

BEYOND 4.0

Policy paper: digital transformation and regional policy options for inclusive growth

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Author(s): Peter Oeij, Gerben Hulsege, Vassil Kirov, Egoitz Pomares, Steven Dhondt – with Sally-Anne Barnes, Clara Behrend, Ronald Dekker, Adrian Götting, Olli Kangas, Esa Karonen, Erika Kispeter, Michael Kohlgrüber, Bagryan Malamin, Alfonso Unceta, Sally Wright

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Document description

This deliverable presents the final policy recommendations from the **BEYOND4.0** consortium on how regions or entrepreneurial ecosystems can be supported to deal with digital transformation and deliver inclusive growth. The recommendations have been formulated in discussion with stakeholders from twelve different ecosystems in six countries participating in our project. The policy recommendations are developed in several steps, based on three rounds of workshops. The recommendations were deducted from comparing the measures used in the different entrepreneurial ecosystems. The first round of workshops (2020-2021) compared recommendations at the level of each of the separate ecosystems. The second round of workshops (spring 2022) delivered a future perspective on entrepreneurial ecosystem development. Participants were asked for suggestions on how to steer future ecosystem policies to deal with the changing contexts using the two future ecosystem scenarios. The objective for the participants was to secure more desirable inclusive-growth futures. A particular aspect of this second round was that participants from the six ecosystems were paired to discuss the needed policy recommendations. The third round consisted of one workshop held at the EU level during the European Week of Regions & Cities (October 2022).

The policy paper Update version 1 reported on rounds one and two (August 2022). This *policy paper Update version 2* is a consolidated report with the reporting on rounds one, two and three as an Annexe.

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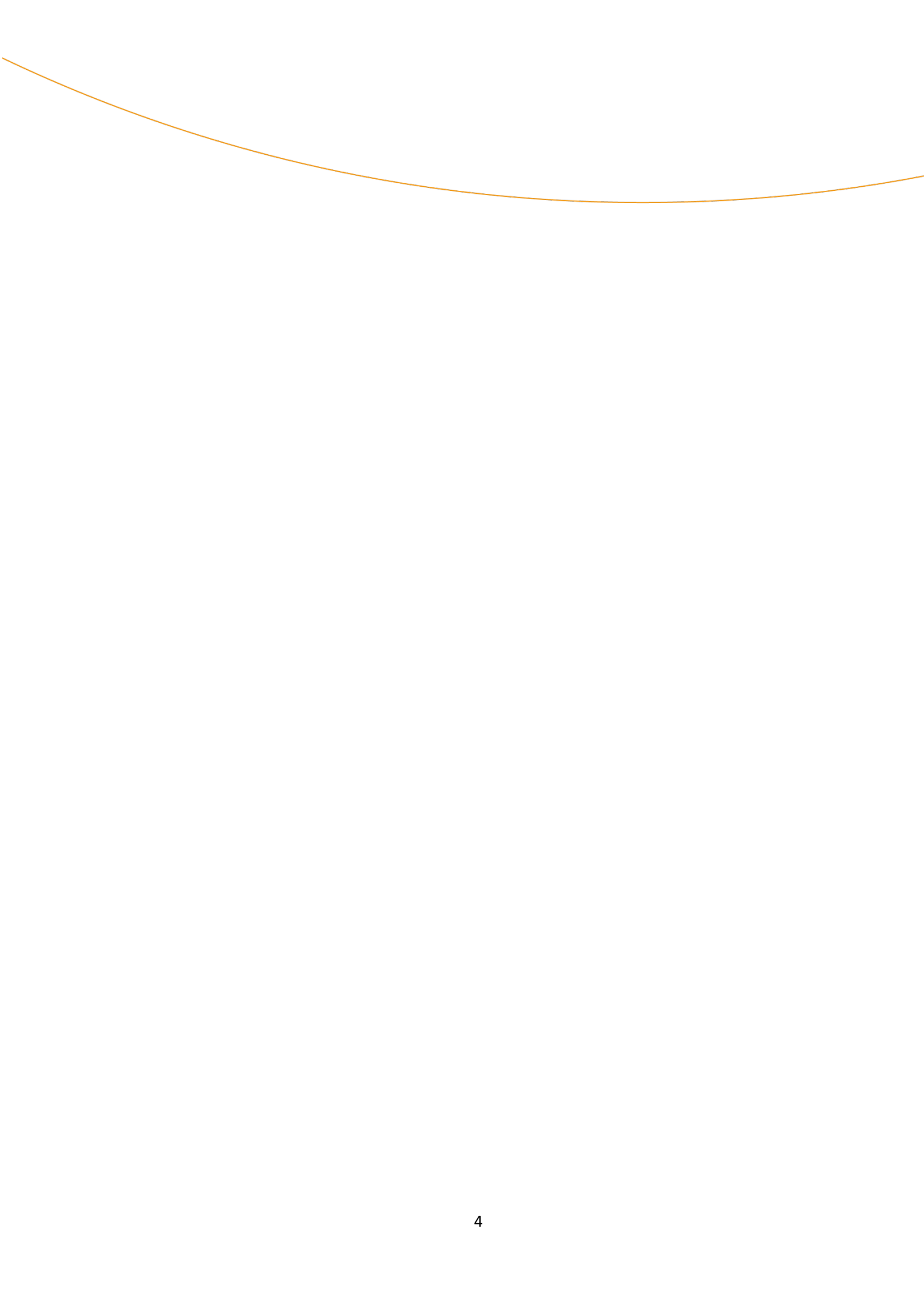
Department of Social Research, University Of Turku, Finland*; Institute for Employment Research, University of Warwick, UK*; Institute of Philosophy and Sociology - Bulgarian Academy of Sciences*; Le CNAM-CEET, France; Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek TNO, Netherlands*; Technische Universität Dortmund, Sozialforschungsstelle Dortmund (sfs) (TUDO), Germany*; UCL Institute for Innovation and Public Purpose (IIPP), London, UK; University of Helsinki, Finland; University of the Basque Country - Sinnergiak Social Innovation, Basque Country – Spain*;

*participating in this Deliverable

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Abbreviations

EE = entrepreneurial ecosystem

IEE = incumbent entrepreneurial ecosystem

IEEs = incumbent entrepreneurial ecosystems

EEE = emerging entrepreneurial ecosystem

EEEs = emerging entrepreneurial ecosystems

SME = small and medium-sized enterprise

JRC = Joint Research Centre of the European Commission

Executive summary

In this report, European regions are seen as composed by one or several entrepreneurial ecosystems. These entrepreneurial ecosystems are considered important for delivering inclusive economic growth. Creative destruction allows regions to deal with the challenges they are confronted with. The **BEYOND4.0** project looks specifically at the challenges of digital transformation for six European regions. For this purpose, a stakeholder approach was developed to learn from regions and formulate recommendations to support these regions in dealing with digital transformation and other challenges.

Entrepreneurial ecosystems show very different levels of performance. It is important to understand what drives such differences so that policies can be developed to align profit and growth motives with other factors that help foster productive entrepreneurship and inclusive outcomes. However, as it currently stands, the entrepreneurial ecosystem level is missing in the European policy repertoire. European policy makers look at industrial ecosystems and other support measures at the regional level (chapter 2). While there is some degree of overlap between regions and entrepreneurial ecosystems, focusing on policy at the industrial level alone is problematic because industrial ecosystems often extend beyond the borders of nations. This results in a blind spot at the entrepreneurial ecosystem level in European policies whereby certain EU-policy instruments do not reach the societal level where they could be most effective.

The **BEYOND4.0** project investigated six European regions with a broad set of above-average performing entrepreneurial ecosystems to identify opportunities for improving inclusive growth. The entrepreneurial ecosystem model (the “Stam-model”; Stam, 2015) was used to map the conditions in each of these ecosystems, such as talent, finance, knowledge and networks, and then this information was used to identify how such conditions might be improved. This effort analysed the impact of digital transformation on these conditions. Is the collaboration and effort in these entrepreneurial ecosystems sufficiently future-proof to deal with digital transformation? If not, how might such future-proofing be achieved?

The analysis with the Stam-model was, in the first instance, refined by distinguishing incumbent and emerging entrepreneurial ecosystems, and, in the second instance, the analysis was enriched by incorporating an actor perspective. The actor perspective was used to understand the degree to which the core companies in the incumbent ecosystems were investing in further developing the ecosystem they operate within (chapter 3). The actor perspective allows us to assess which behavioural evidence in the core companies might strengthen, or conversely weaken, the conditions needed to develop a greater entrepreneurial activity. These behaviours vary from symbiotic to parasitic. Symbiotic behaviours by core companies support entrepreneurial development in an ecosystem. Parasitic behaviours can be detrimental to the development of new businesses. Digital transformation may impact these behaviours. From the analysis, core companies have been shown to exhibit symbiotic and parasitic behaviours simultaneously. This shows that

these companies are opportunistic when acting on entrepreneurial activity in their respective regions. The discussion with stakeholders in the different regions in Europe was conducted with these results in mind in various workshops.

Not only is digital transformation raising the bar for the entrepreneurial ecosystems, but the nature of change that companies face is also shifting dramatically. Until about 15 years ago, the focus was primarily on investing in tangible technology. Currently, companies have prioritised investing more in intangibles. This is a third change with respect to the Stam-model. Consequently, technology and local development must be thought about differently at the entrepreneurial ecosystem level.

To bring the options for policymaking at the entrepreneurial ecosystem level into focus, **BEYOND4.0** held a managed discussion with stakeholders in six countries (with representatives of twelve ecosystems) to identify what a future-proof action repertoire might look like to bring about more entrepreneurial action. Stakeholders formulated different priorities at the incumbent and emerging ecosystem levels via several steps. Relative to existing operation of supporting ecosystems and regions, stakeholders aim:

1. Talent: more cooperation is needed in the ecosystems to deal with a shortage of skills among ~~To improve incumbent entrepreneurial ecosystems:~~

2. Formal institutions need collaboration to align policies and programmes and improve social cohesion.
3. Finance: funds should be used more effectively to invest in digitalisation in a more streamlined manner.
4. Networks: inter-firm collaboration is needed to make better use of digitalisation and deal with ongoing change and restructuring.

The European Commission (DG GROW, DG REGIO) has policies on actions 1, 3 and 4. These policies need to be better aligned with the entrepreneurial ecosystem level. Over the past several years, European Digital Innovation Hubs (EDIHs) were established to stimulate digital skills at the regional level. These EDIHs offer an opportunity for ecosystems to manage their demand for more **talent and digital skills**. The EDIHs should be aligned with the interests of these entrepreneurial ecosystems. **Funding instruments** at the EU-level, in turn, are focused on the company level. Partners at the ecosystem level could inform local companies of the possibilities. **Inter-firm collaboration** is a topic in the policies of the European Commission. The ecosystems show that they may be best placed to manage such collaboration. Actions 2 and 4 connect to the separate behaviours of the main leading companies in the ecosystems. There are currently no policies that direct the behaviours of core companies in regions. More thought is needed to help these local authorities to work with these major companies.

***Emergent** entrepreneurial ecosystems offer different opportunities for new growth. To profit from these opportunities, their stakeholders identified the following necessary action plan:*

1. Networks: as emergent systems are less robust; network building is essential.
2. Formal institutions: governmental and regional organisations must guide inexperienced entrepreneurs.
3. Finance: inexperienced entrepreneurs need guidance on how to acquire finance, and the system requires a coherent development strategy.
4. Talent: to attract talent to less-known companies, businesses, educational organisations, and employment offices must team up to support this.

Action 3 signals that the ecosystems are in need of leading (anchor) companies. New entrepreneurial activity cannot thrive without the guidance of leaders from these anchor companies. Policymakers will need to choose if they want to stimulate more growth. The EU can support policymakers in this effort. The other actions follow the same pattern: better networking, support to inexperienced entrepreneurs, a better-aligned funding system and educational efforts.

The actions show that the stakeholders have less focus on the person of the entrepreneur as is the case in the model of Stam (2015), and more on the whole ecosystem. They all insist on strengthening cohesion and cooperation within ecosystems, whatever the economic context. The spillovers at the ecosystem level require this cooperation. Several recommendations point to strengthening institutions, which is relevant in this regard. A future direction is a cooperation between ecosystems, possibly at the European level. The EU has ideas in this domain (see Chapter 2, table 1, cross-border collaboration), but these ideas are not connected at the ecosystem level. This study points to the importance of this policy level. This ecosystem level is also well-placed to help manage the impacts of digital transformation. These impacts can be very different between ecosystems, so generic or 'one-size-fits-all' approaches to policy dealing with digital transformation may not work. Local stakeholders may be more responsive to local needs.

1. Introduction and objectives of the Policy Paper

This Policy Paper (D4.2) provides policy recommendations to European and national governments to achieve more inclusive economic growth through entrepreneurial ecosystems in the context of digital transformation. The need for such policies was stressed in the **BEYOND4.0** guidance paper (Warhurst et al., 2020).

The proposals for these policies result from a managed discussion with stakeholders in six regions of Europe dealing with the development of their regions and their companies. These stakeholders deal with the impacts of digital transformation daily and try to channel its effects.

An example is the region of Oulu (Finland), where some ten years ago, Microsoft/Nokia decided to leave mobile telephony resulting in the layoff of thousands of people. Microsoft/Nokia was unable to compete with Apple and other suppliers. The region of Oulu was left with the task of managing the economic consequences.

The context of the Policy Paper is that Europe prioritises more inclusive economic growth. Economic growth has slowed since the 1970s (Haskel & Westlake, 2018). We notice its effects daily in lower investment, low wages, and growing inequality. Near full employment in several European countries indicates this situation: companies have a readily available supply of getting cheap labour too quickly, so there is no incentive to improve wages or working conditions, keep wages low and have no incentive to invest in technology and/or innovation to support economic growth and productivity (Kleinknecht, 2021).

In that context, a scientific debate is underway about digital transformation's opportunities for economic growth. This Policy Paper focuses on the level of European regions (NUTS2), a level missing from most discussions on the impacts of digital transformation. The technology discussion focuses on what managers and individuals (skills) need to do (Frey & Osborne, 2017). With a discussion at the regional level, we move the debate to a level where companies, stakeholders in the regions and government should think collaboratively about the conditions needed for economic growth. In contrast, over the past 15 years, the scientific debate has focused mainly on the action repertoire of individual entrepreneurs. The stakes were to develop the Industry 4.0 concept, in which, with government support, companies would increase their investments in new connected technologies. Industry 4.0 differs from the approach taken in an industrial policy developed during the last century, although a significant portion of the measures remains focused on stimulating specifically a usually small number of targeted industrial sectors. At the same time, there is the realisation that with Industry 4.0, significant risks loom for employment. Industry 4.0 would be a productivity boost resulting mainly in job substitution (Frey, 2019). Frey and Osborne (2017) predicted that nearly half of occupations would eventually disappear.

In practice, the view of what is happening at the corporate and organisational level obscures the idea of the broader societal level. For decades, there has been an understanding that trends in employment and growth at the level of regions appear to vary widely (Stam, 2015). Stam and Spigel (2017) elaborated on the entrepreneurial ecosystem perspective that would enable a better understanding of the conditions for economic growth. They place ecosystems in a neo-

Schumpeterian perspective of creative destruction. Certain regions can generate growth from creating new companies that will compensate for the decline of others.

The example in our research is the enormous growth of the Dutch company ASML in a region where the conglomerate of Philips is becoming increasingly split up, and its importance has diminished (Waard, 2022).

The question then becomes how these entrepreneurial regions deal with digital transformation. In what way does digital transformation change the creative destruction visible in regions?

The **BEYOND4.0** project joins this discussion. The research aims to reflect with stakeholders in regions on the outcomes of the various in-depth analyses of the functioning of regions. To that end, the project has taken several steps to reach policy conclusions aimed at governments, stakeholders and businesses to stimulate the economic growth engine.

The outcome of the trajectory is that all stakeholders, whatever the economic context, should strive for more synergistic cooperation. Governments should support new initiatives within and between regions. The sceptical reader might, at this point, ask what is so special about this conclusion. It seems obvious. This Policy Paper clarifies why this central conclusion is unique and why the stakeholders' response is a thoughtful choice. To do so, they had to position themselves to particular scenarios in discussion within their regions, between regions and with the project team. The expectation of the research team was, from the outset, a different conclusion than merely more cooperation, namely that given the economic context, different behavioural repertoires would be required of governments and stakeholders.

The response of those involved only becomes apparent when the "peculiar nature" of entrepreneurial ecosystems and digitalisation is more closely examined. That is what we look at in particular in this Policy Paper.

This Policy Paper is structured as follows. It starts with a short overview of EU policy for regions and positions the entrepreneurial ecosystems in these policies. This overview gives a reference point for the discussions **BEYOND4.0** has undertaken with stakeholders from the different European entrepreneurial ecosystems. Next, the concept of entrepreneurial ecosystems is explained. The importance of entrepreneurial ecosystems is illustrated by showing how these ecosystems can channel spillovers from intangible investments. There is a need to understand the underlying mechanisms that support the development of these ecosystems. The next part looks at how digital transformation impacts what is happening in companies in the respective ecosystems. Which new needs can we see arising? The following part brings together the main conclusions drawn from the different discussions that were conducted with the various stakeholder groups. The details of these discussions are included in the annexes. These stakeholders have translated these conclusions into specific recommendations. The last part of this Policy Paper explains and discusses these recommendations.

2. EU Policy on the entrepreneurial ecosystems

Entrepreneurial ecosystems are not a specific policy level or area for EU policy (DG GROW or DG REGIO). As elaborated further, entrepreneurial ecosystems are regional collaborations affecting local or regional entrepreneurship. The Directorate-General for the Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) addresses industrial ecosystems as the main carrier for its Industrial Strategy (European Commission. DG Internal Market, Industry, 2020): “The ecosystems encompass all players operating in a value chain: from the smallest start-ups to the largest companies, from academia to research, service providers to suppliers”. As such, this broad concept has a different intention than only stimulating new ventures. However, reference to entrepreneurial ecosystems has appeared in European policy over time (Arenal et al., 2021). Whereas until the 2010s, European policy was mainly aimed at supporting SMEs and entrepreneurs in general, the focus began to shift from focusing on the number of entrepreneurs to the quality of those enterprises, focusing on financial needs, skills, and digital-based entrepreneurship. The objective is to achieve maximum growth and leadership in various domains, such as digital technologies.

The instruments in this final phase of entrepreneurship policy reflect this new orientation of European policy (Arenal et al., 2021). According to Mason and Brown’s taxonomy (2014), the table below provides an overview of critical instruments for European entrepreneurship policy. The table identifies four policy directions to support more quality in entrepreneurship by supporting individual entrepreneurs, developing resources (for example, funding), changing European entrepreneurial culture, and supporting the connection between stakeholders in the entrepreneurial domain.

Table 1. An overview of policy initiatives in the past ten years according to the taxonomy of approaches to target entrepreneurial ecosystems (Source: Mason and Brown (2014); see also Roman et al. (2020))

Approaches to policy	Aim	Examples
Entrepreneurial actors within ecosystems	Provision of support and advice through mentorship or incubation programmes	<ul style="list-style-type: none"> • COSME programme (promoting entrepreneurship) • The 2013 Entrepreneurship 2020 Action Plan (also inclusiveness) • Erasmus for Young Entrepreneurs • European Institute of Innovation and Technology (Knowledge) • European Innovation Council (EIC) (funding, high-risk innovations)
Entrepreneurial resource providers within Ecosystems	Enhancing access to finance (equity and loans) and relational resources	<ul style="list-style-type: none"> • COSME programme (access to finance and markets) • Start-up and Scale-up Initiative • Digital skills (New Pact for Skills partnership)
Entrepreneurial orientation with ecosystems	Shaping attitudes towards entrepreneurship and fostering entrepreneurship education programmes	<ul style="list-style-type: none"> • EntreComp (critical lifelong learning competence) • European Entrepreneurial Regions initiative: the EER Label is granted to regions with an outstanding and innovative entrepreneurial policy strategy, irrespective of their size, wealth or competences
Entrepreneurial connectors within ecosystems	Facilitating connections among the actors through communities of practice or entrepreneurial	<ul style="list-style-type: none"> • European Enterprise Network (EEN) • Startup Europe Partnership

	networks	<ul style="list-style-type: none"> • Innovative Entrepreneurial Ecosystem in Regions for young entrepreneurs (iEER) (cooperation between actors supporting YE) (2016; 2020) • Cross-border and cross-ecosystem collaboration
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Table 1 shows a broad set of instruments that mainly aim to stimulate the quality of entrepreneurship in Europe and the supply of digital skills. These instruments stand alongside the existing financial tools available to the EU to support new entrepreneurs in the various stages of their growth. The European Investment Fund (EIF), in existence since 1994, was established with the aim of helping small businesses. In 2015, the European Fund for Strategic Investments (EFSI) was launched. Among other things, the EFSI focuses on risk financing for small businesses. The Structural Funds (ESIF) and the Regional Operational Programmes are elaborations of what is in the Investment Plan for Europe launched by the European Commission in 2015 to improve the economic situation in Europe. These financial instruments, and other funds, such as the Just Transition Fund and Cohesion Fund, are applied in the broader strategies deployed by the European Commission to stimulate economic and regional development. The following table identifies several priorities in the strategic plan from DG REGIO (European Commission, 2020).

Table 2. Summary of core actions related to entrepreneurial ecosystems in the strategy of DG REGIO (European Commission, 2020)

- 1.2 Smart specialisation with a focus on value chains
- 2.1 Investments in digital technologies (broadband) through ERDF investments, development of very high connectivity (VHC) networks
- 2.2 Supporting innovative and smart economic transformation across the EU with the promotion of innovation (smart specialisation), a new industrial and an SME strategy (life cycle investment). This action relies on the Digital Services Act and the development of skills.
- 3.5 This action is aimed at effective, sustainable urban and territorial development strategies involving local stakeholders and others.

As indicated, the entrepreneurial ecosystem itself is not a level for which the European Commission has traditionally focused its policies. DG GROW is focused on industrial ecosystems, of which they identify fourteen in Europe. The strategic plans of DG REGIO aim at macro regional strategies, cross-border region action, or rural areas. These financial and non-financial instruments give Europe policy tools to encourage entrepreneurship. The focus is not only on the individual entrepreneur but also on the entrepreneurial ecosystems that support high-growth and innovative businesses (European Commission., 2013). This policy also focuses on social entrepreneurship and digitalisation. Several European projects contribute to strengthening the inclusive nature of EU entrepreneurship policies (see [We R In \(werinproject.eu\)](http://werinproject.eu)).

In recent years, the need has grown to start monitoring the development of these new forms of entrepreneurship. In addition to the Entrepreneurial Ecosystem Index (EEI, see further), the Joint

Research Centre (JRC) of the European Commission focuses on the growth in digital entrepreneurship with the European Index of Digital Entrepreneurship Systems (EIDES)¹.

European policy is thus relying on entrepreneurial ecosystems to stimulate inclusive economic growth. Its context policy has changed mainly with the discussion on digital transformation. In this Policy Paper, we further develop the perspective of stakeholders in different entrepreneurial ecosystems on what is needed for more entrepreneurial action.

¹ https://joint-research-centre.ec.europa.eu/european-index-digital-entrepreneurship-systems-ei_des_en

3. The peculiar context of entrepreneurial ecosystems

Entrepreneurial ecosystems have been defined in different ways. Bendickson et al. (2021) see the “entrepreneurial ecosystem as the social and economic environment affecting local or regional entrepreneurship”. Stam & Spigel (2017) define an **entrepreneurial ecosystem** as a ‘set of interdependent actors and factors that are governed so that they enable productive entrepreneurship within a particular territory. In both definitions, entrepreneurship is seen as a crucial driver of economic change, with main innovation, diffusion, and competition mechanisms.

The entrepreneurial ecosystem differs from other regional concepts, such as Industrial Districts (Belussi & Caldari, 2009). The Industrial Districts relate more to specific tangible advantages of regions in international competition. It may be that energy is cheap or that resources are abundant (for example, wood and coal). Entrepreneurial ecosystems are less connected to physical factors but rather by factors that support the better use of benefits from intangible factors. Knowledge spillovers drive ecosystems. New ideas, innovation and creativity, are more strongly stimulated by these ecosystems. One means is by knowledge transfers at the regional level.

Stam & Spigel (2017) point out that several generic and specific conditions must be met for regions to show higher entrepreneurial growth. Figure 1 provides a graphical representation of the entrepreneurial ecosystem model (EES) in which ten elements (four framework conditions: formal institutions, culture, physical infrastructure & demand and six systemic conditions: networks, leadership, finance, talent, knowledge & support services/intermediaries) play a role in creating value through entrepreneurial activity (Stam, 2015). A central question addressed in the earlier published ‘regional report’ (D4.1) is to understand if these entrepreneurial ecosystems can in some way be stimulated, created and further developed by policymakers (Dhondt et al., 2022; Schrijvers et al., 2022).

During our study, we observed that certain externalities played a significant role which are not fully covered by the entrepreneurial ecosystem model. One of them is the shift in the economy from investments in tangibles to intangibles (Haskel & Westlake, 2018). A consequence is the impact of spillovers, which investing companies may want to avoid, while the ecosystem as a whole may benefit from it. Such situations emphasise the need for policymaking at the ecosystem level. This may resonate in the call for collaboration by the participating stakeholders in the study. We will come back to this issue.

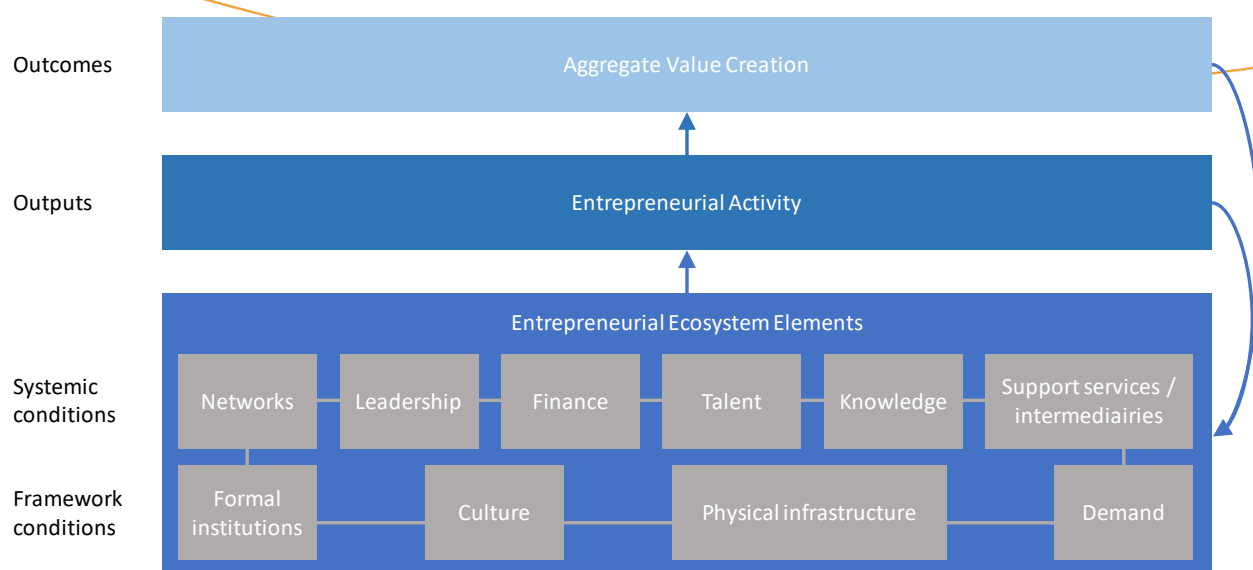


Figure 1. The entrepreneurial ecosystem and its elements, based on Stam (2015)

Leendertse et al. (2021) have translated the thinking of Stam & Sigel into an Entrepreneurial Ecosystem index, allowing them to show large differences in entrepreneurial results between European regions. The Entrepreneurial Ecosystem Index (EEI), for example, measures the degree to which the driving components of the ten elements in an ecosystem are compared to other ecosystems. Leendertse et al. (2021) calculated a quantitative indicator for each component. Table 3 shows how the selected regions in six countries in **BEYOND4.0** compare to the European situation.

Table 3. Eight regions in six countries from BEYOND 4.0 study (Schrijvers et al., 2022)

Region	NUTS2 code	Ranking EEI (1= best performing EE)
Eindhoven (North Brabant) (NL)	NL41	23
West Midlands (UK)	UKG3	36
Salo (FI)	FI1C	68
Oulu (FI)	FI1D	77
Basque Country (ES)	ES21	82
Dusseldorf (GE)	DEA1	84
Dortmund (GE)	DEA2	109
Sofia (BG)	BG41	220

The regions² show a large variety in the quality of their entrepreneurial ecosystem. North Brabant and West Midlands have strong all-around ecosystems. Sofia has only one element in the EEI scoring above the European average.

What distinguishes Stam's model (2015)³ from others is that it sees ten elements as crucial to the working of such entrepreneurial ecosystems. The model distinguishes institutional arrangements

² In two countries, namely Finland and Germany, the selected regions were divided into one where an incumbent ecosystem was studied and another one where an emergent ecosystem was studied.

³ Oeij, P., van der Zee, F. and Kirov, V. (December 2019), *Research Note WP4-WP8. General document*

and resource endowments that could explain productive entrepreneurship. Table 4 describes the ten elements of the Stam model, together with a definition of productive entrepreneurship and inclusive outcomes. The ten elements provide a perspective to understand what accelerates the Schumpeterian concept of 'creative destruction'. Regions scoring better on the EE Index generate more innovative start-ups and scale-ups, allowing them to replace low-productive activity (Schrijvers et al., 2022).

Table 4. Description of the elements of the entrepreneurial ecosystem model for the ecosystem and company (Dhondt et al., 2022)

Elements	Ecosystem	Company
Formal institutions	Rules and regulations; enable voice for entrepreneurs; tax regime. Regional-specific elements	Avoiding / overcoming restrictions; having a voice, knowing how to deal with rules and regulations
Entrepreneurship culture	Entrepreneurial activities, start-ups, accelerators, risk-taking culture	Entre/intrapreneurial behaviour, openness to renewal; technology acceptance and innovation adoption; absorptive capacity
Physical infrastructure	Transport/mobility, digital infrastructure, accessibility, educational institutions	Accessibility. Intra-company investment in equipment/ machinery; digital platform; IoT
Demand	Regional demand and purchasing power	Regional demand and purchasing power
Finance	Investors, banks, venture capital/angel investors, governmental support for innovation	Own capital/private equity, liquidity, financial independence
Talent	Labour market, enough labour supply, (interregional) labour mobility, skill development	Skills, labour supply and demand; attractiveness as an employer
New Knowledge	Innovative sector; investments in R&D and new knowledge	Innovative company; investments in renewal, esp. in intangibles related to (big) data, AI
Intermediaries	Institutions, supporting and business services for the sector	Business service providers
Networks	Partnerships, co-innovation / co-creation / open innovation in the sector	Access to innovation partners, universities and RTOs, knowledge, willingness to cooperate
Leadership	Vision, technological entrepreneurs present, ecosystem strength compared to other competing ecosystems	(Thought) Leadership in terms of digital renewal (use of platforms, AI, big data), i.e. innovation leadership; leadership in growth rates
Productive entrepreneurship (output)	Economic growth generated by the ecosystem; income and wealth, employment and its growth; 'high road strategy'	Profitability, added value, labour income, employment; 'good jobs'; gender, minorities, hiring disabled workers, etc.; the number of spin-offs and spin-outs; 'high road strategy'
Inclusiveness	Social cohesion, support for vulnerable labour market groups, generating jobs; 'high road strategy'	Social employership/entrepreneurship, technology vision of employee augmentation instead of employee replacement; 'high road strategy'

Table 4 has been used in each of the workshops to explain how the entrepreneurial ecosystem functions. The responses of workshop partners are always in reference to this underlying research model.

Stam et al.'s perspective (2017) is at the system level. The actor perspective is missing. Therefore, it does not offer a framework to understand how decisions are taken at the level of the separate organisations within an ecosystem and what the collaboration brings. Why is it that companies need these ecosystems? Ecosystems provide a context that allows managing the spillovers that arise from the changing investment context that companies are confronted with. Haskel and Westlake (2018) have summarised the research into the strategic shift companies have made into intangible investments (see Box 1). Intangible investments are R&D, patents, marketing, and organisational innovation (Corrado et al., 2005). These investments are hard for a company to manage on its own, particularly smaller companies. The tendency is that precisely these intangible investments lead to spillovers to competitors or other stakeholders, which the investing companies would rather not have. Conversely, the not investing companies can benefit from such investments in intangibles by others. The discussion about entrepreneurial ecosystems fits well in this strategic shift within companies since it allows one to understand that at the regional level, companies and other stakeholders are prepared to cooperate to manage these spillovers and the benefits thereof at this local level. It is precisely the cooperation between all kinds of parties that allow us to learn from common challenges (among other things, how to deal with digital transformation) and to act together toward the government. This sort of cooperation is challenging because it lies outside the narrow scope of companies' individual interests.

The example in our cases is how Nokia was willing to share some of its patents with local entrepreneurs so that they could take new steps with technology and prepare with new technologies the situation 'after-Nokia-mobile'.

Stimulating spillovers is not immediately in the interest of individual companies because their competitors may gain advantages from their efforts without having contributed to the sunk costs. Companies rather often prefer not to invest in intangibles and have such spillovers. Such spillovers are, however, in the interest of a region. Underinvestment in these intangibles, and therefore reducing spillovers, reinforces low growth. That is precisely why regions develop strategies and actions to stimulate such spillovers. So, how should regional stakeholders encourage "incumbents" to work together to invest in the common greater good? Over the past decades, companies have been prepared to collaborate and even stimulate this collaboration on such spillovers. The following text box 1 summarises the conclusions from Haskel and Westlake's (2018) book on the changed context for stimulating spillovers.

Box 1. The rising importance of intangibles and the need for entrepreneurial ecosystems (Haskel & Westlake, 2018)

The current investment context is one of growing insecurity. Haskell and Westlake link this uncertainty to the greater weight of intangible investments to compete. Firms must incur more costs in marketing, organisational form, ICT and R&D. These intangible investments are difficult to shield. That is, the benefits of an investment are not exclusive to oneself. Others can benefit from them as well. Therefore, companies face more risks with the increasing importance of intangible investments. An organisational model is an example of such an intangible investment. If the wrong organisational model is chosen, it is difficult and time-consuming to change. Haskel and Westlake find that, while sunk costs of intangible investments can be very high, the benefits of intangibles

can be scaled up more quickly. They can also lead to more synergies with other types of investment. The downside is that any benefits are difficult to calculate, leading to uncertainty.

These intangibles can also lead to conflicts. This is because the benefits of investments extend out wider than the company that invests. Others also benefit, which is precisely the essence of a spillover.

Regions have a policy level that can deal with spillovers. An entrepreneurial ecosystem is an "industrial commons" (Pisano & Shih, 2009, cited in Haskel and Westlake). They allow synergies to emerge between different forms of intangible investment. Regions offer the possibility that knowledge spillovers reinforce each other, and the ecosystem can be called symbiotic. However, this need not always be the case. Ecosystems can also be parasitic where primarily other companies or regions appropriate the spillovers in another region. If, in an ecosystem, the dominant company can skim entire cohorts of students at the expense of the other supplying companies in a region, this behaviour can be called parasitic. The dominant firm appropriates more of the public investment than the other firms. This type of behaviour also explains why "management" of ecosystems and of spillovers is necessary. Spillovers must be managed within a region so that everyone benefits.

The research of **BEYOND4.0** has focused on understanding stakeholders' actions to manage these spillovers.

In the research, some new perspectives were added to the Stam model. First, a distinction was made between emerging and incumbent entrepreneurial ecosystems. Stam et al. (2017) focus on how entrepreneurial ecosystems can achieve the required innovation. In doing so, alongside the dominant incumbent firms, an increasing number of new firms emerge and scale up to the level of leading firms of the ecosystems. Stam et al. operationalise new economic growth as the rise of new unicorns within an ecosystem. However, the Stam model needs to clarify how new firms in new sectors manage to grow beyond existing partnerships. The unicorns are very much linked to the incumbents in the ecosystem. Of interest is also understanding if, next to the incumbent ecosystems, new and "emergent" entrepreneurial ecosystems are able to find their place (Hannigan et al., 2021). As indicated, we make the distinction between incumbent and emerging ecosystems. As Hannigan et al. (2021) indicate, actors in incumbent entrepreneurial ecosystems probably spend a lot of time on organisational maintenance activities rather than on innovation and new knowledge creation. Successful incumbent ecosystems may be losing out on entrepreneurship. That is why it is necessary to also look at emerging ecosystems.

A second addition to the model is the focus on a particular spillover. Within such regional networks, companies are more and more prepared to use the knowledge spillovers generated by universities and research communities. **BEYOND4.0** has investigated more deeply how knowledge spillovers work within entrepreneurial ecosystems. The ecosystem context makes particular sense if companies in regions can find new growth by enjoying knowledge spillovers that arise from companies' investments in local research initiatives.

For example, in the Dortmund region, new logistics companies enjoy the presence of Fraunhofer's knowledge institute, IML. This institute offers surrounding companies' state-of-the-art knowledge about logistics concepts and technologies.

The question is which preconditions best realise such knowledge spillovers. Stam's ten conditions point to how companies benefit from these spillovers. Tangible investments in the local infrastructure (e.g., glass fibre) or educational and training investments allow individual companies to profit from their local embedding.

In the current times, where digital contacts over long distances via the Internet are possible, it still appears important that people and companies are physically close to each other so that they can innovate with each other, launch new products and establish new companies (Haskel & Westlake, 2018). These knowledge spillovers do not easily reach every stakeholder in a region. On the contrary, companies are focused on preventing their knowledge benefits from other competitor companies. Patents, lawsuits and non-compete agreements for employees are examples of measures that are used to limit spillovers. Dominant players in ecosystems have more means to manage and prevent these spillovers.

This last result shows the importance of a third addition to the Stam-model. At the ecosystem level, the dominant players may have specific behaviours that make such spillovers less likely. Ecosystems that score high on the EEI may, in practice, not perform that well, mainly because of the way the dominant player operates. Ecosystems are, therefore, not always "symbiotic" but can be equally parasitic or predatory. Lazonick, Mazzucato and Tulum (2013) point out the risk of parasitic practices. Dominant players in an ecosystem may demand more public investment but privately appropriate these public funds. Mazzucato (2021) gives the example of the American Energy Innovation Council (AEIC), in which the dominant players demanded 16 billion dollars in 2010 as support for clean tech funding but at the same time gave back to their shareholders 237 billion dollars from 2001 to 2010 in the form of share-buybacks. Predatory practices indicate that companies, on the contrary, quickly take over entrepreneurial initiatives and kill several new ventures. An example is how big platforms like Facebook and Google have taken over small players in their market and stopped investing in them (Mazzucato, 2021).

The **BEYOND4.0** research has also paid attention to such practices. An example in Box 2 shows one of the venues **BEYOND4.0** investigated to understand the behaviours of dominant players within ecosystems. Box 2 summarises a separate analysis we have conducted over the past year on knowledge spillovers that can be measured with the SCOPUS-database (see Ryan-Collins et al., 2022).

Box 2. Leveraging knowledge through co-publications

The SCOPUS database collects a significant part of worldwide scientific publications. This database is easily accessible and allows one to get overviews of publications that are connected to a significant number of subjects. The **BEYOND4.0** project was interested in the degree to which the leading companies in the studied ecosystems participate in co-publishing with universities and other research groups.

An important mechanism to take advantage of knowledge spillovers is co-publishing. The major companies in the ecosystems are encouraging their specialists to collaborate more with (local) universities and companies to get a grip on the latest developments in their scientific fields. This database allows making several types of analyses.

The following figure shows a comparison between the development of several partnerships that authors in EU-based companies have established with authors in different regions of the world. Since most of the research of these European companies is nationally or European-funded, the expectation is that co-publications should be primarily local or European. The figure compares the percentage of core companies in the ecosystems with the supplier or non-core companies in these ecosystems. For example, from 2000-2004, 67% of contributors to publications with the core companies were from the EU. That percentage went up to 71% in 2005-2009 before dropping to 60% in 2020 and later years. Compared to the suppliers and non-core companies, 90% and more of publications were with EU authors. The core companies can leverage more international authors, but this also means that locally developed knowledge spills over to other regions more than the suppliers and non-core companies.

(Source: Ryan-Collins et al., 2022)

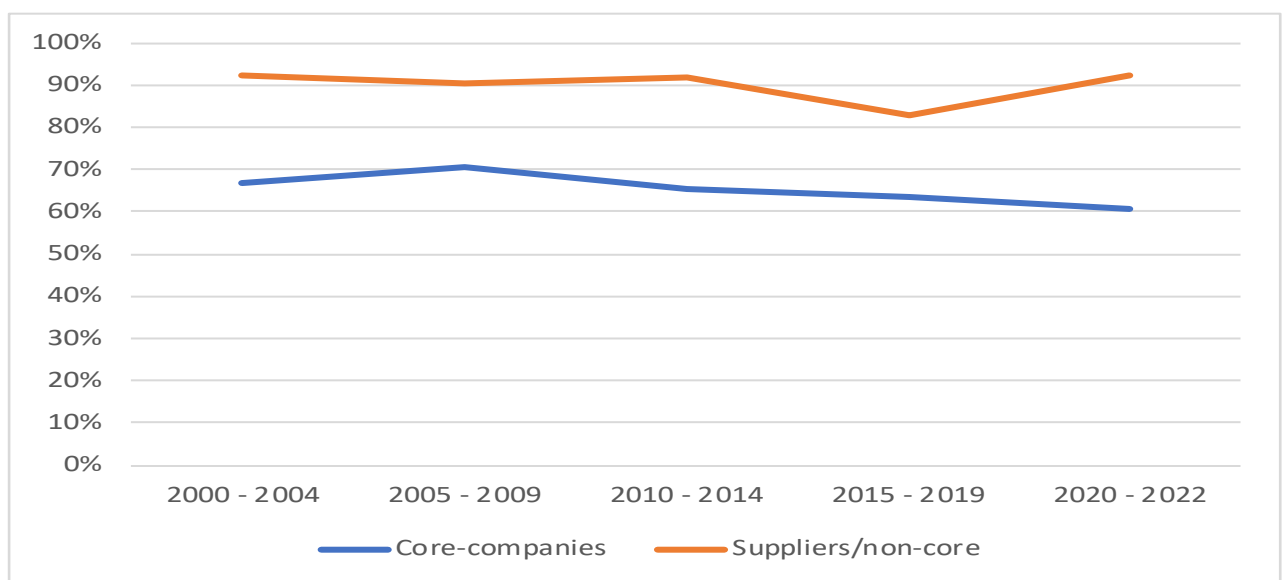


Figure 2. Per cent of co-publications published in the EU relative to publications outside of the EU for the core companies (5) and suppliers/non-core companies (5) in the different ecosystems (2000-2022; SCOPUS)

Box 2 and Figure 2 illustrate that knowledge spillovers generated by co-publications do not necessarily remain local. There are clear differences between companies. The Bulgarian example shows the different practices. BG1 is a local company that develops its knowledge position over time. BG1 leverages mostly local knowledge for its software business. BG2, which is an international software company in Sofia, builds most of its collaborations outside of the EU. Where the behaviour of BG1 can be typified as symbiotic for the ecosystem, the behaviour of BG2 is not.

In the different ecosystems, we have other examples of how the behaviour of major companies can be different.

- An example of symbiotic behaviour was visible in Oulu, where Nokia, aware of the unavoidable collapse of the mobile business, was willing to make several patents available to companies in the region.

- Another symbiotic behaviour is that a major core company promised a non-compete arrangement with its suppliers. It would not recruit new personnel from the suppliers, even if the company needs to continue double-digit growth in personnel in the coming years.
- Several companies have invested in promoting women to management positions. These investments allow more opportunities for women to learn skills that help conduct new business in the future.

The example of BG-2 is illustrative of this more parasitic behaviour. Other examples of parasitic behaviour are:

- An example of parasitic behaviour in ecosystems is visible in Bulgaria. Most international software companies there mainly recruit local talent but do not invest in a relationship with local knowledge institutions.
- Share buybacks in a region where you expect the core company to invest in developing a new production facility.
- Investments in a core company have been made conditional on changing city rules and regulations to the interest of the core company.
- Another example is that another region's core company relies on public funding to develop green technologies. The company itself is stock-listed.

The results show that the same company may be acting symbiotically and parasitically at the same time. The company policies are, therefore, more opportunistic than strategic.

An earlier report (Dhondt et al., 2022) examined the functioning of these incumbent and emerging ecosystems in detail. With the perspective that these ecosystems are more or less responsive to benefit from these different spillovers, it is clear that public authorities may need to streamline corporate behaviour (Mazzucato et al., 2020). In general, with the Stam model, public authorities must also guard against possible institutional voids within ecosystems and gaps in the conditions for thriving entrepreneurial ecosystems (Bendickson et al., 2021).

4. Digital transformation

Stakeholders in all studied ecosystems of the **BEYOND4.0**-project indicate that companies increasingly need more knowledge about digital transformation. These are opinions, not facts. More tangible results can be observed by visualising this increasing need using the SCOPUS data. The knowledge needs of the companies in the surveyed ecosystems have only increased in the last decade. Figure 3 shows an average index (weighted) of the percentage of co-publications by nine core companies in the study.

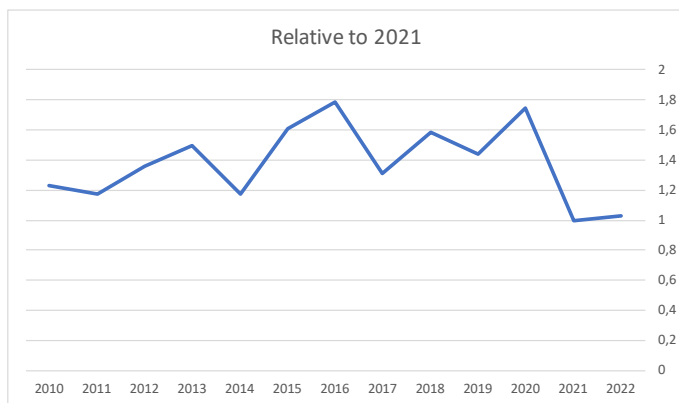


Figure 3. Development of the co-publications of nine significant companies in the period 2010-2022, relative to the number of publications in 2021 (all companies are weighted as equal) (Source: SCOPUS)

Between 2010 and 2020, the number of publications these companies participate in has increased by about six per cent per year. In 2021, the impact of the COVID-19 crisis was visible in the number of co-publications. By 2022, it is visible that the number of publications has picked up again, as in the first six months, there was the same number of publications as in the whole of 2021.

The figure shows that companies see a growing need for external knowledge. In this greater need, digital transformation is changing the game. Figure 4 shows

how publications have seen the concepts of "digital," "machine learning", and "artificial intelligence" grow in importance in co-publications authored by a set of companies in five regions. In the late 1990s, only about ten per cent of co-publications (on average) were dealing with these topics. Today, that percentage has risen to over forty per cent of the publications. Even companies from traditional sectors (German companies, for example) are showing an uptick in the number of publications on digital topics.

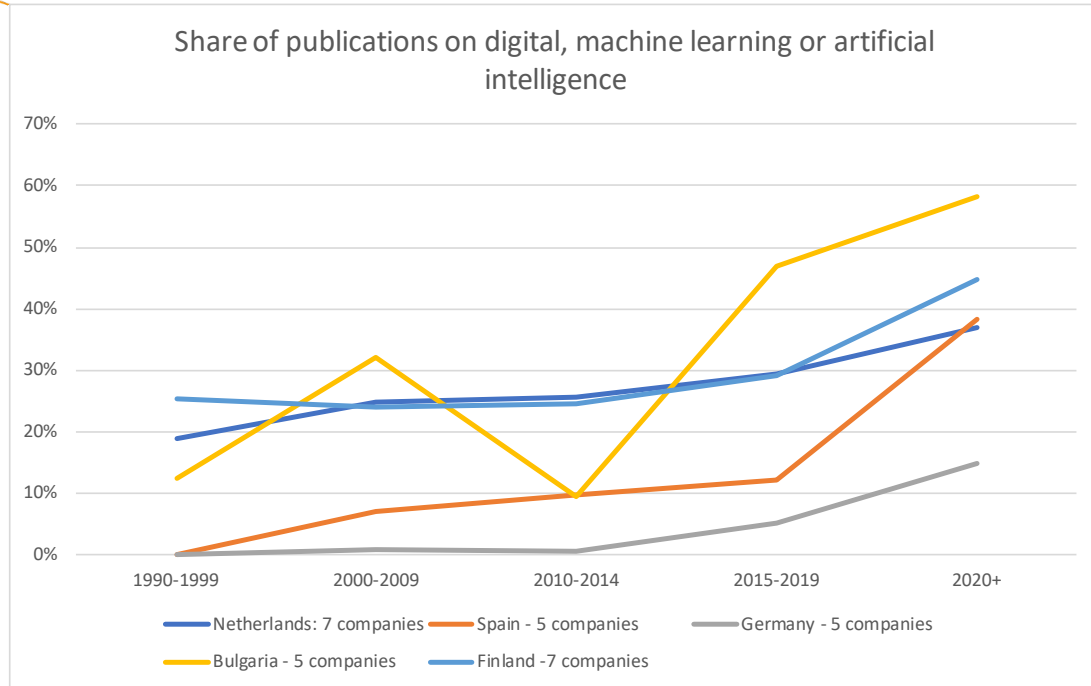


Figure 4. Development of share of publications for major ecosystems on digital, machine learning or artificial intelligence (source: SCOPUS)

The workshop discussions held with ecosystem stakeholders focused on improving digital infrastructure, sharing digital knowledge across as many companies as possible, and ensuring that the region's basic digital skills were widespread. However, regarding the impact of digitalisation, stakeholders had different views and results. This was partly due to differences in experience with that digital transformation.

Figure 5 shows how the regions compare to one another in the development of employment from 2008-2020. The figure also maps the ecosystems on the axis of "dispersed-integrated" efforts to deal with digital technologies. The analyses show how coherent the policy actions from stakeholders and companies were over this period in dealing with the impacts of digital transformation. Suppose the action is mainly a responsibility of an individual company and no alignment of stakeholders is visible; an ecosystem scores on the left in Figure 5. The experiences in dealing with digital transformation and the need to act are quite different. The ICT sector in Bulgaria sees the digital transformation as requiring more employment. A coherent approach is needed to find more employees. The reverse is the case for the German steel sector.

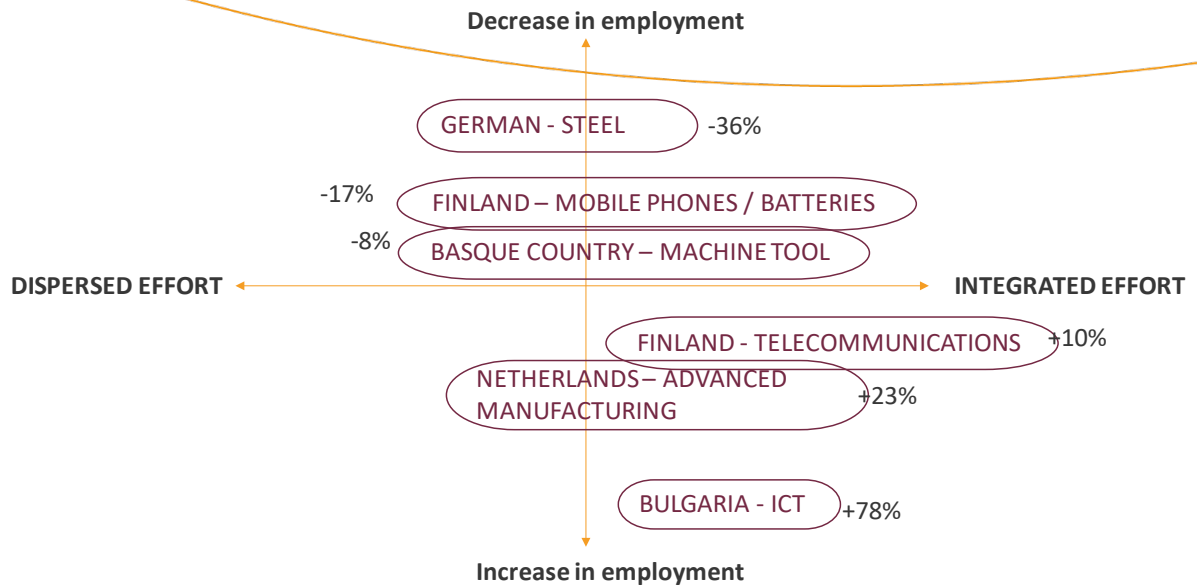


Figure 5. Technology logic and employment levels in incumbent entrepreneurial ecosystems between 2008 and 2020 (regional reports)

The impacts of digitalisation on employment levels are different, but also how companies and stakeholders within the ecosystems deal with these impacts. The leader in the traditional steel industry in the German case (incumbent ecosystem) sees digital technology as leading to further substitution of labour by technology. In Germany, employment in the steel industry is shrinking steadily every year. Digital technology is further helping here in the substitution of labour by technology. The leading company in this region tries to manage its impact itself. In Oulu, employment is currently higher than before Nokia Mobile's demise because of the strong investment in digital technology. There, the local collaboration was strong and integrated to develop new businesses.

There are also differences in employment growth between incumbent and emerging ecosystems. Dhondt et al. (2022) indicate that emerging ecosystems can boast new digital business models where incumbents must reconcile legacy digital technology with the latest technologies. The ecosystems are all interested in better understanding what drives their situation in practice.

5. Discussions on three levels

Three sets of workshops to create convergence

In the workshops, the **BEYOND4.0**-team conducted several discussions at three levels. The starting point for all discussions were the policy recommendations based on interviews with stakeholders and the study of existing documents (for round 1) and later reformulated in the report D4.1 '*Regional report: entrepreneurial ecosystems in six European countries*' (D4.1 Analysis of incumbent and emerging ecosystems in Finland, Bulgaria, Spain, Germany, United Kingdom, and The Netherlands, Dhondt et al., January 2022) (for round 2 and 3). This report provided an analysis of the development and the state of the art of the studied entrepreneurial ecosystems in **BEYOND4.0**. Three rounds of workshops have been conducted to identify the necessary future policy directions.

In 2020-2021, the ***first round of workshops*** was held on the development and the state-of-the-art of the studied entrepreneurial ecosystems in **BEYOND4.0**. Results are limited to the national/regional level. In the first round, in each of the six countries (Bulgaria, Finland, Germany, Netherlands, Spain, United Kingdom), two workshops were held with representatives of an incumbent and emergent entrepreneurial ecosystem. The ecosystems' past and present situations were discussed in connection with possible policy recommendations to deal with local imbalances identified with the entrepreneurial ecosystem model.

The ***second round of workshops***, conducted in 2022, followed the steps of the first round. These workshops combined countries in pairs (Spain - Netherlands, United Kingdom – Bulgaria, Germany – Finland) to stimulate cross-over interaction and discuss the future of the same incumbent and emergent ecosystems. A scenario approach supported the discussion.

These two rounds led to the main recommendations for the ecosystems based on input from the workshop participants of the workshops (Rounds 1 and 2). These recommendations, based on issues and challenges determined in extensive desk research and interviews with various stakeholders, were topics for the future agenda of these ecosystems to achieve inclusive labour outcomes in the context of digital transformation in the ***third-round workshop***: a single workshop targeting the EU level. The main objective of this third workshop was to discuss a reform agenda at the EU level with the participation of policymakers and stakeholders at the national and EU levels (Fall 2022).

The processes followed during the three rounds of workshops focused on improving our understanding of the diversity in positions and working with the stakeholders to identify the core recommendations. The final workshop was needed to clarify what is required at each policy level. Figure 6 summarises this research process.

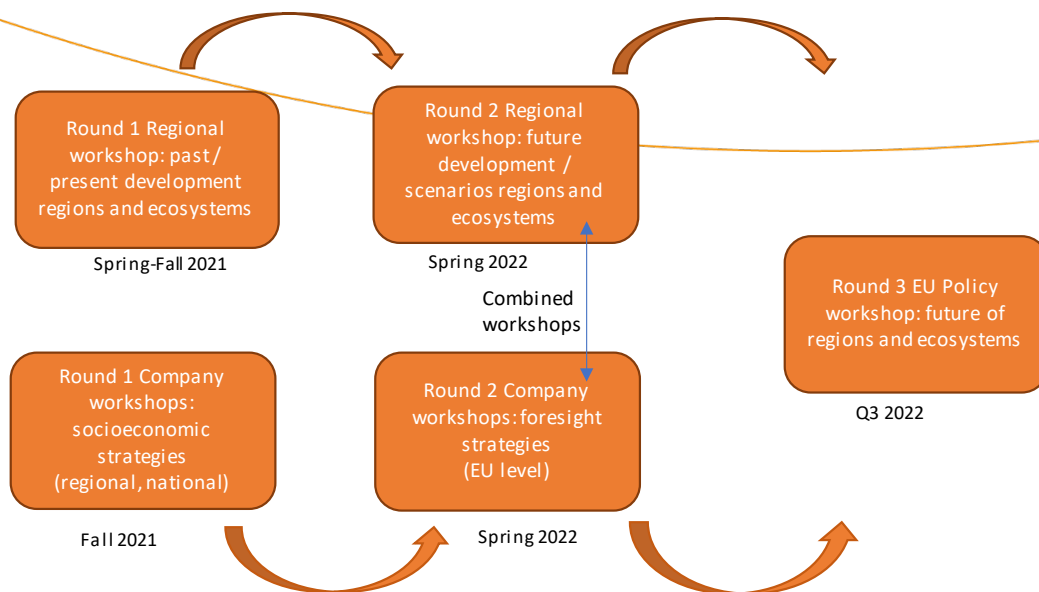


Figure 6. Overview of workshops

These three steps will be clarified in more depth. The following process allowed several checks and feedback loops to improve the quality of the eventual recommendations.

First round of workshops

In the first set of workshops, the main instrument was a direct reflection on the regional reports (see Annexe 1 for an overview of reports). From the first round of workshops, we observed that the elements of talent, finance, knowledge and networks needed the most attention for ecosystems to obtain inclusive growth. According to participants:

- Policymaking is required to tackle talent issues, such as shortage of skilled employees, strong competition for scarce labour supply, and insufficient collaboration among companies, industries and educational institutes. This will be a main problem in the near and far future;
- Funding needs to be improved to stimulate cooperation and development, deal with greening the economy, and boost innovation, with particular attention to start-ups and SMEs;
- Policies are also needed to take new knowledge to a higher level and should be directed at cooperation for innovation, innovative capabilities of personnel, and specific fields (e.g., digital knowledge);
- Networks are recommended to stimulate collaboration, for example, with organisations in the context of skills, co-creation, and especially between firms/companies.

We observed differences in the recommendations for incumbent and emergent ecosystems. Incumbent ecosystems are generally more robust but still sensitive to external events. In particular, the need for skilled talent (from higher education and vocational training) is high to meet the (growing) demand. Emergent ecosystems need new initiatives that can sustain and scale up, for which financial support is essential. For emergent ecosystems - to a larger extent than for

incumbent ecosystems – a collaboration between firms and other stakeholders, as well as a long-term shared vision, should be improved.

Second round of workshops

In the second round of workshops, representatives from the different entrepreneurial ecosystems were engaged to think along the lines of several possible future scenarios in which their ecosystems might find themselves. Box 3 describes these scenarios (see also Annexe 2).

Box 3. Possible future scenarios for the entrepreneurial ecosystems

The scenarios were based on two driving forces: digitalisation and cultural climate.

In the first “Common Ground” scenario, a cultural climate of society is characterised by increased harmony and collaboration between companies and other stakeholders within the ecosystem. At the same time, digitalisation is controllable in the sense that it develops step-by-step, providing organisations with sufficient time to digitalise and change their business models.

In the second “Contested Terrain” scenario, the regional context and society become more individualistic and conflictual, leading to less collaboration with other companies and stakeholders within the ecosystem. At the same time, digitalisation is becoming more and more complex, with too many digitalisation options and demands that have very uncertain outcomes that are hard to manage. Business models need to change fast to deal with digitalisation.

These scenarios were not chosen by chance. They offer strongly contrasting possible futures that push stakeholders to very different action repertoires. The hypothesis was that a harmonious future requires less top-down steering, stakeholders mainly figure it out for themselves more, and a conflictual future requires more cooperation. A harmonious future could limit the role of public policy and of public funding. The reverse is the case for a conflictual future.

Table 5 shows the outcomes of the discussions. For both scenarios, the participants' question was similar: what choices should the policymakers make for the ecosystem to thrive economically and strengthen social cohesion? The outcome in both scenario discussions, in the different regions, is surprisingly similar. In all the workshops, the participants pointed out that cooperation between stakeholders and the need for public support will remain necessary regardless of circumstances. The interpretation given is in line with Box 1: precisely because regions are focused on maximising the benefits of knowledge spillovers for the benefit of a region, it does not matter what the political or economic context is. In all situations, these knowledge spillovers need to be channelled in the interest of the greatest good. It is not envisioned that stakeholders will cooperate less or that government support will be withdrawn. The characteristics of those spillovers (see Haskel and Westlake, 2018) are such that steering is needed at the regional level.

Table 5. the main recommendations and notions from workshops round 2 for the Common Ground and Contested Terrain scenario (only topics that were discussed are shown).

Recommendations and notions		
Elements	Common Ground scenario	Contested Terrain scenario
Formal institutions	Long-term plans for labour markets and other public-private cooperation need to be developed in combination with better alignment between EU and national initiatives.	Leadership within regions should be taken up more by institutions and less by companies. The focus should be on countermeasures for rising unemployment.
Entrepreneurship culture	Entrepreneurship will flourish by developing more initiatives to solidify a cultural environment of collaboration, cooperation, awareness, and anti-discrimination.	--
Finance	Continued public funding is needed but to a smaller extent as in the other scenario. Special attention in emergent ecosystems is needed for scaling-up of companies and start-ups.	More public funding is required to deal with the greater innovation risks of companies. Incremental improvements are the most one can expect in this difficult context.
Talent	Invest more heavily into the educational system, technical and soft skills, and create better (formal and informal) learning conditions for the future	Skilling efforts will be more externalised. The VET system should deliver 'specific skill sets' to deal with the main challenges
New Knowledge	More learning and more upscaling efforts to develop talent	--
Networks	Improving collaboration by eliminating fragmentation and having long-term perspectives. Create opportunities for SMEs. Formulate or increase awareness of EU innovation policies and initiatives	Institutions must play a more central role in coordinating activities. Besides long-term plans, more focus is also needed on short-term plans for collaboration. More international collaboration might also be helpful for the survival of companies. Specific attention is needed for emergent ecosystems that are less robust.
Leadership	Leading companies may play a more guiding role in the ecosystem.	Leadership within regions should be taken up more by institutions, and less by companies (because these are lacking). Companies maintain the core of the ecosystem's action.
Inclusiveness	Improvement and scaling-up of inclusiveness measures are needed to deal with future challenges, such as skills and employee shortages.	Inclusive measures are needed to prevent the risks of failing investments and to keep people employed.

Third round workshop

The third round consisted of one workshop at the EU level, the 'Brussels workshop', targeted at policymakers and was aimed at prioritising policy options and needs in view of digital transformation and inclusive growth. The *Update version 1* of this report (and its executive summary version)

functioned as a discussion paper and as input for round 3. The outcome of workshop round 3, together with the outcomes of rounds 1 and 2, resulted in a synthesis paper (i.e., the main chapters of this document preceding the Annexes) and a high-level policy paper in the form of a (forthcoming) separate policy brief (in conjunction with Work Package 2: ‘Integrated operation, findings, and policy’).

The third workshop was held as an online session, “Digital Transformation: Policy workshop for regional perspectives and prospects”, during the European Week of Regions and Cities 2022 (EU Regions Week) organised by the European Commission and the European Committee of the Regions. The EU Regions Week is the biggest annual Brussels-based event dedicated to cohesion policy. It has become a unique communication and networking platform, bringing together regions and cities from all over Europe, including politicians, administrators, experts and academics in the past 19 years (<https://europa.eu/regions-and-cities/about/nutshell>).

In this session (held on 12 October 2022), 85 participants subscribed in advance, and 46 participated (See Annexe 2). In preparation for the workshop, we informed the **BEYOND4.0**-contacts about the possibility of subscribing to the session. On the EU Regions website, we uploaded links to the reports (D4.1, D4.2, D8.1). The participants of the workshops round 1 and 2 and relevant **BEYOND4.0**-contacts were invited to complete a mini-survey with two questions to rank the policy recommendations from incumbent and emergent ecosystems; via TWITTER, the **BEYOND4.0** community was approached with daily polls about the same questions (see Box 4).

Box 4. Questions used for TWITTER and for SURVALYZER:

An 'entrepreneurial ecosystem' can be seen as a regional collaboration of networks of organisations and actors to generate new knowledge, innovation and actions by policymakers and other actors.

We distinguish incumbent and emerging ecosystems. An incumbent ecosystem is part of a region where a certain industry is dominant, and companies are relatively mature; it is fertile soil for start-ups and scale-ups.

The European Union may develop new policies to support the further development of 'entrepreneurial ecosystems' to stimulate inclusive growth across EU regions. We developed five key policy recommendations for incumbent and emerging ecosystems. Please rate how important it is that the EU supports the following for incumbent ecosystems:

Incumbent entrepreneurial ecosystems

Regions tend to perform differently. We have compared these 'entrepreneurial ecosystems' on ten dimensions. The European Union may develop policy on these dimensions. We provide each of these actions to stimulate such ecosystems. Should the EU support the following (yes/no):

- Ecosystems should be supported in attracting more international talent. (a)
- Collaboration between stakeholders in ecosystems should be stimulated. (b)
- The digital transformation of regions will only succeed if more funds are provided. (c)

- Stimulating inter-firm exchange on digital technology use and development. (d)
- Identifying and supporting the leading company to align regional actions. (e)

Emerging entrepreneurial ecosystems

An emerging entrepreneurial ecosystem is part of a region that represents one or more upcoming industries; start-ups and scale-ups are insecure. Policy priorities might be different for an emerging entrepreneurial ecosystem.

Please rate how important it is that the EU supports the following for emerging entrepreneurial ecosystems:

It is hard to create new sectors or economic activity. We have compared regions on several dimensions to stimulate this new entrepreneurship. The European Union may develop policy on these dimensions. We provide five possible actions for the use. Should the EU support the following (yes/no):

- Stimulating inter-firm exchange on new technologies or products. (a)
- Guide inexperienced entrepreneurs to set up businesses. (b)
- Identify and support leading companies to align regional actions. (c)
- Develop coherent funding possibilities for entrepreneurs (d)
- Support teaming-up of stakeholders in regions to develop more talent (e)

During the session, the **BEYOND4.0** project was explained. Introductory presentations were given to introduce the ecosystem concept, the overall performance of ecosystems across Europe, and the findings in three countries (i.e., three regions from The Netherlands, Bulgaria and Spain).

Based on the answers from TWITTER and SURVALYZER, a ranking of the five recommendations per ecosystem was shared and discussed with participants during the EU Regions Week-session. That ranking did not change during the discussion, except that talent was – also for incumbent ecosystems - seen as an important issue that needs attention from policymakers. The statement in the survey was namely limited to attracting international talent, but other efforts to attract and enhance the skills of employees is still seen as very important in workshop 3, as it also was in workshop 1 and 2.

6. Policy recommendations

The changing context for the entrepreneurial ecosystems

To maintain our level of societal welfare and well-being, Europe needs successful digital transformation with inclusive economic growth. Digitalisation is often associated with the notion of Industry4.0. It seems, however, that companies and businesses that benefit most from digitalisation are the larger companies with limited attention paid to social inclusiveness and good quality jobs. For this reason, the European Commission is proposing a shift to the concept of Industry 5.0, in which digital technologies are supposed to support people, also referred to as a human-centric or socio-centric approach (Breque et al., 2021).

The ecosystems under study in this project are six incumbent and six emergent ecosystems in six different countries across Europe. They differ in how they deal with digital transformation and inclusive growth (Dhondt et al., 2022). Despite the COVID-pandemic in 2020-2022, their economic performance is generally positive, but it must be stated that the selected regions are conducive to a positive bias. They were selected on the expectation that they were performing in ways that others could learn from them. All these ecosystems, given all the common challenges they are confronted with (the after-COVID restart, the Russia-Ukraine war, the rising cost of living prices and energy shortage of energy), need to increase productivity and growth. Apart from the observation that digitalisation may see winners and losers by having disruptive effects on labour market polarisation and the skills of workers, the new economy seems to be shifting as well, namely, from an economy based on tangible investments towards one based on intangible investments (Haskel & Westlake, 2018), which has consequences for how to look at ecosystem development and digitalisation.

European ecosystems must therefore find new ways to foster inclusive economic growth. Yet, the regional perspective, especially the ecosystem level, is missing in the current discussion on digital transformation and inclusive impacts. The **BEYOND4.0** ecosystems research focuses on what the regional stakeholders suggest dealing with digital transformation. Education, regional development corporations, local funders and leading companies have collaborated to formulate recommendations to improve ecosystem-level growth.

At the same time, the ecosystem level is not a perfectly harmonious reality. Some of the core (anchor) enterprises in these ecosystems are so large and internationally oriented that they may have little motivation to be concerned with local issues. Instead, they arrange their affairs themselves, sometimes at the expense of the other entrepreneurs. *The example is in the Dutch case, where the core company can skim off full cohorts of technical students coming out of education at the expense of the inflow at the other companies in the region. At the same time, this company also invests in research with local universities, and local suppliers benefit from the growth of the core company.* Behaviours of such core companies can be classified as parasitic, but at the same time also as symbiotic. The core companies in the different ecosystems show both types of behaviour.

For policymakers, it is essential to implement measures to mitigate the possible negative impacts of opportunistic behaviours.

Current policies in Europe and member countries are not yet geared to the needs of local stakeholders nor to deal with the opportunistic behaviour of companies. In the digital field, Europe is focusing on the European Chips Act (to address semi-conductor shortages), digital skills, and the Digital Services Act (to address online safety and accountability). European research focuses on mapping the digital entrepreneurial systems (EIDES) and the digital economy and society (DESI). All these actions are at a different level than the entrepreneurial ecosystem. Only one policy action seems to support the entrepreneurial ecosystem level. The European Digital Innovation Hubs (EDIHs), an initiative to improve digital skills in the education field, aims to fill a need that has existed for some time. The future will show whether and to what extent, these initiatives will help local ecosystems. The recommendations that the stakeholders have developed in the different workshops aim to redress the policy gap that currently exists.

Specific recommendations

To bring the options for policymaking at the entrepreneurial ecosystem level into focus, **BEYOND4.0** held a managed discussion with stakeholders in six countries (with representatives of twelve ecosystems) to identify what future-proof action repertoire should be used for more entrepreneurial action. Stakeholders formulated different priorities at the incumbent and emerging ecosystem levels in several steps. It is important to stress that the recommendations define the entrepreneurial ecosystem as a policy level that currently does not exist. The importance of having this level was illustrated in the study of Leendertse et al. (2021), which showed how strongly the performances of these ecosystems differ. Relative to existing operation of supporting ecosystems and regions, stakeholders wish:

To improve incumbent entrepreneurial ecosystems

The stakeholders have formulated a long list of actions to improve the current entrepreneurial ecosystems. The different discussions helped narrow this list down to five major recommendations. These are presented and shortly explained.

1. Talent: more cooperation is needed in the ecosystems to deal with a shortage of skills among employees and entrepreneurs.

The outcome of this recommendation is that businesses become more future-proof and include opportunities based on digital skills. In securing more talent, the focus should be on reducing labour market polarisation, stimulating diversity and promoting technical education among girls. Cooperation is needed among educational institutions, public bodies, industry representatives and companies. The EDIHs are the first platform to develop this recommendation.

2. Finance: funds should be used more effectively to invest in digitalisation in a more streamlined manner.

The outcome is that innovation risks are reduced for companies in these ecosystems. In the digital context, companies are confronted with increasing uncertainty about what such technologies can bring to them. Public funding can help this innovation effort. The focus of such investments should be on start-ups and scale-ups.

3. Formal institutions need collaboration to align policies and programmes and improve social cohesion.

Industrial policies, employment policies and innovation programmes require the better collaboration of formal institutions (e.g., regional and national governmental bodies) with companies. This collaboration must stimulate diversity and labour market equality, and EU and nationally-funded programmes demand coordination, cooperation, and alignment with national and EU policies to profit maximally from those programmes.

4. Networks: inter-firm collaboration is needed to use digitalisation better and deal with ongoing change and restructuring.

This recommendation aims at moving the companies and the new initiatives into digital investment areas. Companies, particularly SMEs, need to adopt more digital transformation business models. Only then can European companies compete internationally. The focus should be on stimulating and improving collaboration within but also between ecosystems. The European Commission also targets inter-regional collaboration. The stakeholders in the Beyond4.0 project suggest that this action should facilitate inter-ecosystem collaboration. Intra-ecosystem collaboration should focus on SME-core company collaboration.

The main actors targeted by these recommendations are the European Commission and regional and national authorities. However, national and regional governments need to align their initiatives in these four domains to improve the effectiveness of these measures.

The success of these measures also relies on understanding the behaviours of the leading (anchor) companies in these ecosystems. For stakeholders and policymakers, it is necessary to stimulate symbiotic behaviours and reduce the possibilities for opportunistic behaviour. This requires mapping such behaviours at the ecosystem level and changing the cost-benefit reasoning these core-companies may have.

Emergent entrepreneurial ecosystems

Compared to incumbent ecosystems, emergent entrepreneurial ecosystems are perhaps an even more elusive policy level. They are discussed as a relevant reality, but such ecosystems are not fixed realities. Some of these ecosystems are parts of existing incumbent entrepreneurial ecosystems, trying to replace the dominant players. Some are new business networks in regions with no dominant sector. This means that the emergent entrepreneurial ecosystem is not very recognisable as a policy level compared to incumbent entrepreneurial ecosystems. The recommendations are aimed at working with regional actors to support innovative behaviour of new sectors (for example,

electric mobility [ES]) or at new initiatives (for example, reshaping of the aeronautical industries [NL]):

1. Networks: as emergent systems are less robust; network building is essential.

The networks in the emergent domain are understandably weak and in development. The first focus of policymakers to help such actors, is to focus on the networks and support these networks on up lifting the learning and spillover activities. This can be done through organising new-initiative networks, and specific meetings with regional stakeholders and companies to protect and push new innovations.

2. Formal institutions: governmental and regional organisations must guide inexperienced entrepreneurs.

Stakeholders point out that many upcoming initiatives fail because of the limited experience of the entrepreneurs. Training programmes can help these entrepreneurs, at the start-up and scale-up levels, to remain in business. These programmes should primarily be focused on digitalisation to develop more economic opportunities.

3. Finance: inexperienced entrepreneurs need guidance to acquire finance, and the system requires a coherent development strategy.

Innovative initiatives have a hard time growing into self-supporting businesses. These entrepreneurs are blocked out of access to regular funding. The realignment of funding possibilities should take into account that emerging business is not always covered by what incumbents need.

4. Talent: to attract talent to less-known companies, businesses, educational organisations, and employment offices must team up.

Emerging businesses have an even harder time attracting the necessary talent to grow. The local employment initiatives are insufficiently attentive to the needs of these new initiatives. Their policies, a part of the support, should be redirected to help these companies to attract and educate talent.

Activities of emergent entrepreneurial ecosystems need to be aligned with what key stakeholders want and need. The lack of sufficient leadership from one or two major companies is often an issue that needs to be tackled. Policymakers need help understanding which companies or initiatives they need to support. Their issue is to avoid managing the opportunistic behaviours of core companies but rather to identify them. Supporting possible leaders will be a lot of work. Even so, selecting such leaders may be needed to start the required cooperation on the four identified action points. Such emergent ecosystems lack coherence in the ten conditions that Stam (2015) identified. Stakeholders and policymakers will need to cooperate to 'patch' the institutional voids they see. The list of ten conditions identified by Stam (i.e. the elements of the entrepreneurial ecosystem model) and how they are assessed for each studied ecosystem (Dhondt et al., 2022) is helpful in this regard.

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The scope of the recommendations

The recommendations for both the incumbent and emerging ecosystems show some overlap. In some cases, these ecosystems overlap within regions. This means that if the region is carrying out the recommendations, a shift in attention from the incumbent to the emergent actors, or better coordination and collaboration between them, will be required.

Policymakers need to remain cognisant of the way decision-making is done in this domain. As Haskel and Westlake (2018) point out for intangibles, public investment in what ecosystems do has been quite technocratic over time. This means that the ecosystem level seems a neutral domain of social reality. Choices at the entrepreneurial ecosystem level are not less political than at other policy levels. This means that policymakers need to develop institutions at this level that allow the citizens and businesses in these regions to have influence.

The project has been focusing on six countries and very different entrepreneurial ecosystems. The results of the stakeholder debate are, in the first place of relevance for these regions. As indicated earlier in this report, the performance of the ecosystems is quite heterogeneous. They reflect a broad set of realities in Europe. This report brings some transferable lessons for all entrepreneurial ecosystems.

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Annexe 1 - Outcomes of workshops round 1: comparing entrepreneurial ecosystems

Introduction

Report D4.1 provided a thorough evaluation of the incumbent and emerging entrepreneurial ecosystems across the six countries of the EU. It included an evaluation of success factors, how ecosystems deal with digital transformation, and what digitalisation means for productivity and inclusive growth outcomes. This evaluation delivered the input to the twelve workshops (six incumbent ecosystems and six emerging ecosystems) with regional stakeholders in six EU countries. The workshops provided a list of issues for inclusive growth, which helped formulate policy recommendations to improve or manage the ten elements of each entrepreneurial ecosystem. These evaluations and recommendations are now compared to identify the familiar and different perspectives on the drivers of entrepreneurship and the impacts of the digital transformation. (The separate issues for each of the ecosystems are presented in the annexe Table A1 and A2 of the former version Update 1 of this report). The main recommendations are discussed below. The results are presented following the list of separate ecosystem drivers.

Formal institutions

Table 6 shows the specific recommendations for formal institutions to enhance each country's entrepreneurial ecosystems' economic and inclusive growth. The analysis is done for both incumbent and emerging entrepreneurial ecosystems. Common recommendations for incumbent ecosystems are that **institutions should enhance collaboration across stakeholders and focus more on supporting SMEs and start-ups**. For emerging ecosystems, policy should (financially) support growth.

Table 6. Ecosystems-specific recommendations to stimulate inclusive growth regarding formal institutions

	Incumbent	Emerging
Finland	□ municipality should quicker offer help to (new) enterprises	
Bulgaria	□ corruption of financial resources should be addressed; legislation should be simplified □ institutional support is needed to help the collaboration between companies, technology suppliers, educational institutions etc.	□ create a stable tax and social security policy
Spain	□ policies are needed to support SMEs, and SMEs should be trained by agencies, associations and key players in the sector	
Germany	□ compliance and antitrust regulations should be improved to support the innovation/transformation to green steel; transfer of knowledge about innovations that leads to better productivity and sustainability needs to be supported	

United Kingdom	□ policy support needed for supporting economic growth and social inclusion	□ digital health is identified as part of regional development in the future, but policy support needed to drive growth
Netherlands	□ institutions should have more focus on entrepreneurship	□ clear regulations related to nitrogen are needed to develop the infrastructure

Entrepreneurship culture

For incumbent ecosystems, policies should support the improvement of entrepreneurship culture for start-ups and new Original Equipment Manufacturers (OEMs) (Table 7). Policies directed at the entrepreneurship culture should direct **more attention to emerging** rather than incumbent ecosystems, as entrepreneurship in incumbent ecosystems is often already well established. In emerging ecosystems, entrepreneurship may be less sustained and fragile. Within emerging ecosystems, more attention needs to be directed to innovation, infrastructure, SMEs and pilots.

Table 7. Ecosystems-specific recommendations to stimulate inclusive growth regarding entrepreneurship culture

	Incumbent	Emerging
Finland	□ culture of Salo must be improved for start-ups	□ attract the engineering industry □ decrease the heavy concentration on electronics
Bulgaria	□ branding of Bulgaria as an innovative destination and insufficient incentives to attract investors and start-ups must be improved □ old and new entrepreneurial cultures should be conjoined and be embedded in educational programs	□ entrepreneurship culture should be stimulated
Spain		□ more effort is needed on intra-entrepreneurship and sectoral diversification through public programmes
United Kingdom	□ improve skills and resources of smaller companies to innovate	□ investment in infrastructure needs to support an entrepreneurial culture □ regional pilots supporting entrepreneurial activity and innovation □ continued support for incubators needed
Netherlands	□ region must stimulate new OEMs to rise	□ entrepreneurship culture should be stimulated, especially for SMEs

Infrastructure

For both incumbent and emerging ecosystems, the digital transformation requires policies and support to ensure **high-quality IT infrastructure**. Only then innovation and economic growth can be enhanced (Table 8). For some countries, improvements in regional accessibility are needed.

Table 8. Ecosystems-specific recommendations to stimulate inclusive growth regarding physical and IT infrastructure

	Incumbent	Emerging
Bulgaria		□ improve transportation and parking facilities and Internet (improve more working facilities)

Germany	<ul style="list-style-type: none"> □ IT infrastructure, or more specifically, the quality of internet connections (glass fibre and/or 4G), must be improved to drive forward digitalisation (must go beyond Industry4.0); also for better home office and online teaching 	<ul style="list-style-type: none"> □ increase space for logistics warehouses
United Kingdom	<ul style="list-style-type: none"> □ IT infrastructure improving, particularly in rural areas of the region 	<ul style="list-style-type: none"> □ IT structures in rural areas should be improved
Netherlands	<ul style="list-style-type: none"> □ access and mobility to the region must be improved 	<ul style="list-style-type: none"> □ accessibility of the region should be improved

Demand

The demand of most ecosystems is not focused on the region. Most regions indicated their demand is a global phenomenon. Policies to improve regional demands are mostly not that helpful (Table 9). For ecosystems where local demand is (also) important, policies need a future vision on how to increase it and benefit from digitalisation and innovation.

Table 9. Ecosystems-specific recommendations to stimulate inclusive growth regarding demand

	Incumbent	Emerging
Spain	<ul style="list-style-type: none"> □ servitisation is a new business model that requires more cooperation of companies (agglutination) 	<ul style="list-style-type: none"> □ attract OEMs to the region □ improve collaboration between small regional companies, TIERS and main manufacturers who are often placed far apart □ shared mobility ('car sharing', etc.) should be stimulated to improve the development of innovations and penetration of electric vehicles
Germany	<ul style="list-style-type: none"> □ At the EU level, regulations are needed to enable European steel companies to remain competitive with international steel producers despite dropping steel prices and increased investment needs for the green transformation 	
United Kingdom		<ul style="list-style-type: none"> □ future vision is needed to increase the demand □ demand can be driven by awareness-raising around the benefits of digitalisation and innovation
Netherlands	<ul style="list-style-type: none"> □ region must focus on high mix, low volume, high complexity markets 	

Finance

For both incumbent and emerging ecosystems, **more funding opportunities are needed for SMEs and start-ups to innovate and scale up** (Table 10). Emerging ecosystems may also need policies with improved future vision and support for education and training. In some sectors, policy should improve support to adhere to EU climate and green deal requirements.

Table 10. Ecosystems-specific recommendations to stimulate inclusive growth regarding finance

	Incumbent	Emerging
Finland	<ul style="list-style-type: none"> □ funding needed for scale-up activities; the car industry needs investments 	<ul style="list-style-type: none"> □ need for sufficient investment capital, in particular for SMEs; for scale-up activities
Bulgaria	<ul style="list-style-type: none"> □ funding for investment in start-ups should be stimulated (it is now underused) 	<ul style="list-style-type: none"> □ investment in education and training needed
Spain	<ul style="list-style-type: none"> □ access to finance in the region should be improved to renew the sector 	
Germany	<ul style="list-style-type: none"> □ more public EU funding and support of politics are needed to be able to adhere to EU climate policy requirements □ EU research funding is needed to develop innovation for the green and digital transformation 	<ul style="list-style-type: none"> □ clarify start-up funding; improved opportunities for start-ups
United Kingdom	<ul style="list-style-type: none"> □ funding opportunities for innovation should be increased 	<ul style="list-style-type: none"> □ improve future vision
Netherlands	<ul style="list-style-type: none"> □ ecosystem funding programs needed at the regional governmental level; more coherence on start-ups, innovation and finance 	

Talent

Talent is the element most often mentioned as a policy target. **Policies are highly needed to attract, retain and train talent** (Table 11). This applies to both incumbent and emerging ecosystems and to all countries across the EU. This requires investments in the regions (e.g., housing), branding of the region, and focus on young people, expats, women, and IT/data science graduates and specialists. In addition, educational institutes, companies and other stakeholders should collaborate to invest in new (digital) skills, lifelong learning programs, re-training, and vulnerable groups.

Table 11. Ecosystems-specific recommendations to stimulate inclusive growth regarding talent

	Incumbent	Emerging
Finland	<ul style="list-style-type: none"> □ attract more skilled people, also in (not-so-high skilled) □ increase inclusion of vulnerable people □ increase levels of skills □ increase investments to integrate immigrants (language skills, speed up work permits) 	<ul style="list-style-type: none"> □ make technical education more appealing; □ attract girls to technical education; □ more attention is needed for inclusiveness (integration of immigrants) and recruiting vulnerable groups; □ invest in more life-long learning programs, also for job seekers
Bulgaria	<ul style="list-style-type: none"> □ more digital education is needed; education must catch up with business 	<ul style="list-style-type: none"> □ university courses must be adapted to the needs of the business; more attention must be paid to digital skills; □ attract digitalisation and computerisation specialists; □ provide access to the labour market for foreign (former Soviet states) workers (decrease the number of administrative rules)
Spain	<ul style="list-style-type: none"> □ invest in skills development in programming, simulation, data processing and analysing, and robotics □ attract more young people to the region 	<ul style="list-style-type: none"> □ collaboration with universities and VET schools should be improved to match new demands

Germany	<ul style="list-style-type: none"> □ more incentives for high-skilled people need to be created - an improved image is needed; e.g., through modernised job-profiles and by highlighting the industry's efforts to become greener and more digital □ continuing high importance of in-house training; company investments needed to train their own employees, e.g., with regard to digital and methodological skills; □ upskilling the workforce needed against the backdrop of digitalisation and carbonisation; □ companies should tackle the language barriers to attract foreign talent □ more efforts needed to attract IT specialists/graduates □ more efforts needed to attract women and other target groups 	<ul style="list-style-type: none"> □ more investment in training of companies in digitalisation skills of low-skilled workers □ address the difficulty of motivating low-skilled workers to participate in training by lifelong learning by companies □ improve salaries of employees in transport and logistics (inclusive growth)
United Kingdom	<ul style="list-style-type: none"> □ increase the influence of SMEs on new skills and education □ attract talent, and invest in new knowledge and digital skills (future materials, electrification, big data analytics. Cyber-security, programming and engineering) 	<ul style="list-style-type: none"> □ put more effort into attracting IT data experts and system engineers with health knowledge □ improve in-house talent development □ improve labour market data to better understand the demand and supply of talent and skills
Netherlands	<ul style="list-style-type: none"> □ Invest in housing and culture branding □ combine initiatives in the roadmap, plan ahead □ more attention is needed to diversity and weak labour market groups 	<ul style="list-style-type: none"> □ attract young talents, make work more attractive for them □ improve (branding) of the region for particularly young people □ improve attention to vulnerable groups; □ Invest in broader training of digital skills

New knowledge

More investment in R&D by companies is advised for both incumbent and emerging ecosystems (Table 12). In addition, policies, regional institutions and sector associations should enhance collaboration between companies and technology/educational centres to develop new knowledge for innovation and digitalisation as well as for (digital) skill development of employees.

Table 12. Ecosystems-specific recommendations to stimulate inclusive growth regarding new knowledge

	Incumbent	Emerging
Finland	<ul style="list-style-type: none"> □ more investments in R&D and collaboration with high-tech manufacturing and universities are needed □ invest in digital knowledge 	<ul style="list-style-type: none"> □ invest more in R&D; □ concentrate more on AI (in health care and services); □ stimulate pioneering in large digital applications
Spain	<ul style="list-style-type: none"> □ promote R+D+I policies together with workplace innovation as a quality strategy for employees □ servitisation requires more pooling of complex knowledge and collaboration 	<ul style="list-style-type: none"> □ increase knowledge to support EEs

	□ collaboration with technology centres should be improved	
Germany		□ improve budget for innovation for SMEs □ expand existing logistics structures to other value-added tasks, and new business models, with digitalisation
United Kingdom	□ regional institutions and sector associations should play a bigger role in identifying future skill and knowledge needs □ stimulate collaborations for new knowledge development □ support employers in understanding digital skills, which can be achieved through knowledge development and sharing	□ regional institutions and sector associations should play a bigger role in identifying future skill and knowledge needs
Netherlands	□ put more focus on developing digital software	□ increase and stimulate open innovation

Intermediaries

In the workshop, there were hardly any recommendations for services by intermediaries. Services by intermediaries were mostly satisfactory for the economic and inclusive growth of the ecosystem (Table 13).

Table 13. Ecosystems-specific recommendations to stimulate inclusive growth regarding services by Intermediaries

	Incumbent	Emerging
United Kingdom		□ improve service system support, especially for start-ups
Netherlands		□ improve intermediary support

Social networks

Emergent and incumbent ecosystems are recommended to **stimulate (inter-firm) collaboration** and co-creation with special attention to collaborations between big and small firms and start-ups. Policies that facilitate more collaborations with other stakeholders, such as research and educational institutes and sector institutes, are also needed for economic and inclusive growth.

Table 14. Ecosystems specific recommendations to stimulate inclusive growth regarding social networks

	Incumbent	Emerging
Bulgaria	□ collaboration between ICT companies and educational institutions should be improved	□ improve cooperation and communication between local authorities / formal institutions and business/companies to improve business development □ improve education by better collaboration between business, (local) government and education (also concerning wages and taxes)
Spain	□ more collaboration is needed among (small) companies □ more inter-firm collaboration needed	□ create a collaborative platform to connect small firms and the main manufacturer

		<input type="checkbox"/> improve collaboration is to overcome the fact that many companies are small and lack resources
Germany	<input type="checkbox"/> cooperation with regard to innovation should be improved, especially for SMEs <input type="checkbox"/> rules and regulations should be adjusted in such a way that it improves cooperation among companies instead of only increasing competition	<input type="checkbox"/> improve cooperation between start-ups and established companies to optimise the future potential
United Kingdom	<input type="checkbox"/> lack of collaboration between higher education institutions, research centres and sectoral institutions and/or HR <input type="checkbox"/> co-creation and collaboration needed to promote digitalisation and inclusiveness in the industry	<input type="checkbox"/> improve collaboration between higher education institutions, research centres and sectoral institutions and/or HR
Netherlands	<input type="checkbox"/> more inter-firm collaboration needed <input type="checkbox"/> seek cooperation with other ecosystems in Europe; broader sales markets are needed	<input type="checkbox"/> seek cooperation with other ecosystems in Europe, using broader sales markets

Leadership

For both emergent and incumbent ecosystems, a more long-term vision of innovation, digitalisation, talent and inclusiveness is required (Table 14). Some OEMs have clear visions and strategies but creating shared inter-firm and regional visions of the future with strong leadership is recommended.

Table 15. Ecosystems specific recommendations to stimulate inclusive growth regarding leadership

	Incumbent	Emerging
Bulgaria	<input type="checkbox"/> need for a national vision of innovation and IT <input type="checkbox"/> more awareness-raising is needed around the benefits of digitalisation and innovation	<input type="checkbox"/> create a clear national vision of innovation and IT
Spain	<input type="checkbox"/> long-term perspective on transformation is needed	<input type="checkbox"/> create a long-term perspective on transformation
United Kingdom	<input type="checkbox"/> lack of leadership skills in organisations to drive digitalisation	<input type="checkbox"/> invest in leadership skills in organisations to drive digitalisation
Netherlands	<input type="checkbox"/> long-term perspective needed on vision and talent	<input type="checkbox"/> create a long-term perspective on vision and talent

Some observations after the first round of workshops

We observe several commonalities and a few differences between recommendations for incumbent and emergent ecosystems:

- Incumbent ecosystems are generally more robust but still sensitive to external events. The need for skilled talent (academically and vocationally) is high to meet the (growing) demand. The incumbent entrepreneurial ecosystems have been selected among strongly growing regions, so this result comes as no surprise.

- Emergent ecosystems need new initiatives that can sustain and scale up, for which financial investments are essential. These emergent ecosystems also need more skilled talent. Therefore, policymakers must strongly emphasise creating a sufficient skilled talent labour supply. For emergent ecosystems - to a larger extent than in incumbent ecosystems - collaboration between firms and other stakeholders, as well as long-term shared vision should also be improved.

We see that a few elements need the most attention in policy: talent, finance, knowledge and networks.

- The reason why **Talent** is a point for discussion, often refers to the shortage of skilled employees. Sometimes, there is strong competition for scarce labour supply. Or, there is insufficient collaboration among companies, industries and educational institutes. In many situations, IT skills are short in supply. This is also the case for engineering skills. Demand is further high for skills in new materials and for skilled workers at lower levels. Policymaking is required to tackle talent issues, which is likely a main problem in the near and far future.
- **Finance-related policies** (funding for partners) need to be improved to stimulate cooperation and development, deal with greening the economy, support start-ups, and boost innovation. Finance is also particularly needed for SMEs (in both ecosystems) and emergent ecosystems to diminish innovation risks.
- Policies are also needed to take **New Knowledge** to a higher level and should be directed at cooperation for innovation, innovative capabilities of personnel, and specific fields (e.g., digital knowledge).
- **Networks** are recommended to stimulate collaboration; for example, with organisations in the context of skills, not enough co-creation, especially between firms/companies. Again, attention to collaboration is often most needed in emergent ecosystems. Policy to improve a shared long-term vision and strong **leadership** is needed in some ecosystems, especially emergent ecosystems.

Annexe 2 - Outcomes of workshops round 2: scenarios for the future

Introduction

The first round of Workshops delivered policy recommendations by first analysing the different ecosystems in-depth and then discussing these results with regional stakeholders. This procedure accentuates the current strengths and weaknesses of entrepreneurial ecosystems. At least five of the incumbent entrepreneurial ecosystems are high performers in the EU, which helps us to identify possible broader common issues with entrepreneurial ecosystems in Europe. The objective is, however, broader than dealing with the current situation. The entrepreneurial ecosystems will change, and policymakers need to understand which policy measures are required, given possible futures. Therefore, we developed future-focused policy recommendations for the second workshop by confronting our stakeholders with possible, plausible future scenarios. Such scenarios gave the workshop participants incentives to think of elements of the entrepreneurial ecosystem model that need adaptation to cope with those future scenarios. These future scenarios were developed from possible developments with digitalisation.

In total, three joint workshops per incumbent and emergent ecosystem (in total, six) were organised. The participants discussed their ecosystem futures and provided additional insight by comparing them with another European ecosystem. These were joint workshops of two regions; each workshop consisted of two separate sessions with representatives of incumbent and emergent ecosystems (so in total, all six regions and twelve ecosystems were covered). This procedure helps us provide more significance and understanding of why a specific policy repertoire is suggested to change their ecosystem or develop certain action plans in a certain ecosystem. Furthermore, the stakeholders of these ecosystems could explain to us (and other ecosystem stakeholders) what is specific in their recommendations.

The analysis is focused on understanding the ecosystems' separate stands and learning from the comparisons between all ecosystem discussions. How do the different stakeholder groups view necessary changes to keep productive entrepreneurship flourishing with the perspective on (more) inclusive outcomes? We first discuss the methodology in more detail and then present the comparison results.

Methodology of the future scenarios

For this second round of workshops, we applied a future scenarios methodology (Nekkers, 2020; Van der Heiden, 2005). We presented to participants of the workshops two plausible future scenarios about digitalisation and discussed what needs to happen to deal with these different scenarios successfully. Scenarios are changing contexts that force one to consider today's choices and collaboration. Therefore, the participants needed to secure positive economic and inclusive outcomes for their ecosystems, given the changing environments.

In the entrepreneurial ecosystem context, we already discussed in workshop 1 what the strengths and weaknesses are of each region. Participants already indicated what the strategy should be for

their region. The question related to the scenarios is: do their choices and recommendations change if the 'future' changes?

To build future scenarios, we need to understand the main driving forces of this future. The main question is: What will affect an ecosystem's economic and inclusive outcomes in the near future? In the research team, we considered multiple factors. Eventually, we agreed that two dominant driving forces define the future of ecosystems and, consequently, the entrepreneurial ecosystem's economic and inclusive growth outcomes:

- **Digitalisation:** companies and organisations like to see that digital change is predictable and controllable. Digitalisation may become very unpredictable, but it could be that technological changes may be more predictable. It is not so much the technology itself that is the issue, but the fact that companies (and other stakeholders) cannot foresee the possible demands these technologies put on companies. Companies that do not know if technologies lead to more productive outcomes may be hesitant to invest, even if their competitors are investing. We present two futures in which digital technologies become very predictable and one in which the uncertainty of benefits becomes large.
- **Cultural climate:** a second dimension relates to the context of collaboration between stakeholders and companies in specific regions. Entrepreneurial ecosystems rely on contexts in which stakeholders can predict how their counterparts will react and behave. Stakeholders like to see a cultural and social climate that supports their purposes: harmonisation and collaboration. However, our European societies are already experiencing polarised cultural environments in which distrust between different social groups may worsen.

Figure 7 shows the two driving forces and how they can be used to identify future states of play ('scenarios'). It allows assessment of to what degree ecosystems will face unpredictable digital transformation and increasing polarisation and what needs to be done to maintain economic and inclusive growth.

Uncontrollable digitalisation

Digitalisation is complex: there are too much digitalisations options, companies don't know in what to invest, software changes are ging fast, and there are many cyber security risks.

Polarisation

Society is individualistic and conflictual.

Scenario B

Harmony

Cultural climate is focused on harmony and collaboration.

Scenario A

Controllable digitalisation

Digitalisation is not complex and security is in order.

Figure 7. Quadrants of future scenarios based on digitalisation and cultural climate.

In total, four possible contexts could be discussed with the ecosystem's stakeholders. Each quadrant of the figure presents different implications for the economic and inclusive growth outcomes. To keep the discussions manageable, we opted to limit the discussion to two extreme scenarios⁴:

- **Scenario A** is what we call the "Common Ground" scenario. In this scenario, a cultural climate of harmonisation exists, and digitalisation is seen as very much controllable.
- **Scenario B** is what call the "Contested Terrain" scenario. In this scenario, the cultural climate is characterised as strongly polarised, and digitalisation is perceived as very uncontrollable.

We explain these scenarios with the narratives in text boxes 4.1 and 4.2

Box 4.1. Narrative of Scenario A: Common Ground

The cultural climate of society is characterised by increased harmony and collaboration. Companies and other stakeholders within the ecosystems perceive the situation to improve collaboration opportunities. Stakeholders expect more support from institutions and policymakers at the region, national and EU levels. The digital transformation seems to develop in a more step-by-step process, providing less uncertainty and the actual capabilities of these technologies and the opportunities these technologies provide. Organisations have more time to digitalise and change their business models. There are no large cyber security risks.

⁴ Based on the scenario technology insights of Nekkers (2020) and Van der Heiden (2005) these two scenario's are developed by intensive discussions among the partners.

Box 4.2. Narrative of Scenario B: Contested Terrain

Under this scenario, the regional context and society become more individualistic and conflictual. People and companies are less prepared to collaborate and advance only their own goals as a priority. Policymakers struggle with each other, which makes it hard for companies to find support. It becomes hard to reach a consensus between ecosystem stakeholders on many issues. At the same time, the digital transformation becomes more and more complex with very uncertain outcomes. It is unclear if digital technologies bring the productive results that are expected. Technology carries many (security) risks that all seem unmanageable. It would seem that the context requires an ecosystem approach to the issues even more important. However, too many digitalisation options (e.g., machine learning, cobots, blockchain, AI) render outcomes increasingly a black box. Companies do not know what to invest in, software changes are going fast, a lot of digital competitiveness, and cyber security risks increase by the day. Business models need to change fast to deal with digitalisation.

The workshop participants were presented with these scenarios before they came into the workshop. They were asked to think about the current recommendations they had formulated to improve their entrepreneurial ecosystem and to see to what degree these recommendations needed to be adapted to deal with the new challenges.

Based on the two scenarios (common ground and contested terrain), the workshop participants discussed the main consequences for their ecosystems. The discussion was conditional: the exercise was to find out how economic growth and inclusiveness could be ensured in either scenario. Given that both scenarios require different sets of recommendations, we challenged the workshop participants to position themselves in each scenario and develop recommendations. Apart from the two scenarios, the workshop participants were asked to focus on points of discussion that were drawn up in workshop round 1 and on the basis of the D4.1 report⁵. To stimulate the discussion, we presented a set of statements that suggested a possible action repertoire to the participants. The following tables summarise the core ideas of these action repertoires:

Table 16. *Opposing action repertoires to achieve inclusive outcomes, given the scenarios*

Common Ground
Companies should focus more strongly on eliminating any discrimination in the labour market.
Regional development funding should be completely private.
The education system should focus on technical skills, not on ICT or soft skills.
Employment services should direct themselves primarily to the long-term unemployed.
Regional support agencies should develop more initiatives for long-term international cooperation.
Contested Terrain
Public national and regional funding should rise to reduce innovation risks for companies.
More regional services are needed to support cooperation and technical support to companies.
Regional support agencies should focus on short-term international cooperation.
Skilling, upskilling, and reskilling are core company training issues. No external support is helpful.
Employment services should have programmes to reduce very short-term unemployment.

⁵ The D4.1 report contains a summary of the ecosystems in each of the six regions which were made available for the workshop participants in advance.

In the common ground scenario, we suggested to the participants that stakeholders and companies need less funding and that actors need to shift their attention to the longer term. In the contested terrain scenario, we suggested to the participants that more public support is needed and that the perspective is short-term. The idea with these statements was that they helped the participants to be more precise in their reactions. We did not want the participants to agree on vague notions. They needed to make their opinions explicit and agree in the discussion on their positions.

In workshop round 2, we paired two countries in each workshop: Bulgaria with the United Kingdom, Spain with The Netherlands, and Finland with Germany. This was to stimulate the cross-fertilisation of ideas between representatives of different regions. In addition, the setting forced the participants to explain why they selected specific policy recommendations to other partners.

Comparing the policy pointers from the workshop participants

Table 17 shows the policy recommendations formulated during workshop round 2 for both incumbent and emergent entrepreneurial ecosystems to ensure future economic and inclusive growth in two different scenarios. We separate the discussions on the two scenarios.


The recommendations related to the '**common ground scenario**' are focused on a set of measures to strengthen roles that these ecosystems are already performing well. For companies, the 'common ground scenario' seems a more 'comfortable' situation at first, but it requires companies to act faster on the opportunities presented. The situation also offers the stakeholders to finally make a full improvement effort for any dimension of the ecosystem. The context allows such an investment. It does require stakeholders to be more decisive on a lot of matters.

*Table 17. Recommendations by participants to ensure future economic and inclusive growth for both incumbent and emergent ecosystems in six countries for the **common ground scenario***

Elements	Recommendations
Formal institutions	<ul style="list-style-type: none"> -Employment services should focus equally on short- and long-term unemployed as a labour source. [+ , ^ ^] [IEE & EEE] -Regional support agencies must develop a long-term vision for new modes of public-private (long-term and international) cooperation. [+ , ^ ^] [IEE] -Ministries and governments at the national and regional level should support collaboration within EU or national funded programmes via pilot initiatives [** , ^] [IEE & EEE] -Regional policy and strategy should be embedded in national and European policy, as a coherent (social innovation) process. [* , ++]. [IEE]
Entrepreneurship culture	<ul style="list-style-type: none"> -Companies should invest in eliminating discrimination in the labour market. [+ , ^ ^] [IEE] -Employers need support in understanding digital skills, which could be achieved through awareness-raising and knowledge sharing. [** , ^] [IEE] -To achieve a high road scenario for economic growth and digitalisation, awareness-raising is needed around the benefits of digitalisation and innovation, especially for SMEs. [** , ^] [EEE]
Physical infrastructure	No recommendations.
Demand	No recommendations.
Finance	<ul style="list-style-type: none"> -Regional development funding must be directed both at private and public initiatives. [+ , ^ ^] [EEE] -Much funding is available in regions and at the EU level, which requires a better alignment of policies at the regional and EU levels via international cooperation. [+ , ^ ^] [IEE & EEE]

	-More research funding should be made available for the development of applied digital solutions and for possible digitalisation scenarios.[*, ++] [IEE & EEE]
Talent	<p>-Educational institutes should focus on both technical skills (job-specific skills) as well as ICT/digital skills, apart from soft skills (social, personal and methodological skills) [+,^^] that are sector agnostic.[**, ^]</p> <p>-Education institutes need to invest more in, for example, their pupils' creativity and critical thinking. Companies bring these competencies one step further and need to focus on organisational measures such as teamwork to support these competencies. However, there also needs to be a focus on technical (job-specific), AI and big data skills [+,^^] [IEE & EEE]</p> <p>-New strategies to attract VET-technical talent and training programs to develop specialised technical (specific technology-related) and digital skills. The VET-system needs to remain strongly connected to the industry.[+,^^] [IEE]</p> <p>-Companies need to invest more in vocational training in IT, AI, and Data Science to deal with digital transformation. [+,^^][IEE & EEE]</p> <p>-For skills development, there is a need to reinforce the links between education and companies.[**, ^] [IEE & EEE]</p> <p>-Training of low-skilled workers demand training at all qualification levels. This is of enormous importance for the digital automation potential.[*, ++]. [IEE]</p> <p>-There is a need for better data at a regional level to better understand emergent skill demands and needs in order to support growth and inclusion.[**, ^] [IEE]</p>
New Knowledge	-Digital pilots and test beds support innovation. However, support is needed to ensure learning can be shared and scaled up. [**, ^] [IEE & EEE]
Intermediaries	No recommendations.
Networks	<p>-More inter-firm collaboration and networking are needed for companies (esp. SMEs). The whole 'chain' must collaborate (e.g. common training investment to make employees advanced digitally 'savvy'). Especially in EEEs there is a risk of fragmentation of activities. To avoid this, regional financial (especially public funding) and support systems must be better aligned to a common goal formulation that is practical and realistic [+,^^] [IEE & EEE]</p> <p>-A culture of co-creation and collaboration between stakeholders within a region must be enforced to promote digitalisation and inclusiveness in industry.[**, ^] [IEE & EEE]</p> <p>-Regions that require (strategic) structural change demand collaboration of business development agencies, research institutions, universities and city administrations as well as social partners (business associations and trade unions).[*, ++]. [IEE & EEE]</p> <p>-Policies and objectives of the EU will work better if collaboration between companies and policy is improved. The policies of the EU are not well understood by companies, and policy is not sufficiently driven by the views of companies.[+,^^] [EEE]</p> <p>- Stakeholder groups and networks need to be developed to share learning and support digitalisation awareness-raising.[**, ^] [EEE]</p> <p>-Regional support agencies should foster long-term international cooperation and learn from each other. The cooperation should help combine knowledge within Europe to come to faster innovation. [+,^^] [EEE]</p>
Leadership	<p>-In transformational areas such as the steel sector, a new image must be created at various levels to create a new narrative and to emphasise the innovative potential and modernity of the steel sector (the digital and green transformation), where steel should be seen as part of the solution.[*, ++].</p> <p>-New leadership is needed, and more collaboration between stakeholders. Bigger companies have to take a bigger role. Companies need to reorient their approach, not just use new tools. [+,^^] [EEE]</p>
Productive entrepreneurship	No recommendations.
Inclusiveness	<p>- Companies should focus on diversity in the labour market by attracting internationals, older workers and women and ensuring they can work with digitalisation. [+,^^] [IEE & EEE]</p> <p>-The labour market has become global and flexible integration is crucial, with regard to the recognition of foreign educational qualifications and better integration for the families moving in, for example, in terms of language skills support, kindergartens, work for spouses, etc.[*, ++] [EEE]</p>

Codes:



*	= Finland
**	= Bulgaria
+	= Spain
++	= Germany
^	= United Kingdom
^^	= The Netherlands
EEE	= Emergent Entrepreneurial ecosystem
IEE	= Incumbent Entrepreneurial ecosystem

For the **common ground scenario**, in the case of both the incumbent and emergent ecosystems, a few results stand out:

- No recommendations are formulated for **physical infrastructure, demand, or intermediaries**. The participating stakeholders saw no need to suggest new recommendations for these ecosystem elements. For the physical infrastructure, this may be strange, given that several of the ecosystems indicated during the first workshops that more should be done. However, we interpret this as the participants not seeing extra activities deployed in these domains. Their initial claims and recommendations remain on the agenda.
- **Formal institutions**: the stakeholders agree that now is the time to develop long-term plans for labour markets and other public-private cooperation. However, they also insist on developing a better alignment between EU and national initiatives.
- **Entrepreneurship culture**: the context of 'common ground' allows for the developing of more initiatives to solidify a cultural environment of collaboration, cooperation, awareness and anti-discrimination. This would create even more cooperative entrepreneurship within regions.
- **Finance**: the question discussed during the sessions was if a more consensual environment would allow partners to rely less on public funding initiatives. The higher predictability would reduce the need for public intervention. However, the stakeholders saw a continued need for such public funding. The 'conflicting statement' that we suggested should be reduced. In one of the workshops, this higher investment should be directed at research funding directed at digital solutions. Even if the digital environment is 'predictable', it is seen as an opportunity to uncover more and faster the possibilities of these digital technologies.
- **Talent**: this was a heavily debated topic. All stakeholders see the 'calm climate' as an excellent opportunity to invest more heavily into the educational system, technical (job-specific) and soft skills (social, personal and methodological). The recommendations are to use the opportunities to create better learning conditions for the future.
- **New knowledge**: the stakeholders aligned this topic with Talent, insisting on more learning and more upscaling efforts.
- **Networks**: this topic was also heavily discussed. Companies need to use the context to improve their collaboration. This is a time to eliminate fragmentation of efforts and to work from more long-term perspectives. It is time to create more opportunities for SMEs. Collaboration should also be directed at formulating an EU perspective since many of the (innovation) policies and initiatives of the EU are not well understood.

- **Leadership:** the scenario offers the opportunity to ensure better-supported efforts for the main industries in the ecosystems. This also requires that leading companies play their guiding role in the ecosystems.

For the outcomes:

- **Inclusive outcomes:** there is an understanding that the benefits of inclusive approaches should be used to deal with future challenges (skills and employee shortages). Stakeholders insist on measures to improve inclusiveness (e.g., more effort for recognition of diplomas).

The general feeling is that the scenario is not a situation for public funding to retreat; rather, it is seen as an opportunity to improve the current working of the ecosystems and prepare for the skills shortages that the ecosystems are already experiencing.

The risk of the '**contested terrain**' is that current collaboration is undermined and that no vision can be developed to deal with the technological 'turbulence'. Therefore, the recommendations are focused on a set of new roles to deal with the adverse environment, which are needed in addition to the recommendations formulated in the 'common ground scenario'.

*Table 18. Recommendations by participants to ensure future economic and inclusive growth for both incumbent and emergent ecosystems in six countries for the **contested terrain scenario***

Elements	Recommendations
Formal institutions	<ul style="list-style-type: none"> -More regional services are needed to support cooperation and technical support to companies. Services should especially support SMEs in these environments. [+ , ^^] [IEE & EEE] -Employment services should have programmes to reduce very short-term unemployment but also focus on long-term unemployment to a smaller extent.[+ , ^^] [IEE & EEE] -Companies cannot carry the leadership of the ecosystem in such conditions because the common interest is unclear. Regional intermediaries are needed to align the needs of companies. [+ , ^^] [EEE] -Regional support agencies need to focus on short-term international initiatives to support companies. Yet, there should also be initiatives for long-term cooperation.[+ , ^^] [EEE]
Entrepreneurship culture	No recommendations.
Physical infrastructure	No recommendations.
Demand	No recommendations.
Finance	<ul style="list-style-type: none"> -Public national and regional funding should rise and be balanced to reduce innovation risks for companies. Within the contested terrain, the balancing of policies is more complicated than in the common ground. Funders and policymakers need to spend more time clarifying supporting policies. [+ , ^^] [+ , ^^] [IEE & EEE] - The long-term vision of the ecosystem should be based on incremental modes of innovation to better deal with the unpredictable character of technology.[+ , ^^] [EEE]
Talent	-Companies require external support for skilling, upskilling, and reskilling, especially for EEEs. This will be especially needed to develop high-tech jobs. Specific industry-skill development should be addressed by the VET system to facilitate technology adoption.[+ , ^^] [IEE & EEE]
New Knowledge	No recommendations.
Intermediaries	No recommendations.
Networks	-Regional support agencies should focus on both short-term and long-term international cooperation. [+ , ^^] [IEE]
Leadership	-Companies do need to step up and play a role in the ecosystem under the leadership of regional intermediaries. The companies remain the core of the ecosystem. [EEE]

Productive entrepreneurship	No recommendations.
Inclusiveness	No recommendations.
*	= Finland
**	= Bulgaria
+	= Spain
++	= Germany
^	= United Kingdom
^^	= The Netherlands
EEE	= Emergent Entrepreneurial ecosystem
IEE	= Incumbent Entrepreneurial ecosystem

For the **contested terrain scenario**, in the case of both the incumbent and emergent ecosystems, a few results stand out:

- **Formal institutions:** stakeholders insist on defensive strategies to deal with the 'barren context'. Companies want to have the leadership elsewhere. The focus should be on countermeasures for rising unemployment.
- **Finance:** where public funding is needed in the common ground scenario to take care of the last 'reparations' to the ecosystem, more public funding is required in the contested terrain scenario to deal with the greater innovation risks of companies. A 'grand plan' is not available for this funding; incremental improvements are the most one can expect in this difficult context.
- **Talent:** stakeholders expect that companies externalise the whole skilling effort. Companies hope that the VET system delivers them 'specific skill sets' to deal with the main challenges.
- **Networks:** stakeholders think that maintain inclusive results, the networks should focus on the short and the long-term. International cooperation should be helpful to the survival of companies.
- **Leadership:** under the heading of 'formal institutions', companies shifted the main responsibilities to other actors than themselves to manage the ecosystem in this scenario. However, companies do find that they should remain the core of the ecosystem's action.
- No recommendations are formulated for six of the ecosystem factors. This is strange since it seems that the context of conflict and technological uncertainty would require more initiatives.

For the emergent ecosystems, a few additional policy recommendations are also of importance:

- Strengthen networking because emergent ecosystems are less robust and initially less connected compared to incumbent ecosystems with historically built-up relations and connections;
- Finance and programmes are crucial for sustainability and scaling up of companies/start-ups and supporting and governmental organisations have a major role here. Emergent ecosystems run risks of unsustainable innovation and enduring investments.

In the case of the contested terrain scenario, the ecosystems need support to keep their position. In this situation, governmental bodies must play a larger role via financial support, developing

programmes and aligning activities to protect companies and reduce innovation risks. Leading companies and leadership in emergent ecosystems may be brittle and require more support than the companies in incumbent ecosystems. The question we have is if the governmental bodies can achieve such results since they are themselves subject to major societal conflicts.

Core observations after the second round of workshops

Regarding both workshops 1 and 2, a few dominant elements need attention by policymakers, namely: talent, finance, and networks. In addition, we observe that the participants see a responsibility for governments, policymakers and institutions to stimulate and support certain actions and policies concerning digitalisation and stimulating inclusive growth.

In the **common ground scenario**, the situation is characterised by harmonisation and predictable development of digitalisation. The expectation was that stakeholders in the ecosystems needed less 'public intervention', and the companies could lead long-term initiatives. The workshop participants insisted on the central role of public partners, mainly to help improve the core elements of the entrepreneurial ecosystems. Public funding and long-term action are still needed for the ecosystem to remain inclusive. The main policy pointers in the common ground scenario are related to:

- **Formal institutions:** employment policy, public-private cooperation, and funding programmes need a more coherent policy based on a shared long-term vision and strategy at various levels.
- **Finance:** more direction and aligning of funding towards innovation and digital knowledge are needed, with particular attention to supporting SMEs and start-ups. Better access to funding is especially important in emergent ecosystems.
- **Talent:** improve cooperation between education, industries and regional supporting bodies for various skills and increase labour supply. This also demands regional branding and improving housing.
- **Networks:** increase collaboration between firms but also with agencies, research institutions, universities and city administrations as well as social partners, with regard to the labour market, innovation, and industrial structural change. The fragility of emergent ecosystems requires extra attention for support, cooperation, and knowledge sharing of all involved actors/agents/institutions regarding innovation, finance/funding, skills and awareness about the opportunities of digitalisation (esp. for SMEs).
- **Leadership:** in emergent ecosystems, direction and development of a long-term shared vision and strategy are needed, and collaboration of stakeholders must enhance.

For the outcomes:

- **Inclusiveness:** stimulate diversity, and integration of immigrants / foreign workers and families.

In the **contested terrain scenario**, the situation is more conflicting with polarisation and fierce competition and the highly unpredictable development of digitalisation. Stakeholders insist on government and institutions' importance in safeguarding businesses and jobs. These actors need to

develop and execute active policies to support society, mainly weaker groups on the labour market, and reduce investment risks for businesses, especially SMEs. There needs to be a central focus on innovation support and skilling the working population. With emergent ecosystems, regional intermediaries should have an even larger role. They should have a leading role because there is a leadership vacuum among companies in emergent ecosystems. However, the participants in the workshops are split since they insist on a stronger role of public partners but insist on companies remaining the core driver of the ecosystems.

The two scenarios show that the stakeholders rely strongly on the role of the entrepreneurial ecosystem (public) institutions. Companies may be the driver of economic performance, but their success still depends greatly on the support and guidance of public funders (RDAs), the educational system, and policymakers. The action repertoire of all stakeholders seems to mainly expand in a context of 'tranquillity' rather than in a context of 'turbulence'. Contrary to our expectations, the ecosystem does not provide a safe haven in this context of turbulence. It seems that thinking about inclusive outcomes in the context of digital transformation is only possible if the stakeholders see technology as manageable and the culture as cooperative. This is a warning sign for the future of the European entrepreneurial ecosystems as political polarisation deepens. Economic growth may be severely hampered if such a context prevails.

Policy recommendations for workshop round 3

The list of recommendations is prioritised based on the workshops and the expert judgements of the researchers. The recommendations for emergent ecosystems largely overlap with those for incumbent ecosystems, but the prioritisation is different. For each recommendation, there is a need to assess the inclusive outcome, the productive entrepreneurship aspect, what should be improved and who is responsible, and if there is an EU dimension. In workshop three, we will present and discuss the following recommendations to secure productive and inclusive outcomes.

Incumbent ecosystems: priorities for inclusive and productive outcomes

1. **Talent:** A broad approach is needed to engage stakeholders (educational organisations, employment organisations, industry representatives, social partners and governmental bodies) in attracting talent and enhancing the skills of employees, students and job seekers (technical skills [job-specific], ICT skills, 'soft' skills [social, personal and methodological]). In itself, this is not a new issue. However, more collaboration and cooperation involving companies (especially SMEs and start-ups) are needed. Educational programmes must be connected to the newest technological developments and innovations to minimise the gap between company practices and the educational curricula, but also have more attention to soft skills (creativity, critical thinking) (methodological skills). The talent base, including different educational levels, is crucial for ecosystems to move forward. There is a shortage of skilled labour (medium and high-level) in almost all studied ecosystems. This issue of talent is not restricted to employees alone. Entrepreneurs must also become more 'digital savvy' to understand the entrepreneurial possibilities and requirements to sustain their businesses, especially SMEs and 'traditional' entrepreneurs.

Inclusive outcome	Prevent/reduce labour market polarisation; stimulate diversity; more girls opting for technological skills
Productive entrepreneurship aspect	Ensure that business models are future-proof and include opportunities based on digitalisation
What must be improved	The collaboration between agents that have a stake in qualified labour supply
Responsible agent(s)	Education, governmental bodies, industry representatives and companies
EU dimension	Retention of competitiveness, resilience, sustainability and social cohesion

2. **Formal institutions:** industrial policies, employment policies and innovation programmes require the collaboration of formal institutions (e.g., regional and national governmental bodies) with companies. On the one hand, this collaboration must stimulate diversity and labour market equality (as a social, inclusive goal). On the other hand, EU and national funded programmes demand coordination, cooperation, and alignment with national and EU policies to profit maximally from those programmes.

Inclusive outcome	Creating opportunities for labour market participation
Productive entrepreneurship aspect	Creating opportunities for start-ups
What must be improved	The use and accessibility of funded programmes by companies
Responsible agent(s)	Governmental bodies and connected stakeholders from industry and knowledge institutions
EU dimension	Optimising the effectiveness of EU programmes that stimulate innovation, economic growth and inclusiveness

3. **Finance:** continuous investment is needed in digitalisation to remain up to date. Again, regional, national and EU policies demand alignment to make programmes effective. Often international cooperation is needed, while at the same time, innovation risks for companies (especially for SMEs and start-ups) should be reduced. Streamlining initiatives and direction of innovation in digitalisation can support the effective use of financial funds. The availability of funding is not the main problem, but to 'channel' it to the appropriate agents in the region.

Inclusive outcome	Stimulate entrepreneurship among (young) starters; including social entrepreneurs
Productive entrepreneurship aspect	Reduction of innovation risks and maximising the use of innovation funding; stimulate start-ups and scale-ups.
What must be improved	The effectiveness of the financial funds for innovation at the regional, national and EU level
Responsible agent(s)	Governmental bodies, industry representatives, universities and research institutes, national/regional investment institutes
EU dimension	Optimising the effectiveness of EU programmes that stimulate innovation, economic growth and inclusiveness

4. **Networks:** regions and ecosystems require broad inter-firm collaboration. For digitalisation to become used optimally by SMEs and 'traditional' entrepreneurs, such collaboration and knowledge sharing are essential. Moreover, industries require continuous restructuring to adapt to new circumstances and remain innovative. Within regions, companies and industry chains can benefit from networks that combine business, knowledge institutes and governmental bodies. This further contributes to the entrepreneurship culture as well.

Inclusive outcome	Higher participation of businesses in digital 'savviness' initiatives
Productive entrepreneurship aspect	More development of business models based on the opportunities of digitalisation
What must be improved	The dissemination of digitalisation business knowledge through inter-firm collaboration, i.e., networks, to stimulate business-making and entrepreneurship
Responsible agent(s)	Governmental bodies, industry representatives, companies, knowledge institutes, regional network organisations
EU dimension	Retention of competitiveness, resilience, sustainability and social cohesion

5. **Leadership:** regions and ecosystems need a 'narrative' that legitimises their existence. Industrial leaders often play this role. However, new leadership is needed to direct regional agents when a region is in transition. In such instances, leadership, networks, finance, and formal institutions become important at the same time to align the actions in a region (an integral view is needed).

Inclusive outcome	Ensure that industries can make the digital transition to ensure competitiveness and employment
Productive entrepreneurship aspect	Ensure that companies renew their business models timely in relation to digitalisation
What must be improved	Regions/ecosystems must develop and align clear economic development plans and align the economic and social actions of agents
Responsible agent(s)	Business leaders, thought leaders, governmental bodies
EU dimension	Connection with innovation priority goals in specific (digital) technologies

Emergent ecosystems: priorities for inclusive and productive outcomes

1. **Networks:** since emergent ecosystems are brittle and not robust, networks play a crucial role in their sustainability. They are conditional on the success of many individual companies. Emergent ecosystems often lack a leading party; sometimes, different industrial activities strive for dominance. Stakeholders of the ecosystem must work on a common goal formulation (despite different interests). These stakeholders must align financial means and regional programs and strengthen the cooperation and collaboration in the ecosystem. They must also mobilise knowledge about digitalisation for entrepreneurs and promote inclusiveness of the regional workforce/labour market.

Inclusive outcome	Ensure that businesses stay in business and retain employment
Productive entrepreneurship aspect	Continuation of businesses and start-ups to stay in business
What must be improved	Networks that facilitate the acquisition of finance and knowledge, and guide businesses to sustain and scale up
Responsible agent(s)	Governmental bodies, industry representatives, development agencies, companies
EU dimension	Retention of competitiveness, resilience, sustainability and social cohesion

2. **Formal institutions, especially governmental and regional support organisations, must align policies and programs for regional development, employment and innovation.** Companies in emergent ecosystems have limited experience and access to how to deal with rules, regulations and funding for innovation and digitalisation (e.g., EU programs).

Inclusive outcome	Ensure that businesses stay in business and retain employment
Productive entrepreneurship aspect	Continuation of businesses and start-ups to stay in business
What must be improved	Support companies in the acquisition of funding for innovation and digitalisation to enlarge economic opportunities and employment
Responsible agent(s)	Governmental bodies and regional support organisations (regional development and investments)
EU dimension	Retention of competitiveness, resilience, sustainability and social cohesion

3. **Leadership:** leadership by industrial leaders is essential, but these may be absent in emergent ecosystems, and thus there is a role to play for stakeholders, notably administrative/governmental bodies. Regional development organisations could play an important role here.

Inclusive outcome	A regional development plan that stimulates employment growth
Productive entrepreneurship aspect	A regional development plan that directs economic structuration
What must be improved	The direction in the future regional development of digital transformation
Responsible agent(s)	Governmental bodies and regional development organisations, in cooperation with companies and industries
EU dimension	Regional development

4. **Finance:** funding is available at the EU level (often also at the national level), but companies need to be supported on how this funding can be acquired. It demands a regional development strategy as well as a link to these innovation programs. Again, formal institutions play a crucial role here.

Inclusive outcome	More jobs
Productive entrepreneurship aspect	More start-ups and scale-ups and business establishments
What must be improved	A regional development plan including industries and (digital) innovation for start-ups
Responsible agent(s)	Governmental bodies and regional development organisations in cooperation with companies and industries
EU dimension	Regional development

5. **Talent:** emergent ecosystems might need more effort to get skilled people than incumbent ecosystems because the companies are less well-known (i.e., fierce competition with others). They also have fewer contacts with educational organisations (for internships etc.). This means emergent ecosystems need clear support and links between businesses and educational organisations. The skills needed range from technical/mechanical engineering to IT & data skills and 'soft' (social, personal, methodological) skills. Education, employment offices and businesses should join hands.

Inclusive outcome	Creation of employment for a broad range of skills
Productive entrepreneurship aspect	The supply of skilled labour enhances opportunities for economic growth
What must be improved	The supply of skilled labour if various disciplines across various levels
Responsible agent(s)	Education, governmental bodies, employment offices, industry representatives
EU dimension	Regional development and social inclusion

Country-specific/ecosystem-specific topics

For some countries, specific recommendations have been formulated.

- **Spain:** the incumbent machine tool ecosystem is highly important and impacted in the region. The international nature and diversification of the customer base is a success factor. In the digitalisation process, the sectoral application of new technologies needs to be improved.

The emerging ecosystem of electric mobility is based on the principles of specialisation, excellence and collaboration. However, the innovative potential of the region's industrial capacities needs to be better channelled. Although the region has several anchor companies, the attraction of new OEMs is essential. The advanced knowledge ecosystem should serve to promote a more inclusive, digitalised and sustainable economy. In addition, it requires the creation of a strong technological infrastructure; boosting entrepreneurship (and intra-entrepreneurship); and generating and managing knowledge, especially from the experimentation with new projects.

- **Germany:** in the incumbent ecosystem steel, the main task is to shape the green transformation of the sector. The shift to hydrogen technology as an energy carrier seems to be of central importance in this context. Investments, technical solutions and the right talent/skills are needed here as well as the construction of according to infrastructure and neighbouring industries (such as hydrogen production and storage). Decarbonisation is of paramount importance for the survival of the European steel sector.

Digitalisation poses a major threat for the emergent logistics ecosystem, especially concerning the numerous low-skilled workers in warehouse logistics. This threat is there if automation potentials are fully implemented in the coming decades. In the ecosystem, low-road strategies prevail in the form of low wages, short-term employment and a low willingness on the part of companies to provide further training. However, these go hand in hand with a great potential for inclusion of disadvantaged labour market groups, as (especially in mail order and warehouse logistics) the requirements for formal entry qualifications are low. The future of low-skilled workers needs to be secured by a concerted action of public authorities, training providers and companies.

- **The Netherlands:** for the emergent ecosystem aerospace, a solution is needed to prevent fragmentation/silos of different industrial sectors, apart from aircraft maintenance, each striving for dominance. Stakeholders must align more clearly in developing programmes and projects for these industrial sectors and ensure the coherence of these initiatives.

An agenda for the EU-level workshop

We highlight the purpose and the desired result of the EU-level workshop, mention the target group of possible participants and provide a programme on headlines. The workshop was held in October 2022 (see Chapter 5).

Purpose

The EU-level workshop aimed at exchanging best practices and mapping policy options because of digital transformation and inclusive growth. This workshop in Brussels (round 3) took place in October 2022. Based on this report D4.2, a brief discussion paper describing policy options and requirements (based on workshop round 1 and 2) was used as input. The results of the round 3 workshop are used to develop this 'Updated version 2' of the D4.2 report (M44). This report intends to indicate required policy steps at the EU level to accommodate the regions and enable regional development based on inclusive growth and highlights various regional and EU policy options to create resilient regional economies and societies and accommodate desirable inclusive-growth futures.

Possible participants

We wanted to engage policymakers and comparable stakeholders from the six regions (persons with a regional administrative role). The policymakers could be servants at the EU, national and regional levels.

Programme on headlines

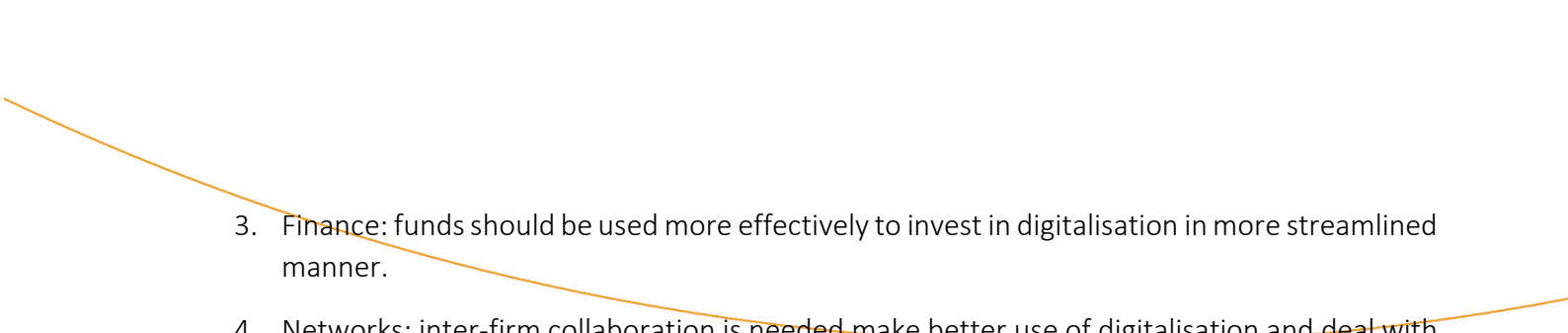
The preliminary programme was as follows:

- Introduction goals and participants
- Summarising findings by BEYOND4.0 researchers
- Discussing the main 'points of discussion' and 'suggested policy recommendations' (see further on)
- Prioritise policy recommendations
- Closure

The (to be discussed) recommendations for emergent ecosystems largely overlap with those for incumbent ecosystems, but the prioritisation is different. For each recommendation, there is a need to assess the inclusive outcome, the productive entrepreneurship aspect, what should be improved and who is responsible, and if there is an EU dimension. In Workshop Round 3, we presented and discussed the following ten recommendations to secure productive and inclusive outcomes:

Incumbent ecosystems:

1. Talent: there is a shortage of skills among employees and also entrepreneurs which demands more cooperation.
2. Formal institutions: collaboration is needed to align policies and programmes and improve social cohesions.

- 
3. Finance: funds should be used more effectively to invest in digitalisation in more streamlined manner.
 4. Networks: inter-firm collaboration is needed make better use of digitalisation and deal with ongoing change and restructuring.
 5. Leadership: leaders must develop narratives to align needed actions in a region.

Emergent ecosystems:

1. Networks: as emergent systems are less robust network building is essential.
2. Formal institutions: governmental and regional organisation must give guidance to unexperienced entrepreneurs.
3. Leadership: a vacuum exists which require stepping in of stakeholders.
4. Finance: unexperienced entrepreneurs need guidance to acquire finance and the system requires a coherent development strategy.
5. Talent: to attract talent to less known companies, businesses and educational organisations and employment offices must team up.

Annexe 3 - Outcomes of workshop round 3: policy recommendations at EU level

Introduction

The third round consisted of a workshop at EU level, the 'Brussels workshop', targeted at policymakers, and was aimed at prioritising policy options and needs in view of digital transformation and inclusive growth. The Update version 1 of this report (and its executive summary version) functioned as a discussion paper, and as such as input for round 3. The outcome of workshop round 3, together with the outcomes of round 1 and 2, resulted in a synthesis paper (i.e., the main chapters of this document preceding the Annexes) and a high-level policy paper, in the form of a (forthcoming) separate policy brief (in conjunction with WP2).

The third workshop was held as an online session, "Digital Transformation: Policy workshop for regional perspectives and prospects" during the European Week of Regions and Cities 2022 (EU Regions Week) organised by the European Commission. EU Regions Week is the biggest annual Brussels-based event dedicated to cohesion policy. It has grown to become a unique communication and networking platform, bringing together regions and cities from all over Europe, including politicians, administrators, experts and academics in the past 19 years (<https://europa.eu/regions-and-cities/about/nutshell>).

To this session (held on 12 October 2022) 85 participants subscribed in advance and 46 of them actually participated. (See Annexe 2). In preparation to the workshop, we informed the BEYOND4.0-contacts about the possibility to subscribe to the session. On the EU Regions website we uploaded links to the reports (D4.1, D4.2, D8.1). The participants to the workshops round 1 and 2 and relevant BEYOND4.0-contacts were invited to complete a mini-survey with two questions to rank the policy recommendations from incumbent and emergent ecosystems (see section 4.5); via TWITTER the BEYOND4.0 community was approached with daily polls about the same questions (see text box below).

Questions used for TWITTER and for SURVALYZER:

An 'entrepreneurial ecosystem' can be seen as regional collaboration of networks of organisations and actors to generate new knowledge, innovation and actions by policymakers and other actors.

We distinguish incumbent and emerging ecosystems. An incumbent ecosystem is part of a region where a certain industry is dominant, and companies are relatively mature; it is fertile soil for start-ups and scale-ups

The European Union may develop new policies to support further development of 'entrepreneurial ecosystems' to stimulate inclusive growth of regions across the EU. We developed five key policy recommendations for incumbent and emerging ecosystems. Please rate how important it is that the EU supports the following for incumbent ecosystems:

Incumbent entrepreneurial ecosystems

Regions tend to perform differently. We have compared these 'entrepreneurial ecosystems' on ten dimensions. The European Union may develop policy on these dimensions. We provide each of these actions to stimulate such ecosystems. Should the EU support the following (yes/no):

- Ecosystems should be supported in attracting more international talent. (a)
- Collaboration between stakeholders in ecosystems should be stimulated. (b)
- The digital transformation of regions will only succeed if more funds are provided. (c)
- Stimulating inter-firm exchange on digital technology use and development. (d)
- Identifying and supporting the leading company to align regional actions. (e)

An emerging entrepreneurial ecosystem is part of a region that represents one or more upcoming industries; the situation for start-ups and scale-ups is insecure. Policy priorities might be different for an emerging entrepreneurial ecosystem.

Please rate how important it is that the EU supports the following for emerging entrepreneurial ecosystems:

Emerging entrepreneurial ecosystems

It is hard to create new sectors or economic activity. We have compared regions on several dimensions to stimulate this new entrepreneurship. The European Union may develop policy on these dimensions. We provide five possible actions for the use. Should the EU support the following (yes/no):

- Stimulating inter-firm exchange on new technologies or products. (a)
- Guide inexperienced entrepreneurs to set-up business. (b)
- Identify and support leading companies to align regional actions. (c)
- Develop coherent funding possibilities for entrepreneurs (d)
- Support teaming-up of stakeholders in regions to develop more talent (e)

Results of the EU Regions Week session

During the session the BEYOND4.0 project was explained. Introductory presentations were given to introduce the ecosystem concept, the overall performance of ecosystems across Europe, and the findings in three countries (The Netherlands, Bulgaria and Spain).

Based on the answers from TWITTER and SURVALYZER, we made a ranking of the five recommendations per ecosystem and discussed these during the EU Regions Week-session. That ranking was as follows, and did not change during the discussion:

Incumbent ecosystems:

- Collaboration between stakeholders in ecosystems should be stimulated. (b)
- Stimulating inter-firm exchange on digital technology use and development. (d)
- The digital transformation of regions will only succeed if more funds are provided. (c)

Emergent ecosystems:

- Develop coherent funding possibilities for entrepreneurs (d)
- Support teaming-up of stakeholders in regions to develop more talent (e)
- Identify and support leading companies to align regional actions. (c)
- Guide inexperienced entrepreneurs to set-up business. (b)

Annexe 4 - Overview of workshop participants

Participants Workshop Round 1

Spain

Emergent ecosystem:

Position	Organisation, institution
Gen. Director of Strategic Projects	Provincial Government of Gipuzkoa
Director	MUBIL – Smart Mobility Innovation Pole
Executive Director	TKNIKA VET Applied Research Centre– Vice ministry of Vocational Education, Basque Government
Projects Director	BIC Gipuzkoa
Head of electric mobility	EMobility, Gipuzkoa Chamber of Commerce
Researcher	Orkestra, Basque Competitiveness Institute
Technical director	DATIK S.L.

Incumbent ecosystem:

Position	Organisation, institution
Director Knowledge Promotion	Provincial council
Technician Knowledge Promotion	Provincial council
Director of the IMH	Machine tool institute
Economic and financial consultant	Basque Grouping of Labour companies

Bulgaria

Emergent ecosystem:

Representative of the Branch organisation of the BPO companies
Lecturer of BPO outsourcing Master Degree programme in a major Sofia University
HR manager of a large BPO company – 2
BPO employees – 4
Researcher, Innovation studies from the University of Varna

Incumbent ecosystem:

- Vice-Minister of Education and Science
- Director of ICT research institute
- Representative of large ICT company, team leader
- Representative of small ICT company, Senior Developer
- High official of a large Employer organisation
- High-level official from the Sofia Municipality
- Researcher, economist from the University of Plovdiv
- Researcher, Innovation studies from the University of Varna
- Sectoral Expert, Large think-tank

Finland

Oulo:

- Senior civil servant, Ministry of Employment (MY);
- Director of Employment Services (ESei);
- Director of an educational unit, University of Applied Sciences (OE);
- Director of an educational unit, University of Oulu (YU);
- Head of Company Finances, BusinessOulu (BOeeiii);
- Head of Company Services, BusinessOulu (BOS);
- Chairperson, the Oulu Chamber of Commerce (Oeee);
- Director of Services, the Oulu Chamber of Commerce (MV);

- Managing director, a soft-ware company in the public sector (EK);
- Senior Coordinator, Oulu Talen Hub (MNS);
- Head of the technical planning, a digital manufacturing company (Ie);
- Site director, a high tech manufacturing company (Me);
- CEO, a high tech manufacturing company (Qe);
- Chief engineer, a multinational company (Niii).

Salo:

- Senior civil servant, Ministry of Employment (MY);
- Project manager, BusinessSalo (BS);
- Director of services, Social Insurance Institution of Finland (DS);
- Specialist, Employment office (EO)
- Director of an educational unit, University of Applied Sciences (MR);
- Director of an education unit, vocational school (VS)

Germany

Emergent ecosystem:

- Representative of the Business Development Agency (1)
- Representative of the Business Development Agency (2)
- Managing Director of the Employment Agency (1)
- Managing Director of the Employment Agency (2)
- Company Representative – Anchor Company Logistics
- Representative Logistics Network
- Representative Research (1)
- Representative Research (2)

Incumbent ecosystem:

- Company Representative – Anchor Company Steel
- Senior Manager of steel network/Trade Association
- Director of further training institute
- Head of Department, Steel Research Institute
- Representative of the Employment Agency (1)
- Representative of the Employment Agency (2)
- Representative Business Development Agency

The Netherlands

Emergent ecosystem:

- Director logistics company [logistics company][LCO]
- Policy-making official [ministry] [PMOM]
- Head logistics Defence [logistics center] [LCE]
- Researcher [university][UNI]
- Director business park [business park aerospace][BPA]
- Policy-making official [province] [PMOP]
- Director Netherlands Aerospace Group, director [aerospace trade association][ATA]

Incumbent ecosystem:

- Senior public affairs officer (TUE) [UNI-PA]
- Director business association [BA]
- Director real estate (TUE) [UNI-RE]
- Program manager regional development organisation [RDM]
- Researcher (UU) [UNI-R]
- Recruitment Business Partner R&D [RBP]
- Professor (UU) [UNI-P]
- Senior Project Manager Strategic Technology Program [PM]
- Smart industry expert [SIE]

United Kingdom

Emergent and incumbent ecosystem

- Automotive manufacturing experts (n=2)
- Automotive industry expert (n=1)
- Regional policymaker responsible for local skills strategy (n=1)
- Regional policymaker responsible for regional economic development strategy (n=1)
- Digital healthcare expert (n=1)
- Regional network leader for digital healthcare (n=1)
- Regional incubator manager (n=1)
- Automation expert for automotive sector (n=1)

Participants Workshop Round 2

Finland and Germany

The following participated in the workshops for the incumbent and emergent ecosystems (13 altogether):

- Company representative for last mile logistics (inner-city) delivery (EEE, GER)
- Company expert on innovative digital solutions for last mile logistics (EEE, GER)
- Researcher on Industry 4.0 (EEE, GER)
- Researcher at Institute (EEE, FIN)
- Senior researcher from company specialised in R&D (EEE, FIN)
- Company representative specialised in IT and digitalisation (EEE, FIN)
- Company representatives specialised in digitalisation (IEE, GER)
- Representative from the employment agency (IEE, GER)
- Researcher on steel & ecosystem expert with focus on digital & green transformation (IEE, GER)
- Company representative for Electronics (IEE, FIN)
- Rector from Technical University (IEE, FIN)
- Ecosystem manager and technology expert at University (IEE, FIN)
- Representative from business development agency (IEE, FIN)

Netherlands and Spain

Incumbent ecosystem:

Basque participants:

- SP_AFM_1
- SP_R&D_1
- SP_Education_1
- SP_R&D_2
- SP_education_2
- SP_education_3
- SP_AFM_2
- SP_R&D_3
- SP_AFM_3
- SP_education_4

Dutch participants

- NL_Supplier 1
- NL_Core company
- NL_Supplier 2
- NL_Regional development 1
- NL_Education
- NL_Regional development 1

Emergent Ecosystem

Basque participants:

- SP_R&D_1
- SP_Innovation_Centre
- SP_R&D_2
- SP_Policymaker

Dutch participants

- NL_MinDef
- NL_R&D
- NL_Education_1
- NL_Supplier_1
- NL_coreCompany
- NL_Supplier_2
- NL_businessDevelopment
- NL_Education_2

Bulgaria and United Kingdom

The following participated in the workshops (17 participants across the two workshops):

- Government consultant on international trade and economics
- Manufacturing expert
- Professor of economic regional development
- Regional policy analyst on business competitiveness
- Policy advisor responsible for adult education and upskilling (including digital skills)
- Director of ICT at a higher education institution
- Regional government representatives from the Digitalisation, Innovation and Investment department
- Regional government director of the Digitalisation, Innovation and Investment department
- Two regional policy experts from the Ministry of Innovation and Growth
- Sector expert based in a higher education institution

Participants Workshop Round 3

Registered attendees

- Lena Abrahamsson, Professor Luleå University of Technology
- RalucaOana And one, Legal adviser The Petru Poni Macromolecular Chemistry Institute of the Romanian Academy, BioNanoTech Project Support Centre
- Eileen Appelbaum, CoDirector Center for Economic and Policy Research
- Jaime Arrese, Consultant Sinnergiak
- Lucy Bastin, Reader School of Computer Science, Aston University
- Furio Bednarz, Consultant Independent professional
- Clara Behrend, Researcher Technical University Dortmund
- Danielle Bruel, Research Integrator TNO
- Alessandro Cancemi, Statistical Analyst Regione EmiliaRomagna
- Simona Cavallini, Senior researcher Progress Consulting S.r.l.
- Benedetta Cerbini, Officer Umbria Region
- Roland Chaumat, Intern Pays de la Loire Europe
- Periklis Christidis, BPM Team Leader Blue Value SA
- Paolo Ciambellini, Officer employment and public services The Council of European Municipalities and Regions
- Diane Confurius, Senior Data Scientist TNO
- Stephan Corporaal, Lector Human Capital Saxion University of Applied Sciences
- Tiago Costa, Head of DT Valerius hub
- Mathias Cuypers, Researcher TU Dortmund University

- Joke Dekker, Advisor VNG Realisatie
- Steven Dhondt, Senior research scientist Netherlands Organisation for Applied Scientific Research
- Josette Dijkhuizen, prof dr De Zakencoach
- Irene Facchin, Project manager Fondazione Bruno Kessler
- Dika Fadmastuti, PhD student Ragnar Nurkse Department of Innovation and Governance
- Tânia Ferreira, Data Analyst Data CoLAB
- Constantin Furdu, Consilier Consiliul Județean Ilfov
- Enrico Gallo, Senior Policy Officer Assistant Veneto Region
- Dietmar Gattwinkel, Desk Officer European Commission
- Giovanni Gentili, Ing. Regione Umbria
- Oleg Golubchikov, Reader in Human Geography Cardiff University
- Domen Grudnik, Project manager Municipality of Velenje
- Martin Guth, Project Manager Smart City/Regionatene KOM
- Phivi Haratsi, Policy officer EC
- Ulf Hedestig, Ass. Professor Umea University
- Erwin Hernando Hernandez Rincon, Profesor Universidad de La Sabana
- Md Khalid Hossain, Research Fellow Monash University
- Gerben Hulsegge, Researcher TNO
- Zdenek Husek, RIS3 manager Usti region
- Lena Lykke Jønch Clausen, Funding advisor FaaborgMidtfyn Kommune
- Magnus Yngvi Josefsson, Research and Innovation Manager accelopment Schweiz
- Dimitrios Katsouras, Project Officer Cyprus Institute
- Vassil Kirov, Associate Professor Bulgarian Academy of Sciences
- Andrzej Klimczuk, assistant professor SGH Warsaw School of Economics, Poland
- Michael Kohlgrüber, Senior Researcher TU Dortmund University
- Mina Kostova, Intern Bulgarian Academy of Sciences
- Alena Kottova, Head of the development department Jihlava
- Asier Lakidain, Researcher Sinnergiak Social Innovation (UPV/EHU)
- Ingrid Lundvall, Special advisor Viken County Administration
- Bagryan Malamin, PHD student Bulgarian Academy of Sciences
- Karina Maldonado Mariscal, Researcher TU Dortmund
- Mirela Marcu, Lector Universitatea din Oradea
- Jem McKennaPercy, Smart London Team Manager Greater London Authority
- Maria Mircheva, project manager European Digital Innovation Hub North West Automotive Cluster Bulgaria
- Dominika Niksa, Starszy Specjalista Marshal Office
- Seri No, Research Fellow Korea Labor Institute
- Peter Oei, Senior research scientist TNO, Netherlands Organisation for Applied Scientific Research
- José Luis Padrón Plazaola, Content Creator Sinnergiak Social Innovation (UPV/EHU)
- Roy Peijen, Labour market sociologist TNO
- Larisa Petcu, technical expert in Smart Specialization Agentia de Dezvoltare Regionala NV
- Mihaela Pitu, Project Access and Implementation Expert Romanian Standards Association ASRO
- Egoitz Pomares, Research Manager University of the Basque Country Sinnergiak Social Innovation
- Frank Pot, professor of social innovation of work and employment RADOUD UNIVERSITY NIJMEGEN
- Paul Preenen, Senior Researcher TNO
- Natalia Restrepo, Researcher Sinnergiak Social Innovation Centre
- Laura Sabulienė, Chief specialist Ministry of Finance
- Boris Schmitt, Head of Regional Management RhineNeckar Regional Planning Association
- Antonius Schröder, Member of Management Board Social Research Centre TU Dortmund University
- Rui Sousa, Diretor de projetos Sabforma, Lda
- Justyna Stachurska, Inspektor Urząd Marszałkowski Województwa Podkarpackiego w Rzeszowie
- Małgorzata Stelmach, Consultant Schuman Associates
- Vitalii Stoliarchuk, Testing engineer / Postgraduate (PhD) State Design Office "Yuzhnoye"/ Oles Honchar Dnipro National University
- Rosemary Strevinioti, Project Manager Friedrich Ebert Stiftung Athens
- Fanni Tamasi, PhD researcher University of Stirling

- Ramona Tiganasu, Researcher Alexandru Ioan Cuza University of Iasi, Romania
- Alina Totti, Policy advisor international relations Province of North Brabant
- Nikolaos Trangelos, Executive Officer Gaia Epicherein S.A.
- Vanda Turczi, Chargée de mission Territoires Intelligents Région Bourgogne Franche Comté
- Sophie Valdenaire Ratto, Déléguée à la Transformation Numérique Région Bourgogne Franche Comté
- Hardy van de Ven, Researcher TNO
- Glenn Vancauwenberghe, Research Manager KU Leuven
- Jessika Weber, Senior Researcher & Lecturer Breda University of Applied Sciences
- Clara Weller, Praktikantin Europabüro der badenwürttembergischen Kommunen
- Peter Wolf, presidential advisor Local Government of Pest County
- Sally Wright, Senior Research Fellow University of Warwick
- Gabriela Yordanova, Doctor of Sociology (Associate Professor) Institute of Philosophy and Sociology at Bulgarian Academy of Sciences
- Renata Žugić, Ravnateljica Lječilište Veli Lošinj

