEE region is even stronger than in the advanced countries, given its particular challenges; more specifically, considering the deep socio-economic restructuring and major changes in the external environment. Yet, long-term thinking is discredited across the region. Policy-makers do not rely on modern decision-preparatory tools to a sufficient extent, and quite often do not realise the close interconnections between RTDI processes and socio-economic development. Thus, in many cases, they are only willing to spend on R&D when “we can afford it” – although it should be the other way around: “we spend on promoting RTDI processes, because we want to foster wealth creation”. In several instances science, technology and innovation policies are isolated from each other, and major economic policies are not co-ordinated with STI policies.

Foresight may change these attitudes, especially when it is coupled with strong commitment by major stakeholders to seriously consider and effectively implement policy recommendations, accept/ introduce a new decision-making culture, along with a new way of thinking, placing more emphasis on communication, co-operation, consensus among the major stakeholders, and joint commitments to take action.

### **3.2 Types of activities proposed**

International co-operation can raise awareness among the stakeholders, and also enhance the chances of success by sharing lessons and experience, easing the lack of financial and intellectual resources through exploiting synergies and economies of scale. International

organisations can also facilitate foresight programmes in the SEE region. It is crucial, however, to maintain the commitment of local actors, e.g. in terms of time and funds devoted to the programme, willingness to implement the results. In other words, the main forms of foreign assistance should be the provision of knowledge-sharing platforms and other fora to exchange experience, monitoring and evaluating foresight initiatives in the SEE region.

Several distinct activities would be needed to promote regional SEE foresight initiatives:

- [1]. **Raising awareness of foresight as a tool for enhancing competitiveness, and thus contributing to improved quality of life;**
- [2]. **Adopting and adapting foresight in the region, and developing/ testing methods required for regional co-operation;**
- [3]. **Establishing and strengthening capability of using foresight for designing policies and strategies that focus on innovation;**
- [4]. **Initiating regional foresight projects on specific sectors or themes so as to demonstrate its relevance; and**
- [5]. **Providing proposals for solutions to relevant problems in the region that can be addressed by foresight.**

### 3.3 Key methodological considerations

Some general considerations should also be kept in mind when devising regional foresight activities in South East Europe.

First, a **clear separation should be maintained between the role (competence) of decision-makers, on the one hand, and participants of foresight programmes, on the other**. The latter ones provide various types of inputs – e.g. analyses, lists of suggested actions, policy or strategy recommendations – to the decision-making processes. Yet, the ultimate responsibility to make decisions rests with the former ones, as it is clearly indicated by their name.

Second, **foresight should not be conducted for its own sake** – just because it is becoming “fashionable” throughout the world. **It is crucial to prove the relevance of foresight for decision-making**: its timing and relevance to major issues faced by societies, as well as the quality of its ‘output products’ – reports and policy recommendations – are critical. Only substantive, yet carefully formulated proposals can grab the attention of opinion leaders and decision-makers, and then, in turn, the results are likely to be implemented. Otherwise all the time and efforts that participants put into a foresight programme would be wasted, together with the public money spent to cover organisational and publication costs. The so-called process results – e.g. intensified networking, communication and co-operation among the participants – still might be significant even in this sad case, but they are less visible, and much more difficult to measure. Thus, the chances of a repeated programme – when it would be due again given the constantly changing environment – are becoming really thin.

Third, **foresight is only one of the available policy instruments to support future-oriented decisions**. There are a number of other useful ways, techniques, and methods to assist long-term policy processes – and strategic decision-making for businesses – besides foresight. **The selection of methods should be based on the policy or strategy issue**, i.e. none of these methods is superior to any other ones *a priori*. The context (challenges to be tackled, time, resources, expertise and time available, etc.) should drive the decision as to what approaches and method(s) are adequate, and hence to be applied. Hence, it is of crucial importance to maintain a clear distinction among the various approaches, ways, methods and techniques aimed at analysing future developments. In other words, **confusing foresight with other future-oriented analyses is likely to lead to ill-defined programmes, methodological deficiencies, and thus questionable, unreliable analytical results** and recommendations, and, in turn, clients, sponsors, and participants of foresight programmes are likely to become disappointed and disillusioned.

Finally, it is also worth recalling the principle of ‘variable geometry’: the geographic coverage of actual SEE regional foresight projects would depend on the nature of the issue to be tackled, the willingness of SEE countries to participate, their skills, financial and intellectual resources, and most importantly the perceived benefits of the project.

### **3.4 Potential benefits of regional foresight programmes**

The major benefits of being engaged in regional foresight programmes are as follows:

- Tackling issues of regional (trans-border) character jointly, and thus creating shared visions and opportunities for joining forces for strategic actions, including regional RTDI co-operation;
- Compensating for underdeveloped or lacking methodological skills;
- Creating synergies (both in terms of conducting actual foresight projects, and implementation of the policy recommendations);
- Saving costs (by exploiting economies of scale, e.g. background analyses and preparatory activities relevant for a group of countries, regions, as well as common awareness building and training);
- Capacity building (foresight and prospective analyses methods, decision-preparation, policy-making; policy implementation);
- Promoting regional (trans-border) networking;
- Reaching the necessary quality and size of experts when collecting their opinion.

Notwithstanding the advantages of the regional approach, foresight cannot be imposed upon the relevant stakeholders and decision (policy) makers. It can only be applied in a demand-driven manner, when and where its implementation is feasible, and the socio-economic situation among the related countries are relatively comparable.

### **3.5 Youth involvement**

Communicating foresight to youth is essential for embedding the foresight into the culture of business and policy decision-making (in 2025 horizon). Organising youth competitions with an extended horizon of thinking in virtually all spheres is something that can train the students to think ahead. There are various school-based Olympiads (not only tech-oriented) supported by the relevant ministries (i.e. philosophy, civil education, environment, etc.) that could ask for longer-term thinking. Some of these Olympiads have regional and international editions where regional focus could be applied. Subsequent foresight exercises could be linked with visualization competitions for youth that could further promote the foresight results to the general audience.

## Annex I: SEE SMART COALITIONS

By 2025, governments in SEE, following EC guidelines and international trends have prioritised DC openness and have put in place legislation and regulations for IR, copyrights, consumer rights, market competition, privacy and data ownership that effectively realise the potential of DC for the benefit of the society. DC openness has become a key element of a social innovation strategy adopted by most SEE states and content is open and easily accessible for re-use, sharing and re-configuration. Transparency has been prioritised and publicly co-funded data (owned either by the state/public organisations or by the private sector) can be accessed to produce DC products and services that meet customers' needs (demand side). Digital content ranging from real-time transport information and weather data to health statistics, research data and educational & cultural information has been exploited to offer value-added services. DC stakeholders have promoted the use of generative technologies, platforms and infrastructures for DC creation and consumption, putting the user or consumer and the developer in the driver's seat to control the mode and purpose of use. Public policies support the creation of DC offerings that address societal challenges and generate benefits for SEE citizens.

Local companies and niche-oriented SMEs have identified an opportunity in emerging business models in the DC industry and have transferred successful business cases and practices from the international scene to the local/regional one. Creative SMEs have managed to provide innovative DC products and services, exploiting the availability of content and the openness of technologies and platforms, which have reached beyond their national borders, attracting regional SEE customers and sometimes entering other international markets, too. High-speed adoption of technologies in the region is a reality, supporting further growth of the SEE DC industry.

Service-oriented business models have been adopted by several SEE companies in the DC industry and collaborations with global players have been established in the national markets of the region. The SEE industry does not compete with the 'new intermediaries'<sup>11</sup> that are circumventing the traditional industry and have turned into the main access providers in global markets; instead, the SEE DC industry has established new relationships with such global players to exploit local markets and create revenue streams in the national economies.

Innovative SEE firms build on local creative talent and skilled human resources, being groomed through the reformed education system, which has significantly updated programmes and curricula to improve alignment with the DC industry. Following international trends, technology enhanced learning has been integrated in all education programmes, and the development of life-long learning programmes for corporate & educational purposes has received considerable attention. Firms in the region can easily obtain human capital with expertise in fields like software development, content authoring,

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<sup>11</sup> new platform intermediaries delivering content to customers include companies such as Apple, Amazon and Google, replacing traditional intermediaries such as broadcast networks

DC management, IT and systems support, media authoring and design, sales and marketing, quality assurance and testing, to name just a few. Creativity and innovation is also underpinned by increased public investments in RDI, which in turn boost the participation of the private sector in research and innovation activities. DC Openness has stimulated RDI financing from all types of companies. As a result, the local academia and research community is empowered by open knowledge conditions and manages to improve access to European research funding against significant competition. The academia's capacity to make contributions to the international research community and to the SEE DC industry is high. Linkages with the national DC industry have kept talented scientists from fleeing the region into other parts of the world.

Both the public and the private sector have taken interest in regional collaboration for joint DC creation. The SEE governments have envisioned a strong SEE coalition built on collaboration and mutual benefit from the aggregation of content at regional level. The objective of such alliances includes the introduction of common standards and the establishment of an SEE approach for providing/publishing geographic, geopolitical, historic, cultural, linguistic, touristic, or socio-economic data, as well as for creating related services. Most policies for SEE collaboration aim at the creation of value-added services for the civil society at national level, but the attention of customers outside the SEE is also attracted, mainly for cultural and touristic purposes. At the same time, capacities have been developed in the region for the transformation of DC production related to the preservation of cultural heritage into sustainable activities. Public financing has been provided and new business models have been applied mainly by large public cultural organisations that exploit the digital world to create new revenue streams. The SEE states have also financed research related to natural languages processing or machine translation to help overcome language barriers in DC creation and consumption. Consequently, local content is affluent and new demand-driven DC offerings appear constantly.

In this open access environment, the civil society is very active in DC creation and consumption. Civil involvement in producing user-generated content is strong, supported by the embedded DC openness. Patterns of a wider consumption scope are emerging.

## Annex II: Major variables of the envisioned future

No	Variable name	State C	CURRENT STATE <sup>12</sup>
T1	DC openness (degree to which digital content is accessible and open for re-use, sharing, re-configuration)	Mostly open (service driven revenue streams)	Mostly closed (product driven revenue streams)
2	Generativeness of technologies (nature of technologies, platforms and infrastructure for DC production and distribution in terms of openness)	generative (open and in the control of consumer/user/individual for what and how it can be used)	non-generative (closed/proprietary and in the strict control of the producer/provider that restricts what and how technology can be used)
3	Access to publicly funded data (includes publicly and privately owned data that have been publicly co-financed and range from real-time transport information to weather data, health statistics, research data, educational & cultural content, etc.)	Unrestricted access – full transparency is targeted	Restricted access to publicly funded data
4	Legal & regulatory conditions for DC openness (IR & copyright, market competition, DC production & consumption, privacy, security, data protection, etc.)	Legislation & regulations support DC openness, transparency, and fair competition	Legislation & regulations do not support DC openness
5	Market reach of SEE firms (assumes that SEE firms have the innovative capacity to enter markets and investigates what customers they target and which markets they manage to reach)	SEE market reach (SEE firms target mainly SEE customers and achieve SEE market reach)	SEE market reach (SEE firms target mainly SEE customers and achieve SEE market reach)
6	Private sector investments in RDI (assuming the existence of public RDI funding, refers to relative volume of RDI financing invested from private funds)	Relatively higher private investment in RDI provided by all types of innovative companies	Relatively low private investment in RDI (avg. BERD volume in SEE is low against EU avg. - exc. AT)
7	Dominant players in the local DC market (assuming that, in all cases, global market players have significant influence and market share)	Larger number of SEE companies become competitive (mostly SMEs) – more opportunity for smaller market players with highly innovative profiles	Large SEE companies prevail (mainly companies with large customer base like Telcos with multilocal presence) - SMEs find opportunities as local service partners of SEE Telcos or global IT players
8	SEE regional collaboration towards joint DC creation (refers to the aggregation of local/ national digital content, based on geographic, geopolitical, historic, cultural, linguistic, touristic, or socio-economic data)	High interest and intense focus on regional collaborations for DC creation (SEE content aggregation promoted)	Limited interest in regional collaborations for DC aggregation at the SEE level – only by organisations targeting SEE regional markets (multinational presence)

<sup>12</sup> The 'current state' column presents an approximation of present day conditions in the SEE region using the same factors and elements (variables) as for the analysis of the four future states. This column was introduced to facilitate quick reference and easy comparison between existing and envisioned conditions during discussions with experts and regional stakeholders and will be utilised and further developed in the final stage of the FORSEE pilot RFE when proposals for policy recommendations will be articulated..

9	<b>Capacities for sustainable DC production (refers to public interventions or application of new business models that transform endeavours such as the preservation of cultural heritage and historic records into sustainable activities)</b>	Strong capacities are available for achieving and managing sustainable DC production	Weak capacities are available for achieving and managing sustainable DC production
10	<b>SEE education models focus on life-long learning</b>	Highly focused on the provision of both educational & corporate life-long learning	Limited focus in providing opportunities for life-long learning
11	<b>Production of local content</b>	High production on global services platforms	High production on local services platforms (lower than EU avg. on global platforms; higher than EU avg. in online newspapers/local radio stations)
12	<b>Availability of skills needed for the DC industry (SEE human capital in fields like software development, content authoring, DC management, IT and systems support, media authoring and design, sales and marketing, quality assurance and testing, etc.)</b>	Readily available with opportunities for constant skills updating	Generally available but frequently with outdated skills (since skills conversion/ updating courses are unavailable)
13	<b>Civil involvement in DC development (intensity of user generated content)</b>	Strong civil involvement in DC creation	Weak civil involvement in DC creation (similar to EU avg.)
14	<b>RDI focus on natural language processing and machine translation</b>	Strong	Limited (lower than EU avg.; low FP7 participation relative to other DC themes)
15	<b>Local academia's performance in terms of research excellence in DC related fields</b>	Relatively strong	Relatively strong (SEE avg. Per capita participation in FP7 DC themes is higher than EU avg.; success/interest rate in FP7 DC participation is higher than EU avg.)
16	<b>Speed of technology adoption in SEE</b>	High	moderate

## Annex III: Recommendations addressing major variables of the envisioned future

No	Variable name	addressed by Recommendation
1	DC openness (degree to which digital content is accessible and open for re-use, sharing, re-configuration)	I.1, II.1, III.2
2	Generativeness of technologies (nature of technologies, platforms and infrastructure for DC production and distribution in terms of openness)	II.1, II.2, III.2, IV.3
3	Access to publicly funded data (includes publicly and privately owned data that have been publicly co-financed and range from real-time transport information to weather data, health statistics, research data, educational & cultural content, etc.)	I.4, II.1, III.2
4	Legal & regulatory conditions for DC openness (IR & copyright, market competition, DC production & consumption, privacy, security, data protection, etc.)	I.2, I.3, I.4, II.1, III.2
5	Market reach of SEE firms (assumes that SEE firms have the innovative capacity to enter markets and investigates what customers they target and which markets they manage to reach)	II.2, IV.1, IV.5
6	Private sector investments in RDI (assuming the existence of public RDI funding, refers to relative volume of RDI financing invested from private funds)	IV.2
7	Dominant players in the local DC market (assuming that, in all cases, global market players have significant influence and market share)	IV.1, IV.2, IV.4
8	SEE regional collaboration towards joint DC creation (refers to the aggregation of local/ national digital content, based on geographic, geopolitical, historic, cultural, linguistic, touristic, or socio-economic data)	I.3, II.2, III.2, IV.4, IV.5
9	Capacities for sustainable DC production (refers to public interventions or application of new business models that transform endeavours such as the preservation of cultural heritage and historic records into sustainable activities)	I.2, II.1, II.2, IV.4
10	SEE education models focus on life-long learning	III.1
11	Production of local content	II.2, III.2, IV.4
12	Availability of skills needed for the DC industry (SEE human capital in fields like software development, content authoring, DC management, IT and systems support, media authoring and design, sales and marketing, quality assurance and testing, etc.)	III.1
13	Civil involvement in DC development (intensity of user generated content)	I.5, II.1, III.1, III.2
14	RDI focus on natural language processing and machine translation	II.2, IV.3
15	Local academia's performance in terms of research excellence in DC related fields	II.2, III.1, IV.5
16	Speed of technology adoption in SEE	II.1, II.2, III.1