3 Reconsidering innovation policy and reinforcing innovation policy governance in Piedmont, Italy

A fresh look at innovation and innovation policy in Piedmont, Italy could help boost the region's innovation capacity and process of industrial transition. This chapter evaluates the current approach to innovation in Piedmont and identifies challenges, including a lack of institutional thickness that can stymie the full development of an innovation ecosystem. It begins with an overview of Piedmont's regional innovation system and current policy, identifying points to consider for the next policy. It then focuses on mechanisms to update and broaden Piedmont's approach to innovation. From there, it explores how to generate a more integrated regional innovation system. The chapter also examines ways to reinforce the multi-level governance of innovation policy, and ends with a series of recommendations for action.

In Brief

Piedmont's next innovation policy can be used to develop a dynamic regional innovation ecosystem

- Piedmont, a moderate innovator+, faces several economic weaknesses, including productivity declines, low skill levels, and limited entrepreneurialism. Innovation policy can help address these while supporting the region's industrial transition. Doing so effectively means transforming Piedmont's current innovation environment into an innovation ecosystem.
- Regions with the best performing regional innovation systems are those that enjoy both organisational and institutional thickness. Currently, Piedmont's organisational thickness is strong. It has a rich and diverse organisational fabric that contributes to innovation through research, education and other relevant activities, and actors that recognise the importance of innovation for the region's development. It also outperforms Italian averages with respect to private sector R&D expenditures, and European averages in terms of small and medium-sized enterprises (SMEs) innovating in-house. Yet, its institutional thickness is not strong. There is a limited culture of innovation and cooperation among institutions, which may be holding back the growth of innovation activities.
- Piedmont dedicated more than twice as much of its EU funding to research and innovation in the 2014-2020 programming period than to other EU priority areas. Its approach to innovation focuses on a strong cluster model that prioritises research and development (R&D) innovation, the promotion of cross-disciplinary technologies and products, and on the region's largest existing business and research concentrations. Greater diversity, achieved by supporting other forms of (non-R&D) innovation and small and micro enterprises, and expanding innovation networks could boost innovation, and economic opportunities in the region.
- Piedmont's SMEs, and particularly its smaller firms, may be missing out on value-added from the value-chains to which they belong. Small size and limited innovation levels may be holding them back. However, the way that large firms manage the relationship with small suppliers may also be playing a role. Productivity among SMEs also needs to improve, and boosting their capacity for functional upgrading could be one way to accomplish this.
- Greater integration among innovation actors and innovation activities, as well as expanded innovation networks, would make a difference in Piedmont's innovation environment. This calls for developing, over time, an effective toolbox of coordination mechanisms so that actors understand each other's roles and work together to advance innovation and innovation policy objectives. Doing so could help address one of the most significant challenges confronting the region's innovation system.
- Framework conditions are the largest obstacle in the multi-level governance system supporting Piedmont's innovation policy. Regulatory/administrative requirements – and especially those associated directly and indirectly with the financing system – are perceived as most onerous. To implement its future innovation policy, Piedmont will need to make it easier – to the extent that it can – for its firms to meet European Union (EU) fund requirements while supporting greater agility within the frameworks.

Introduction

Innovation and innovation-based activities have steadily grown as a focus for place-based regional development policy and investment. This is regardless of whether the region is predominantly urban or rural, advanced, falling behind, or in a process of industrial transition. Regional development policy is likely to continue to focus increasingly on innovation as countries and regions concentrate on building resilience post-COVID-19, including through investment in Industry 4.0, greater digitalisation, the environment (green investment) and a just transition to carbon neutrality. The expectation is that place-based innovation policies, particularly those grounded in smart specialisation strategies (S3), can promote economic development and tackle new and pressing social and environmental problems, or grand challenges (Larrue, 2021[1]). At the same time, policy makers acknowledge the complexities of innovation-driven regional development, which include fostering a dynamic and effective innovation ecosystem, and ensuring that governance systems inside and outside the ecosystem are well structured.

Piedmont, together with other regions in European Member States, is redesigning its S3 for the 2021-2027 Programming Period. As part of this, it is taking a careful look at its approach to innovation policy and its cluster model to make innovation a bigger contributor to the region's development. As Chapter 1 highlighted, there are a number of structural barriers to development in Piedmont, such as marked territorial inequalities, the risk of falling into a middle-income trap, and a polarised productive structure with large and medium firms on one side and small and micro firms on the other. In addition, Piedmont must grapple with several economic weaknesses, including productivity declines, low skill levels, and limited amounts of entrepreneurialism. Innovation and innovation diffusion could help address these challenges, particularly the last three, while contributing to Piedmont's process of industrial transition. Success will depend on Piedmont's ability to refine its current innovation policy. It will also need to reinforce certain aspects of its governance system inside and outside the innovation policy environment. A broader definition of innovation will be important, so will be monitoring and learning from policy experience (i.e. knowledge sharing), and introducing new mechanisms to advance innovation, such as innovative public procurement (Marques, P., 2020[2]). The result could be a positive shift from today's innovation environment to a dynamic innovation ecosystem.

Moving from an innovation environment to an innovation ecosystem will depend on transforming the innovation environment. Transforming it from one where actors act in the same space but relatively separate from one another (despite a common goal), to a space where actors act as part of an integrated community or network and are each a unique but essential and interdependent performer in a complex system. This chapter focuses precisely on these matters. It first considers the current regional innovation system (RIS) and innovation policy in Piedmont. It then spends time examining what would be necessary to innovate innovation policy and shift from an innovation environment to a true innovation ecosystem. Finally, it looks at the multi-level governance system that supports innovation policy design and implementation, focusing on aspects that are either constraints or need to be reinforced. The chapter concludes with a series of recommendations as the Piedmont regional government reconsiders its innovation policy and the policy's governance.

An overview of innovation in Piedmont

Piedmont is a moderate innovator+ that performs within the top 40 of EU Member State regions in a number of areas[1] (Hollanders and Es-Sadki, 2021[3]). It ranks among the top 20 regions for only one of these – "Employment in knowledge-intensive activities as percentage of total employment SME's" – where it scored 19. To put this into context, of the benchmark regions only cities that form part of Baden-Württemberg and Bayern scored better than Piedmont.[2] With regard to the indicator "R&D expenditure in the business sector as a percentage of gross domestic product (GDP)", several German cities in the Baden-Württemberg, Bavaria and Saxony regions scored better than Piedmont (39), as well as the

Wallonia region in Belgium and Auvergne-Rhône-Alpes region in France. Regarding "SMEs introducing business process innovations as percentage of SMEs", of the selected benchmark regions only cities that form part of Baden-Württemberg, Bayern and Sachsen scored better than Piedmont (37). There clearly is innovation occurring in Piedmont. The question is what may be holding innovation back, and what can be done to more fully unleash the region's innovation potential.

Piedmont's regional innovation system

In general, RIS can be organised along two dimensions: organisational thickness (i.e. the number of organisations that exist in a region) and institutional thickness (i.e. the existence of formal and informal institutions that promote coordination among actors and facilitate the exchange of knowledge). Regions with the best performing RIS tend to have a large number of organisations that produce and exploit knowledge, and an ability to link these organisations in an integrated manner (Table 3.1) (Trippl, M., B. Asheim, J. Miörner, 2016[4]). Based on this framework, Piedmont falls into the bottom left quadrant of Table 3.1.

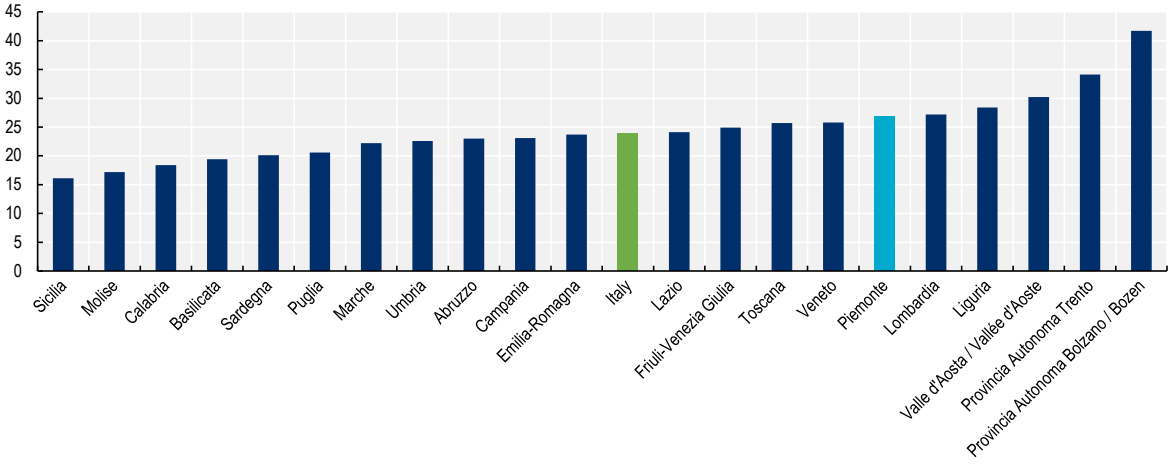
Table 3.1. Organisational and institutional thickness in regional innovation systems

	Organisational thickness	Organisational thinness
Institutional thickness	Metropolitan/city regions in Northern and Western Europe	Industrial districts in the "Third Italy" (i.e. north eastern and central areas); Nordic peripheral regions
Institutional thinness	Larger cities in Southern and Eastern Europe; old industrial areas in Western Europe	Southern and Eastern European peripheral regions

Source: (Trippl, M., B. Asheim, J. Miörner, 2016[4])

Piedmont is a region with organisational thickness, having a rich and diverse organisational fabric that directly or indirectly contributes to innovation through research, education and other relevant activities. Its large, innovative firms and SMEs (Delponte, L., E. Sirtori, 2018[5]; OECD, 2020[6]) outperform the Italian average in terms of private sector R&D expenditures as well as the European average in "product/process innovation" and "SMEs innovating in-house" (European Commission, 2019[7]). Its universities have high quality research departments and strong training programmes. In addition, there are well-developed cluster management organisations and other public and private institutional actors, including the private bank foundations. Yet, it suffers from institutional thinness – where a limited culture of innovation and cooperation among institutions, combined with a need for stronger institutional capacity, including government capacity, may stymie innovation activities. This is evidenced in a general perception that cluster activities and relationships among actors (e.g. among the various universities, and universities and start-up incubators) could and ought to be more integrated (OECD, 2020[6]). In addition, key private-sector actors (e.g. the bank foundations) tend to shy away from working with public institutions to promote innovation given real or perceived red tape, which could slow project implementation (OECD, 2020[6]). The regional government is aware of this and is taking steps to build dialogue and exchange opportunities with the bank foundations, for example, to build coordination and identify synergies, as a first step towards more structured collaboration in the future. The lack of interpersonal trust has been cited as a major reason for the limited cooperation among Piedmont's RIS actors (OECD, 2020[6]). A 2020 survey shows that only about 30% of people in Piedmont say that most people can be trusted (Figure 3.1). This is higher than the Italian average, but still low. A lack of trust has important consequences for innovation and innovation support. If small business owners and managers do not trust one another or others, including the government, this not only undermines their ability to approach each other for a cooperative opportunity, it can also undermine efforts by public sector organisations to reach these firms and help them build their innovation capabilities (OECD, 2018[8]; Murtin, F., et al, 2018[9]).

Figure 3.1. Percentage of people in each Italian region that say most people can be trusted



Source: (I.Stat, 2020[10])

The lack of coordination among Piedmont's RIS actors is also compounded by low innovation capabilities among micro and small firms. This can indicate they do not value innovation, and thus do not actively pursue collaborating on innovation projects with other institutions (Marques, P., 2020[2]). Encouraging regional innovation actors, such as the cluster management organisations or the *Istituti Tecnici Superiori* (ITS), to develop outreach programmes for training micro and small firms in areas such as digitalisation or management skills (see Chapter 4) would be valuable. This could facilitate engagement with such companies and, in doing so, build trust, which is particularly important as an informal contributor to institutional thickness. At the same time, it is important to note that, according to the European Innovation Scoreboard 2021, Piedmont is currently considered a "bottom high performer" with regard to the indicator "Innovative SMEs collaborating with others as percentage of SMEs", scoring above the European and Italian averages (Hollanders and Es-Sadki, 2021[3]). This represents a strong improvement vis-à-vis 2019 when Piedmont scored well below the European average and just below the Italian one (European Commission, 2021[11]).

Piedmont's innovation policy in the 2014-2020 EU programming period

Piedmont's current innovation policy is rooted in its innovation antecedents and is strongly guided by European Union Cohesion Policy programming and funding. This is true not only for Piedmont but also for many other Italian and European regions.

To meet the requirements of the 2014-2020 European Programming Period, Piedmont developed an S3 – in accordance with the EU's smart specialisation strategy concept (Box 3.1) – to prioritise and guide innovation investment financed through European Structural and Investment Funds (ESIF)[3]. It built this strategy and its innovation policy around a strong innovation cluster and cluster organisation model[4] and promoted cross-disciplinary technologies and products in six areas of specialisation: aerospace, automotive, mechatronics, green chemistry/cleantech, "made-in" (agri-food and textiles), health and well-being. There are also two transversal guidelines or guiding directions: "smart" and "resource efficiency". These are considered transformation trajectories, and should support the six prioritised specialisations, for example by increasing the use of digital modalities to improve agricultural production and to make use of the circular economy. In general, the strategy reflects and supports the largest existing business and research concentrations in the region – mechatronics and industrial production, as well as agriculture and

food (“made in”). Other specialisation areas, such as green chemistry/cleantech (or biotechnology in general), health and well-being, have a smaller existing basis on which to build activity.

Box 3.1. What is a smart specialisation strategy?

Smart specialisation is a concept designed by the European Commission to encourage regions to identify their strongest assets in research, innovation and entrepreneurship so they can then select priority investment channels and build their regional comparative advantage around them. The objective of an S3 is to help regions diversify their economic base – their industrial specialisations – in fields with the greatest socio-economic potential for their region. The concept emphasises the role of entrepreneurial knowledge to identify regional priorities, giving rise to the entrepreneurial discovery process[5]. The 2021-2027 EU Cohesion Policy programming period dedicates the majority of its budget to promoting a Smarter Europe. This is one of the five thematic objectives of the new programming period and emphasises innovative and smart economic transformation.

European regions have to update their S3 and ensure that it meets seven “enabling conditions”, as follows:

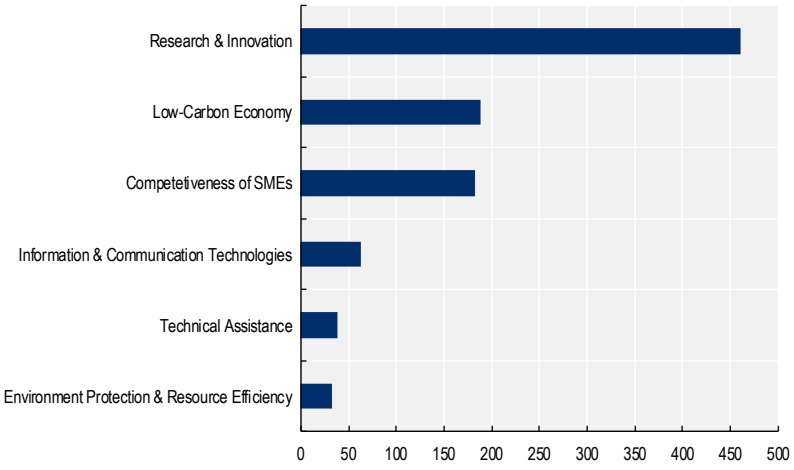
1. Up-to-date analysis of bottlenecks for innovation diffusion, including digitalisation
2. Existence of competent regional / national institution or body, responsible for the management of the smart specialisation strategy
3. Monitoring and evaluation tools to measure performance towards the objectives of the strategy
4. Effective functioning of entrepreneurial discovery process
5. Actions necessary to improve national or regional research and innovation systems
6. Actions to manage industrial transition
7. Measures for international collaboration

Source: (Interreg Europe, 2020[12])

In the 2014-2020 EU programming period, Piedmont heavily prioritised investment in research and innovation (R&I), as evidenced by its allocation of ESIF. It dedicated more than twice as much of its European Regional Development Fund (ERDF) to R&I in the six specialisation areas than to other EU priority areas (e.g. low-carbon economy, SME competitiveness, information and communication technology (ICT), etc.) (Figure 3.2). This prioritisation aligns with Piedmont’s S3 objectives of supporting smart and resource-efficient industrial modernisation. It also signals an S3 strategy and innovation policy focused on R&D-driven projects – a rather traditional approach to innovation and its definition. While this is a clear choice, it may be at the expense of supporting other forms of innovation, particularly non-R&D innovations that could be more adapted to potential innovators in Piedmont, such as micro and small enterprises. A recent study by *Istituto di Ricerche Economico Sociali del Piemonte* (IRES Piemonte) (2020[13]) also came to the same conclusion. Lost innovation (and economic) opportunities arising in other important areas, such as advancing toward a low-carbon economy and building SME competitiveness, may also be a consequence of this strategic direction. As Piedmont considers its next generation S3 strategy and innovation policy, it may wish to rethink this prioritisation approach. Doing so could help it identify and build on additional innovation opportunities and investment complementarities.

Figure 3.2. Total budget by ERDF theme: Piedmont

EUR billion



Source: (European Commission, 2021[14])

Looking forward

As it reconsiders its S3, and especially its regional innovation policy, Piedmont will need to emphasise shifting the innovation space from an innovation environment to an innovation ecosystem, the latter term referring to a wider and more integrated set of actors and sectors, as well as to broader and more dynamic frameworks, structures and processes involved in fostering the various forms of innovation. This can mean building institutional thickness – reinforcing (or building) the ability of formal and information institutions and mechanisms to promote coordination and facilitate knowledge exchange within the innovation space. Doing so could help overcome a number of challenges for Piedmont's RIS, including a narrow approach and limited space for innovation to occur (i.e. in terms of the types of innovation that is supported), limited system integration, and framework barriers embedded in the governance system. Structuring a policy that promotes expanding the system's networks, encourages the formation of new networks, and fills the real or perceived leadership and coordination vacuum will be important. Piedmont has a dynamic and diverse group of organisations that recognise the importance of innovation for the region's development, and support it as a lever for industrial transition. These organisations – and the RIS – would benefit from greater coordination, from more diverse networks and from a more integrated approach to managing the innovation environment. To advance in this direction, public authorities should be prepared to articulate, promote and support a more strategic view of innovation activities. Equally important will be to use the policy to grow private sector productivity, particularly in micro and small firms, and to stimulate job creation. Finally, and perhaps most critically, it will be crucial to broaden the innovation space. This can mean expanding the definition of innovation that supports the emergence of related sectors of economic activity to help advance structural economic change and employment growth, while at the same time addressing broader social and environmental challenges. Of course, the region should continue to nurture and reinforce its well-developed organisational thickness, a current strength of its RIS.

Piedmont made two very clear decisions with respect to its 2014-2020 S3 and innovation policy: first, it would focus efforts on R&I, and second it would depend to a large degree on its cluster organisations to advance the innovation policy. This approach, combined with the need to rely heavily on EU funding in order to implement its innovation policy, has resulted in some systemic challenges that can be grouped into three broad categories: i) a rather narrow approach to innovation which can exclude many smaller and less innovative firms from the innovation environment, ii) limited system integration, and iii) significant

framework constraints in the multi-level governance system supporting innovation policy. In their own ways, each of these challenges may be contributing to Piedmont's institutional thinness in the innovation space. This is compounded by limited regional and local experimentation in innovation policy. Piedmont may want to orient its upcoming S3 and innovation policy in such a way that they help Piedmont address – and ideally overcome – the challenges identified and transform the innovation environment into an innovation ecosystem.

Updating Piedmont's innovation policy: broadening the definition and approach to innovation

Innovation activities and financing in Piedmont focus on technological innovation (R&D), particularly among the cluster management organisations. This works well within the space created and for those who participate in it. However, there is less room, and financing, for other, potentially more creative, or more innovative approaches to innovation, or approaches that are more inclusive of the diversity of the region's enterprise fabric. For example, less emphasis is placed on promoting innovation in management, marketing, or product development processes in micro-firms and small enterprises. There is no doubt that R&D-based innovation is important, and it is a critical component of any region's S3. Yet, regions also can promote innovation that is based on a sector's experience (doing-using-interacting), is incremental (e.g. improvements in process or product engineering), improves production capacity, or builds stronger management practices, for example (Foray, Morgan and Radosevic, 2018[15]). The Autonomous Community of Extremadura in Spain offers a relevant example (Box 3.2). In Piedmont, little is done to "mainstream" social innovation activities, and more attention could focus on innovation in the public sector. Doing so could create greater inclusiveness, support meeting larger societal goals (e.g. addressing climate change), and also generate greater citizen satisfaction with public and administrative services. Piedmont may want to consider broadening its definition of innovation, or the types of innovation and locations for innovation that the government actively supports through its next innovation policy and Regional Programme for the 2021-2027 EU Cohesion Policy funding period.

Box 3.2. Process and product innovation in Extremadura, Spain: *La Torta del Casar*

Extremadura, Spain's smart specialisation strategy is structured around five sectors: agro-industry, energy, tourism, health and ICT. It is a region well-known for speciality food products, including its unique cheese, *La Torta del Casar.* To further improve and develop the production of this cheese – and to advance other S3 Pillars, the Local Action Group for Rural Development of the Tajo-Salor-Almonte *comarca*, brought together farmers, shepherds and other actors to identify weaknesses in the production system and design solutions to overcome these. This led to the creation of the Farmers School of XXI and the Shepherding School, which partner with farmers and shepherds and provide training in farming techniques including in the use of ICT and other technological advances that can support production. In addition, cheese producers are exploring and testing how to improve their production processes. For example, they are investigating the use of seawater in the cheese's salting process, rather than brine, to give the cheese different characteristics. The region is also developing tourism around the cheese – launching a *ruta de la Torta del Casar*.

Source: (European Commission, 2017[16]; Avuelapluma, 2014[17]; European Commission, 2016[18])

The current innovation environment, which centres around Piedmont's cluster organisations, does not necessarily foster economic diversification or the active expansion of networks. In general, there is a limited number of cluster activities designed to help existing firms find new product and service lines, and/or to encourage the emergence of related or – perhaps more innovative – unrelated economic activities. There are exceptions to this, particularly among Piedmont's more cross-sectoral cluster organisations (e.g. mechatronics, green chemistry/cleantech). Yet, the narrow specialisation of most of Piedmont's clusters

may be working against diversification. While this may not have been the initial intention, it has evolved to be the case and affects not only cross-sector specialisation, but integration potential, as well (OECD, 2020[19]; OECD, 2020[6]; Marques, P., 2020[2]). This lack of diversification and integration is reinforced by an apparent "exclusivity" to cluster membership, evidenced in two ways. First, cluster membership levels may not represent the broader business base of the specific industrial activity. This indicates a tendency to concentrate activities on a number of "insider" organisations (Marques, P., 2020[2]). Second, approximately 30% of ERDF funds are reserved for cluster members wishing to apply for innovation funding opportunities through ERDF.[6] This might be considered an incentive to join a cluster, though it does not seem to work as such. Behind this may be the complexity and bureaucracy that is associated with accessing EU funds, putting off small firms that may need them and large firms that can access other lines of credit. It could also be due to a lack of interest or ability in joining a cluster organisation. This could be particularly true for micro and small firms. They may not recognise the value added in joining, they may feel that the heavy emphasis on R&D and technology-driven R&D is outside of their scope of activity, or they may not have the capacity or resources to do so (OECD, 2020[19]). Chapter 4 explores, in depth, Piedmont's clusters and cluster organisations, and their place in the region's innovation policy.

Promoting more than technological innovation

Advancing R&I should continue, and Piedmont's clusters are active and essential players for accomplishing this. Yet, innovation is a much broader concept, and there is a need to work with it as such in Piedmont. Ensuring that a future innovation policy provides guidance on what a broader approach to innovation means, how to realise it, who should be involved, and what its objectives are, will be important to encourage and legitimise the shift in perspective.

Traditionally, innovation is associated with science, R&D. This view has biased the formulation of innovation policies and institutions in many regions by focusing on a "linear" or "supply side" approach, whereby research is seen as generating R&D and inventions and then is transformed into innovations introduced by firms in markets (Howells and Bessant, 2012[20]). It has influenced innovation policy design and created new knowledge and more radical, disruptive, and novel innovations. Yet, its application should be balanced with efforts to adapt existing knowledge and technologies, and more generally, create and build basic innovation capabilities (OECD, 2018[21]). While more novel or radical innovations are important, they are not necessarily everyday occurrences. The "linear" view misses the fact that incremental innovation and upgrading are important characteristics of the innovation system. Thus, a broader view of innovation (Box 3.3), one that includes incremental innovation and upgrading, is needed to improve innovation policies. This may be particularly beneficial in Piedmont. Broadening innovation policy is not about defunding R&D and the instruments that support it. Rather, it means balancing the composition of innovation activities, for example by aligning budget allocations with the actual and evolving capabilities of the region's private sector (OECD, 2020[22]).

Box 3.3. Types of innovation activity to consider supporting through an innovation policy

A well-balanced innovation policy for Piedmont should incorporate different types of innovation, including those that depart from current technologies and practices. Some forms to consider include:

- **Technological innovation**: refers to developing technologically new or substantially changed goods or services, or to the use of a technologically new or substantially changed process.
- **Social innovation**: refers to the design and implementation of new solutions that imply conceptual, process, product or organisational change, and which aim to improve the welfare and well-being of individuals and communities. The aim of social innovation is to meet social demands traditionally not addressed by either the market or existing institutions and generally, but not exclusively, directed towards vulnerable groups in society. For instance, social innovations can aim at encouraging a more participative society where empowerment and learning are sources and outcomes of well-being. An example of social innovation includes the creation of a community-managed development bank that provides credit for initiatives aimed at solving local service delivery gaps.
- **Business model innovation**: seeks to change to an organisation's value proposition and to its underlying operating model by changing the rationale of how an organisation creates, delivers and captures value in economic, social, cultural or other contexts. Business model innovations in existing firms can include: a firm ceasing its previous activities and entering into new types of products and markets that require new business processes; or a firm changing the business model for its existing products, for example by switching to a digital model with new business processes for production and delivery.
- **Policy innovation**: aims to find novel processes, tools and practices used for policy design, development and implementation that result in better problem solving of complex issues. These can include innovative methods of engaging the public in the design of policy and services (for example through participatory budgeting), and evaluating the efficacy of policies, services and funding.
- **Public sector innovation**: refers to the design and implementation by a public sector organisation of new or significantly improved processes, methods or services – from data analytics to prototyping and design thinking – aimed at improving its operations or outcomes. Many of such innovations create services that are more user-focused, better defined and better targeted to user demand. Such innovations can alter the supply of services by improving their characteristics, and demand for services. Public sector innovation differs from policy innovation in that it generally encapsulates a wider range of measures to enable and accelerate innovation within government.

Source: (OECD, 2020[22]; OECD/Eurostat/European Union, 1997[23]; OECD, 2020[24]; OECD/Eurostat, 2018[25]; OECD, 2016[26]; Marques, Morgan and Richardson, 2017[27])

The regional government could also use its influence – and policy – to support innovation among targeted populations and/or targeted territories within the region (e.g. youth in rural areas). Early evidence in a study of innovation in OECD rural regions is indicating that innovation capacity is high for young, start-up entrepreneurs. Yet, their numbers and activities are dropping in rural areas. Young entrepreneurs in rural areas, towns and suburbs are 30% less likely to start a business than their urban counterparts. This becomes problematic, particularly for regions that have a significant amount of rural territory, since innovation can improve income, productivity and employment in rural areas more so than in dense ones (Marshalian, M., 2021[28]). Ensuring that the upcoming policy emphasises, even more strongly, training and

education can help. Developing specific incentives for education institutes in rural areas to work with youth interested in entrepreneurship could be part of policy programming.

In addition to broadening the definition, or type, of innovation that it supports, and targeted populations, Piedmont may also want to consider paying particular attention to mainstreaming social innovation and developing public sector innovation in its upcoming innovation policy.

"Mainstreaming" social innovation by integrating it into the innovation policy

Piedmont boasts a fairly well-developed social innovation ecosystem, with a longstanding tradition of community-based organisations and the emergence of new organisations and funding agencies. It has a strong third sector, and a growing social economy. There are about 40 000 organisations with a social purpose in Piedmont, of which about 4 000 are for-profit companies that pursue social goals. In addition, Piedmont has a relatively well-established network of institutions that support social entrepreneurs and impact investing. For example, Torino Social Impact functions as a platform that fosters high-tech social entrepreneurship in the Turin metropolitan area (European Commission, 2019[29]). Though the third sector has been characterised as rather risk-averse and closed to outsiders (OECD, 2020[19]), its existence is nonetheless a strength. By providing financial incentives it could become better mobilised and encouraged to open up to new ideas (Marques, P., 2020[2]).

Actively mainstreaming social innovation into Piedmont's innovation mix would both broaden the approach to innovation, and could help the region address some of its more persistent structural challenges, especially if combined with more traditional innovation instruments. Many initiatives launched by social economy organisations[7] and by civil society have proven to be innovative in dealing with socio-economic and environmental problems, while contributing to economic development (OECD, n.d.[30]). For example, a non-profit organisation in Luxembourg provides donated digital devices, such as smartphones, to refugees and other marginalised groups. This material support is combined with educational services. The recipients of digital devices learn how to fix the donated equipment through refurbishing workshops and ICT skill classes. These are delivered in different languages to reach a wider audience. The project considers digitalisation to be an enabling factor for integration, while also having a positive environmental impact through the re-use of ICT equipment. The WASCO Cooperative in Slovakia seeks to reduce long-term unemployment of Roma people in deindustrialised areas. The cooperative provides Roma people and other vulnerable groups with work in laundry and ironing services. The employment is accompanied by training in order to help the beneficiaries develop their skills and experience. In the longer-term, the cooperative aims to help participants to move on to employment elsewhere through tailored guidance on searching for and securing a job (European Commission, 2020[31]). Using social enterprises to advance education for disadvantaged groups, to address a chronic low-skill level shortage certain segments of the population, or to design and deliver training for micro and small firms in management, digitalisation or new-market prospecting are all are forms of social innovation that can contribute to an innovation policy that supports both R&D and non-R&D driven innovation.

Integrating social innovation into Piedmont's overall innovation policy would require identifying ways to overcome one of its principle challenges – the lack of funding in the third sector. One way to address this would be to launch project calls open to any social enterprise or non-profit organisation, ideally in partnership with a social enterprise or an organisation already funding social innovation, such as SocialFare, private foundations (e.g. the bank foundations), or ImpactHub Turin. Social enterprises already providing services to micro and small firms could also seek support from SME associations in order to increase the number of possible funders (Marques, P., 2020[2]). Skills for social innovation, including social enterprise financing, would also need to be built. These activities could be integrated into the curricula of the ITS, and could also include placement schemes for graduates. Skills-development activities or initiatives similar to those that support SMEs could be created for the social enterprise sector to help improve its skill base. Higher education institutes, such as Santa Clara University (United States) have

developed specific education material and foment collaboration between students, social entrepreneurs, corporate partners and faculty to incubate and scale development projects in areas such as clean energy, mobile technologies and sustainable livelihood development (Fichter, Geier and Tiemann, 2016[22]). Scaling-up the third sector to further advance social innovation can also require encouraging cooperation and collaboration among social enterprises, since there is evidence that mergers are a common growth strategy for such organisations (Marques, P., 2020[2]). Fostering networks between social enterprises and other types of organisations would be important to disseminate ideas, diffuse social innovation knowledge could promote growth among social enterprises. In addition, strong coordination with small business associations and other relevant organisations, in order to ensure broad stakeholder buy-in and improve coordination within the overall innovation system.

Reinforcing innovation in the public sector as part of innovation policy

Public sector innovation should not be ignored in the upcoming innovation policy. There are two dimensions to this. The first centres on the need to ensure that innovation policy addresses societal challenges (Coenen, L., and K. Morgan, 2020[32]). This is particularly important given that innovation itself can contribute to these challenges, for example by reinforcing inequalities, disrupting the labour market, and generating further environmental degradation. The debates surrounding the direction of innovation, mission-oriented innovation and inclusive innovation – be it innovation generated by marginalised or under-represented groups or innovation that generates more inclusive growth (Heeks et al., 2013[33]) – illustrate the growing concern (Box 3.4). The EU Green Deal, the growth in national, regional and local policies and investments targeting or incorporating green infrastructure, the circular economy, climate transition and the call for greater regional resilience post COVID-19, indicate that these concepts will become even more relevant in the future. Piedmont has already made some progress in these areas and is preparing to advance further, as outlined in its Agenda 2030 and Unified Strategy Document (*Documento Strategico Unitario – DSU)*[8]. Yet, these approaches to innovation can be very challenging to the government departments, institutions and individuals tasked with designing and implementing innovation policies. There may be a lack of capability, expertise or technical knowledge to design appropriate social or environmental programming. Building innovation within the public sector can help address these shortcomings, as can encouraging stronger partnerships between the public sector, the private sector and civil society (Mazzucato, 2018[34]). It can also mean building the capacity and comfort level within the public sector to be more open to exploration, experimentation, and learning-by-doing (Mazzucato, 2018[34]).

Box 3.4. Inclusive and mission-oriented innovation

The debate about inclusive and mission oriented innovation is a response to the conventional views of innovation that understand development to refer mainly to economic growth, thereby excluding its social and economic dimensions.

Inclusive innovation views development in terms of active inclusion of those groups that are currently marginalised. Depending on the issue at stake, this can refer to women, youth, the disabled, ethnic minorities, 'the poor', etc. Innovation initiatives can be inclusive in terms of the process by which they are achieved, and inclusive in terms of the problems and the solutions that they address.

Mission-oriented innovation is closely related to inclusive innovation. It stresses the importance of directionality. The policy debate about the directionality of growth and innovation should involve a wide array of public and private stakeholders, each contributing to a set of questions, including:

- What are the key challenges facing society?
- How can concrete missions help solve those challenges?
- How can the missions be best designed to enable participation across different actors and levels?

As such, innovation missions should have societal relevance, for example in the ability to improve the living environment, health outcomes or contribute to poverty reduction. This implies that missions should be defined broadly enough to engage the public and attract cross-sectoral investment and participation, and yet remain targeted enough to involve industry and achieve measurable success.

Source: (Mazzucato, 2018[34]; Heeks et al., 2013[33])

Generating more innovative approaches to innovation policy could help Piedmont address the current challenge of a narrow approach to innovation policy implementation (e.g. through cluster management organisations which themselves frequently take a narrow approach) and broaden the basis for strategic action (Marques, P., 2020[2]). This may be more easily said than done given public sector dynamics, particularly a need to respond to internal (e.g. election cycles) and external pressures (e.g. interest groups), and overcome the inertia that can settle over large public organisations. The INFUSE project in Cardiff, Wales (United Kingdom) offers an example of how to address this challenge. The project is based on experimentation, on improving the skills of public sector employees and on building monitoring mechanisms that help policy makers learn from experience. It could be a useful reference as Piedmont works to solve structural issues such as lack of skills, or low productivity among small and micro firms.

There is a second dimension to public sector innovation that merits consideration as Piedmont rethinks its approach to innovation policy. An OECD/Bloomberg Philanthropies study on innovation capacities, innovation goals and innovation strategies at the city-government level[9] points to evidence that cities with higher public sector innovation capacity tend to rate higher in terms of city satisfaction among residents, and exhibit stronger outcomes in a number of OECD well-being dimensions (e.g. safety and education). Furthermore, the cities themselves indicate that innovation contributes to improving service delivery and internal efficiency (OECD, 2019[35]). Encouraging cities within Piedmont to develop their own innovation strategies, and supporting their design and implementation through the region's innovation policy could contribute to further building the attractiveness of the region for investment and households that may be considering moving to the area, and contribute to addressing some of the demographic challenges.

Finally, Piedmont could also make better use of potentially underused policy levers – introducing more innovative working methods into public sector practices, for example using innovative public procurement to encourage innovation in micro and small firms. Redirecting procurement funds to achieve specific goals,

such as increasing innovation capabilities within targeted firms, or encouraging economic diversification is one of the most efficient ways to ensure that public funds are mobilised to achieve strategic development goals (Uyarra et al., 2020[36]). Public procurement allows the state to become a lead buyer by demanding a certain type of good and service that pushes suppliers to innovate and develop new capabilities. It can also be used to support technological development at a stage when firms might struggle to attract private funding, a problem that is salient in Piedmont (OECD, 2020[19]). It can also serve to enforce or diffuse product standards, which facilitates adoption and diffusion of new technologies and raises quality standards (Marques, P., 2020[2]).

Public procurement is a challenging process, since it demands a skill set in the public sector that is not always available. Innovative public procurement must include some level of technical sophistication, both in the writing of calls and in their evaluation, rather than a simple method of selecting the cheapest bid. It also poses challenges regarding transparency and the avoidance of conflict of interest, since this type of procurement is usually preceded by conversations between the public sector and private firms, with a view to preparing the potential suppliers for the bid's technical requirements (Uyarra et al., 2020[36]). Innovative public procurement is equally challenging from a technological point of view, especially when the goal is to deal with problems that are not clearly understood, when the technology that is being bought is not yet mature and therefore requires further development, or when there is no consensus as to which solution is the best to deal with a problem. An example of the latter are strategies to address climate change, and the debates that exist about how to reduce CO_2 emissions. Though a holistic take on this matter might suggest that governments need to implement a variety of initiatives in coordination, the reality is that each has a set of potential risks and rewards, and governments tend to favour some over the others. Nonetheless, considering its potential, innovative public procurement is a line of action that Piedmont should pursue, and for which it could rely on support from the European Union. This was the case in Galicia, Spain (Box 3.5), which undertook innovative public procurement in the health sector. This is particularly relevant to Piedmont as it prepares to build the Health City in Turin (European Commission, 2020[37]).

Box 3.5. Public Procurement in Galicia, Spain

The region of Galicia in Spain is a good example of the potential of innovative public procurement (IPP). After the economic crisis of 2009, under worsening financial conditions, the Galician government needed to search for new processes and partnerships to ensure its ageing population received adequate care. A health innovation platform was created to find solutions to these challenges.

By leveraging financial resources from the European Technology Fund 2007-20013, the health innovation platform launched two projects in 2011, worth EUR 90 million, with the aim of developing services for elderly care among local firms. It required that firms follow international health standards, so that these innovations could later be sold to other health service providers. Before launching the public procurement calls, the platform reached out to local suppliers to learn about their innovation ideas for elderly care. This allowed the public sector to refine the technical specifications of the calls and to prepare a document that gave the private sector advanced warning of what was going to be required, and give them sufficient time to prepare proposals.

At the early stage, a large proportion of contracts were awarded to SMEs, and more than half the contracts involved Galician firms. Of these, a significant number later received contracts from other regional governments. The IPP initiative allowed the regional government to strengthen the innovation ecosystem in the area of health, and to support innovation initiatives in other sectors.

The success of the IPP initiative also generated interest from universities and other public authorities and encouraged the creation of new formal and informal networks.

Source: (Marques, P., 2020[2]; Uyarra et al., 2020[36])

Initiatives that can improve the effectiveness of innovation policy are likely to require a more innovative public sector, one capable of training staff to monitor the implementation of innovation tools, and able to adopt complex (but potentially very beneficial) implementation instruments, such as innovative public procurement. Piedmont's public sector has accumulated a significant level of knowledge and experience, which should be fully utilised and also expanded.

Promoting the region's unique competences and knowledge sources to attract investment

A further policy consideration is to attract investment partners by strongly promoting the region based on its unique competences and knowledge resources. Currently, these include Piedmont's specialisation in a number of innovative manufacturing sectors (e.g. mechatronics), and in health and life sciences, supported for example by the upcoming City of Health (Delponte, L., E. Sirtori, 2018[5]). This could encourage foreign firms to invest in Piedmont based on an interest in engaging with local firms, thereby increasing the likelihood that foreign direct investment (FDI) has a larger impact on local innovation. Success, however, rests with the region's ability to clearly demonstrate its strengths, using data and data-based evidence, and identify which organisations (firms, universities and others) offer the highest innovation capacities (Marques, P., 2020[2]).

Adopting a strategic approach will be necessary to optimise resources. This means targeting FDI attraction efforts to those sectors or economic areas where Piedmont has demonstrated unique knowledge resources. Such an effort could be supported by a technological diagnostic of the region (Balland et al., 2018[38]), which could help firms, particularly SMEs incorporate innovation into their development strategies. This could help the region identify current specialisations and use those with a high degree of complexity to build networks across them. This may require specific incentives, particularly since the

funding disbursed through clusters is already focused on building greater coordination and collaboration. However, the government could use funding opportunities to foster networks and greater collaboration in areas of complex specialisation among firms that are not active in clusters, or in areas where collaboration is limited, such as cross-sector collaboration, collaboration among universities and third-sector parties or with micro and smaller firms (Marques, P., 2020[2]).

Spending time to identify new, related sectors, currently not in the region but in which there is potential to generate investment could also help attract investment. Chapter 4 of this report presents the Complexity/Relatedness Matrix, which is a framework that can contribute to identifying technological opportunities for the region based on the relatedness density and knowledge complexity of individual technologies. It can also be used to advance economic diversification efforts. Stakeholder consultation should support the identification of new areas in a process similar to the entrepreneurial discovery process. By mapping its technological strengths, the region could use them to target foreign investors interested in the region's unique knowledge resources and guide its efforts to attract FDI to these strengths (Marques, P., 2020[2]).

Better supporting innovation among the "S" in SMEs to boost productivity and innovation capabilities

As highlighted in Chapter 2, Piedmont suffers from decreasing productivity and many SMEs struggle with weak performance. Raising productivity levels is a strategic development challenge facing Piedmont, and will be key to its successful industrial transition. Given that SMEs form a significant proportion of the region's enterprise fabric, supporting greater productivity, including through innovation, should be a cornerstone – not only of Piedmont's approach to regional development – but also to its innovation policy. Special attention will need to be given to small and micro enterprises.

Piedmont's SMEs, and particularly its small firms, appear to only be capturing a limited amount of value-added from the value chains to which they belong (OECD, 2020[19]). There are a number of factors behind this. Their small size and lack of innovation are two. Yet another factor is SMEs' limited opportunity to move up the value chain for higher reward given how large firms manage the relationship with small-firm suppliers. Cluster members are generally better integrated in local and international value chains (OECD, 2020[19]), one indicator of their better relative performance compared to non-cluster member firms (Marques, P., 2020[2]). To address this issue, cluster membership would need to increase.

Piedmont's firms, including micro-enterprises, could substantially improve productivity by adopting knowledge or technologies that have already been generated. They could also benefit from building managerial and organisational practices in local businesses to manage and accumulate knowledge and organise the business routines needed for innovation. For example, target setting, or quality management and monitoring, are key activities to manage innovation projects across different sectors. During the COVID-19 pandemic, many businesses were forced to reconsider and adapt how they did business, for example, by embracing e-commerce and adjusting their businesses to incorporate e-commerce models (e.g. click and collect) (OECD, 2020[19]). Innovation policy in Piedmont needs clearer support for building productivity through non-R&D focused innovation, and for building the capacity of small, and even micro enterprises to recognise innovation opportunities rather than discard them as irrelevant to their businesses.

Using innovation policy to strengthen value chains

Attention to value chains is also important for building productivity among the smaller firms. How multinational or large firms govern interactions within their value chains strongly affects the business strategies of supplier firms, including with respect to technological development and innovation (Gereffi, Humphrey and Sturgeon, 2005[39]; Marques, P., 2020[2]). When large firms do not or no longer push innovative behaviour from their suppliers it can generate a disincentive on the part of smaller, supplier firms to innovate or generate new knowledge. The result can be limited upgrading. Upgrading occurs when

a firm in a supply chain begins to provide a wider range of goods and services (product and process upgrading) or when it starts supplying higher value-added services (functional upgrading), such as engineering or design, or developing its own brand (Marques, P., 2020[2]). While product and process upgrading can result from a lead firm demanding that suppliers take on more responsibilities, functional upgrading, often considered the more desirable form, happens in a more limited fashion, as it depends on firms acquiring unique knowledge resources. This can lead some SMEs to downgrade their value chain position, for instance by supplying a more limited range of goods and services that carry less risk (Blažek, 2015[40]; Marques, P., 2020[2]).

In recent years, the automotive sector, a stalwart of Piedmont's industrial fabric, has focused on cost-cutting and making supply chains leaner, which means that suppliers have not been actively encouraged to innovate or focus on developing unique knowledge skills. This may explain why it appears that Piedmont's micro and small firms may be appropriating only a small share of the value in the value chains to which they belong: they are choosing to remain in a lower tier and avoid taking on too much risk (OECD, 2020[19]). This may be coherent as a strategy for an individual company. Yet, if too many firms adopt such a strategy, it could negatively affect aggregate productivity within a region or a country. Innovation policy in Piedmont should fully consider the region's value chains, their composition, strengths and weaknesses, in order to help firms in industries that have been targeted for support to overcome the challenges.

One approach to the value chain challenge as it affects productivity is to encourage the development of mutually beneficial relationships between multi-nationals and the region's SMEs. When a region has unique knowledge resources, multi-nationals are more likely to invest in order to engage with local firms or universities, rather than to exploit lower factor costs, such as labour (Crescenzi, Pietrobelli and Rabellotti, 2013[41]; Marques, P., 2020[2]). Flipped around, this concept indicates that when a smaller firm already has the ability to access, integrate and exploit knowledge, it is more likely to benefit from engagement with large multi-national firms. *Centro Estero Internazionalizzazione Piemonte* (CEIP), Piedmont's agency dedicated to internationalisation, could play a strong role in bringing the parties together and working with clusters to nurture such relationships. Success, however, may depend on mechanisms to encourage stronger coordination and collaboration between CEIP and innovation actors, such as the cluster management organisations (OECD, 2020[19]).

Raising innovation capabilities within small (and micro) firms

It will be important not only to improve innovation capabilities among micro and small firms that are already innovating, but also among those that are not. Piedmont's cluster management organisations are a strong lever for this, and their role is extensively explored in Chapter 4. At the same time, networks among smaller firms should be nurtured. This could be done through a series of coordinated activities that help build qualified expertise (human capital) within the firms, and also by increasing the skills of individuals who are already employed. For example, the government could incorporate into its policy programming university-student placement schemes in which the government works with small firms to identify skills needs and matches them with recent university graduates who want practical work experience. Placement schemes could come with fiscal or other incentives to encourage firms to participate in them. This would extend Piedmont's apprenticeship programme, already in place with large firms (OECD, 2019[42]). The United Kingdom's Knowledge Transfer Partnership (KTP) is an example of such a programme, as is the Danish innovation pilot in rural districts (Box 3.6). Aspects of these placement or apprenticeship programmes could be adapted to Piedmont's context, for example, by permitting only SMEs (with a special emphasis on micro-firms) to participate. This would be reasonable given Piedmont's existing apprenticeship programme with large firms.

Box 3.6. University-student placement schemes in Denmark and the United Kingdom

The UK's Knowledge Transfer Partnership

Knowledge Transfer Partnerships (KTPs) are programmes partly funded by the government of the United Kingdom that help firms gain access to knowledge, expertise and resources available in universities. Core to the KTPs are tripartite agreements among a business (or a non-profit organisation), a university and a student. The placement of the student can last between 12 and 36 months, and is subsidised by the state. The KTP initiative, which has existed for over 40 years, involves graduates working on projects identified as central to a company's future commercial development. Whereas an SME has to cover one-third of the costs related to the placement, a large firm has to cover half. The KTPs also involve training for the students before their placement. This helps the student implement the specific projects, drawing on the expertise of the academics involved in the KTPs, and facilitating knowledge transfer, under the supervision of, and with input from, company staff.

The Danish Innovation Pilot in Rural Districts

The Innovation Pilot in rural districts is an initiative launched by Denmark's Innovation Fund. It allows firms located in rural areas with an idea for a particular innovation (e.g. the development of new products, services, or production methods) to apply for funding to hire a university graduate for up to two years. The graduate, whose education profile must differ significantly from the education profiles of the company's staff, must play a key role in creating and developing the innovation project. In addition, the participating firms are required to grant the graduates a certain level of autonomy in managing the innovation project to ensure it benefits both parties involved.

Source: (Jones-Evans, n.d.[43]; Innovation Fund Denmark, n.d.[44])

Piedmont could prioritise innovation funding for projects that promote cross-sector activity and economic diversification, such as digitalisation tools for agro-food companies, or biotechnology solutions for the chemical industry. The overall aim is to ensure the new innovation policy includes guidance or support for helping (smaller) private sector firms attract qualified candidates with tertiary education, and to help foster a closer relationship between universities and the private sector in the innovation space (Marques, P., 2020[2]).

Piedmont's future innovation policy could also support placing researchers in firms for a given period of time (e.g. six months) in order to identify the firm's innovation strengthens and needs. In Spain, the Basque Country's technological centre Tecnalia, has implemented such an approach. Here, a firm hosts a researcher from a technological centre that is tasked with identifying latent opportunities for innovation within the company. The company might not be aware of the opportunity or might not know how to capitalise on it. Piedmont could consider piloting this model with university researchers or others in research institutes. The placement could be subsidised by the public sector with the requirement that the main technological breakthroughs or solutions not be protected by strong intellectual property rights but rather be disseminated to other companies that could also benefit from them.

Better supporting cross-regional collaboration would also be important in the next innovation policy (and S3), both to build innovation among SMEs and to increase institutional thickness. To boost cross-regional collaboration in S3, the European Commission announced a EUR 500 million Interregional Innovative Investment programme. Piedmont could take advantage of this funding opportunity by coordinating with regions that have a similar industrial structure. Such coordination could encourage Piedmont's SMEs to work together in order to ensure that the value-added generated in the value chain(s) is more evenly distributed among them, and avoid arms-length behaviour by multi-nationals. Cross-regional S3

cooperation could also support further internationalisation of local firms. There are two broad, common constraints faced by SMEs, including those in Piedmont, when they seek to internationalise: financial support and general business advice on finding appropriate international partners, marketing strategies, market prospecting, networking, etc. (Abel-Koch et al., 2018[45]). Piedmont could begin to address the first by expanding lines of credit provided by Finpiemonte for internationalisation activities. For the second, the CEIP could further develop or be further encouraged to develop its innovation-related advisory services. Alternatively, a one-stop-shop for all business activities related to innovation could be established. Collaborating with Agenzia ICE, the Italian trade and investment agency, could be valuable in order to create vertical (national and regional) synergies in activities undertaken, benefit from cross-border collaboration (e.g. with other Italian regions) that might arise from networking, access to external partners, clients, etc.

Making the most of Piedmont's Istituti Tecnici Superiori to address a skill deficit

In 2010, the national government introduced a policy of *Istituti Tecnici Superiori* (ITS) to restart vocational education in Italy, which was strong until the 1970s, and then was abandoned in favour of tertiary education. By law, according to the 2010 policy, at least 50% of ITS teachers must come from the private sector, and the training includes student placements. Within this national framework, Piedmont successfully introduced a regional ITS system of seven ITS centres that focus on the six technological areas within the national framework[10] and roughly correspond to Piedmont's S3 and cluster specialisations, with the goal of better integrating skills training and innovation. The seventh is focused on tourism. The ITS are considered pivotal for dealing with the structural problem of low skills and skills mismatches. The latter is achieved primarily by involving firms in the design and delivery of courses, to make sure that skills are well-aligned with industry needs (Marques, P., 2020[2]). ITS are undeniably successful at student placement. Most ITS administrators report at least 80% of students employed within one year after finishing their degrees, with some reporting up to 98% (prior to the COVID-19 pandemic) (OECD, 2020[19]). Yet, Piedmont is grappling with a skill deficit, and the number of students completing ITS-offered training is insufficient to reduce it. In addition, the ITS focuses on youth entering the job market, but this misses the opportunity to also provide reskilling or life-long learning for workers already in the workforce. Furthermore, the ITS do not themselves promote an integrated or multi-disciplinary approach to studies, which limits the development of a "reflex" to multi-disciplinary or cross-sector problem solving when the students finish their studies and enter the workforce.

ITS administrators work hard to attract more students. This has paid off as the number of students enrolled in ITS programmes continues to grow. Yet, the total number of graduates remains relatively low. Optimising what the ITS can offer in terms of skills and training could help address the low skill level of Piedmont's youth who are not enrolled in a university, which is considered a structural problem (OECD, 2020[19]). Doing so would mean overcoming at least three constraints. First, there is a constraint in terms of enrolment. This is due, at least in part, to a general public bias against vocational education training (VET), and a preference to ensure students enrol in a university. While there may be many, individual reasons for such a bias, in general there appears to be a lack of knowledge and understanding about the nature and value of VET. This limits the ability of ITS to attract quality students. Second, the ITS face a financial constraint: their budgets are renewed annually. The lack of multi-annual budget visibility makes it very difficult for them to plan for even the medium-term, and it is considered a fundamental constraint by ITS administrators (OECD, 2020[19]). Finally, the ITS focus on youth, and training young people to enter the job market. This is a crucial contribution to the region, but does not address the lack of skills in the existing workforce. Adding a focus on life-long learning, continuous training and reskilling for established workers could help boost the skill level of Piedmont's current labour force.

Making the most out of the ITS

In the next innovation policy, strengthening the ITS, and helping them grow, will be important. Identifying ways to stabilise their funding would be a first step. ITS are financed by grants from the Ministry of Education, the European Social Fund (ESF) and some private sector financing. While more funds are always welcome in education, it may be less of a question of increasing the financing levels, and more a question of finding ways to establish multi-annual budgets. Even if they had two years of budget visibility, this could already make a large difference. If this is not possible to do for all seven ITS at once, it may be possible to pilot a new budgeting approach with one or two to determine the impact. More effective budgeting practices alone will not attract more students, however. There will need to be an effort placed on changing perceptions regarding the value of VET and the employment opportunities for those who graduate from these training programmes. Investing in a targeted communication campaign designed by – or with input from – the ITS, students and teachers, and supported by the regional government would be valuable. The ITS could also work with social enterprises to attract "difficult-to-reach" and/or often marginalised or disadvantaged groups. Finally, it will be important to encourage ITS to collaborate with each other. This would serve at least three purposes. First, it could prompt ITS to share resources that can alleviate financing shortfalls. Second, it could show students how the different industries or fields are linked, thus helping to build greater integration within the innovation space in the future. Finally, it can also contribute to fostering a culture of collaboration and trust among students, which over time could hopefully spill over into the regional fabric, and building trust within the region in the process.

ITS are already contributing to improving the skill level in Piedmont, but they could do more, particularly by training people who are already in the labour force. Thus, ITS could offer life-long learning courses to help workers refresh existing skills or acquire news ones in key areas, such as digitalisation and industry 4.0, for example. Given the region's challenges with its unemployment rates, and the additional strain on employment (and the economy) arising from the COVID-19 pandemic, the region could consider working with the ITS to offer courses to individuals who have lost their jobs due to the crisis. Ideally, this can help workers prepare to re-enter the labour market with upgraded skills that would make it easier to find employment, and help firms by making it easier to find employees with work experience and relevant skills.

Generating a more integrated regional innovation system: from innovation environment to innovation ecosystem

Piedmont's current innovation environment is characterised by significant number of organisations, including private firms, public sector entities, public-private agencies, such as the seven clusters (*Poli di innovazione*), private foundations, and others. These organisations operate in a region with a long tradition of manufacturing and which has a history of pioneering key Italian industries, despite the current context of economic stagnation. The most well-known example is the automobile company FIAT, headquartered in the Turin area. Yet, the region is also the birthplace of the Italian chemical industry in Novara, and home to Olivetti, born in the city of Ivrea. In the 1950s, Olivetti was the largest typewriter company in the world, and it pioneered the production of electronic calculators as well. This explains why Piedmont continues to host several high-performing economic sectors, including in the production of intermediate outputs, such as advanced packaging or medical devices (Delponte, L., E. Sirtori, 2018[5]). While Piedmont has a rich innovation environment, measured in terms of the number of organisations that exist and the scope of their activities, there is a relatively weak innovation ecosystem. This means that the activities of these organisations are undertaken in parallel to each other, notwithstanding a few important exceptions, rather than in an integrated or coordinated fashion. The lack of coordination among these actors is likely affecting their ability to have a greater impact on the region (Marques, P., 2020[2]).

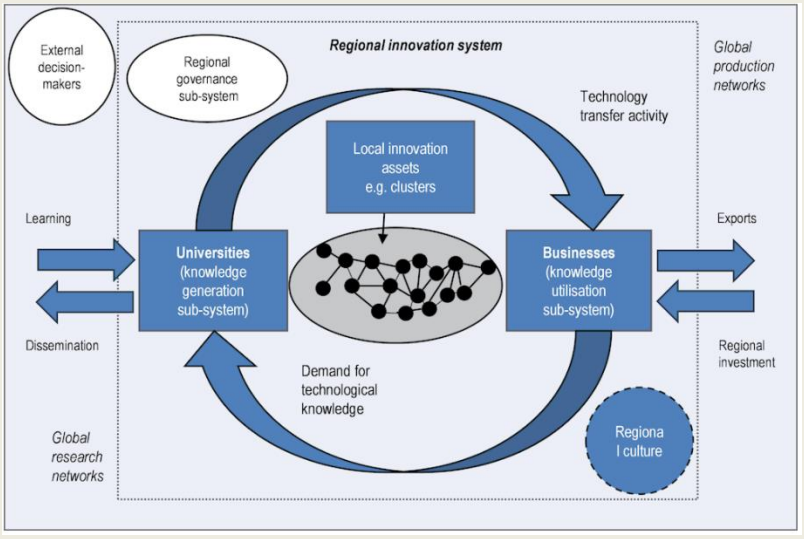
One challenge for Piedmont's next innovation policy is to generate greater integration within the innovation space – to move from an innovation environment to an innovation ecosystem (Box 3.7). Doing so will mean

expanding its approach to policy implementation, and reinforcing coordination mechanisms among innovation actors. Piedmont's current innovation policy relies heavily on cluster organisations for its implementation. The way in which these organisations have been functioning in the 2014-2020 EU Programming Period presents an obstacle for the development of an innovation ecosystem and for generating institutional thickness. They have been narrowly focused in their areas of specialisation and limited in terms of their reach, particularly in terms of their membership and the support services they provide. Overcoming this may require encouraging a more integrated perspective of the specialisation areas, adopting a broader definition to what constitutes innovation within their specialisations, identifying complementarities and encouraging ways for cluster management organisations to work together, and ensuring that they expand their membership base (see Chapter 4). In addition, it could also mean reinforcing the role of other innovation actors as contributors to the innovation ecosystem. Innovation stakeholders in the region have expressed a desire for greater integration, which is a strong step towards building stronger networks within – and beyond – each cluster (OECD, 2020[19]) and generating greater institutional thickness.

Box 3.7. Regional innovation systems: innovation environments or ecosystems

A regional innovation system (RIS) is a complex combination of multi-level considerations (global, national, regional and local) and the interests and objectives of very different actors (public sector, private sector, investors, firms, academia, higher education institutes, civil society organisations, etc.). Evaluating an RIS means mapping the system and its actors, understanding interactions and relationships, and identifying how policy measures can improve these interactions with the recognition that it is a dynamic and not static process. The RIS concept assumes that regional innovation performance increases through more knowledge intensive interactions among partners (Figure 3.3). Each component of an RIS serves a function in advancing innovation in a region. The system works as an environment when its components are less integrated (i.e. there is less of a network) – where each actor fulfils a particular role in its unique space, but does not contribute to the system as a whole. The more networked (i.e. integrated and dynamic) the components of the system are, the more it works as an ecosystem.

Figure 3.3. Regional innovation ecosystems



Source: (Benneworth and Dassen, 2011[46]; Cooke, 2005[47])

A future innovation policy that actively supports a more networked, integrated approach could also help overcome critical obstacles to innovation in the region, such as financing for start-ups and for technology-based firms. The lack of financing for these firms is perceived as an innovation barrier (OECD, 2020[19]) and may contribute to a competitive rather than cooperative, partnership-based approach among actors.

Linking innovation actors and activities

Innovation stakeholders in Piedmont, particularly cluster managers and the regional government, recognise that innovation actors and activities lack integration. Piedmont's cluster organisations do not actively seek to expand their networks. The result is an innovation environment that is rich and dense in its actors, generating its organisational thickness, but also highly fragmented, which contributes to the institutional thinness. This indicates that the necessary scale and critical mass (e.g. in human or financial resources) remain elusive as actors and initiatives focus on individual or unique objectives. System fragmentation can dilute resources and limit the capacity of the region to achieve innovation objectives. This is not an argument for a top-down, or highly controlled, approach to policy implementation – doing so can stifle creativity and innovation. Rather, it is a call for developing a toolbox of effective coordination mechanisms to ensure that actors and actions throughout the ecosystem work together rather than against each other, and contribute not only to their own organisational objectives but also to those established in the innovation policy and beyond.

Creating a single entry point to the regional innovation ecosystem

Creating a single entry point for regional innovation support, for example a website that provides an overview of all innovation support and financing activities offered in the region, can contribute to ensuring that the innovation ecosystem operates in a harmonious way. In Piedmont, the Torino Tech Map platform fills this need, but only for Turin and not for the entire region. The platform localises and describes all of the actors in Turin's high-tech start-up innovation ecosystem, including, investors, incubators, accelerators, training institutions, co-working spaces, associations and innovative start-ups. In addition, it offers training resources for start-ups and additional services such as dissemination of relevant, innovation-dedicated events (Comitato Torino Finanza, n.d.[48]). Another example is Scotland's Highlands and Islands Enterprise (north and west Scotland's economic and community development agency), which launched its "Innovate your Business" portal as a "go-to" place for businesses seeking specialist support and advice about their business ideas and potential opportunities (Scotland Highlands and Islands Enterprise, 2019[49]).

There are two courses of action that could be taken with respect to a single point of entry portal. First, expanding the Torino Tech Map platform in order to cover the region is one option. While one could create a new portal for the rest of the region, this would serve to increase the system's fragmentation rather than reduce it. Here, the Silicon Europe platform could serve as an example. Ten European clusters that represent over 2 000 firms collaborate to promote the network and its members internationally, facilitate the transfer of knowledge and technologies between the cluster members and promote available R&D results for better commercial use (Silicon Europe Alliance, n.d.[50]). Another example comes from the Noord-Brabant Region in the Netherlands. The Brainport Eindhoven platform provides information about the associated universities and firms, and lists job vacancies. It also presents the particular societal challenges it seeks to address through collaboration between government, civil society, the private sector and academia, and provides information on the attractiveness of the region, both in terms of professional opportunities and quality of life (Brainport Eindhoven, n.d.[51]). The second course of action is to establish a portal for the region that distinguishes between start-ups/entrepreneurs and interested investors and risk capital players. Such a portal could offer an overview of all existing innovation support and services available regardless of whether the actor is a tech start-up or not. It could also provide a free digital business diagnostic as a means to encourage businesses incentivised to make use of existing support offers. The diagnostic tool could lead to tailor-made suggestions for further advice or training and provide relevant links (OECD, 2020[52]).

Creating regional innovation platforms around existing strategic themes

Innovation platforms can bring together different stakeholders to identify solutions to common problems or to achieve common goals. They ensure that different interests are taken into account, and various groups contribute to finding solutions. Innovation platforms are particularly useful at a regional and local level because they provide a space for learning and exchange on complex themes. They can be used to explore strategies that can boost productivity, manage natural resources, improve value chains, and adapt to climate change. Some innovation platforms focus on single issues, others deal with multiple topics (OECD, 2020[22]).

In Piedmont, a thematically-oriented regional innovation platform could be designed to connect different stakeholders (e.g. universities, the private sector, and public institutions) and enable a continuous dialogue among them. There are already examples of such platforms being used in other Italian regions, for instance the Open Innovation Platform of the Lombardy Region, the Emilia-Romagna Open Innovation platform, and Open Innovation Campania. The experience of Tampere in Finland is also relevant. The region became a Nokia-led global ICT hub from the 1990s to the early 2010s. With the closure of Nokia's research facility, Tampere needed to modify its innovation model to retain the highly skilled workforce in the region and to maintain its image as a dynamic and innovative place. With the aim of transitioning from its regional cluster policy, based on the dominance of a large company, into an entrepreneurial ecosystem of innovative technological start-ups, Tampere's Open Innovation Platform (OIP) was launched (OECD, 2020[22]). This initiative funds and supports a variety of platforms that stimulate students, firms, and citizens to interact, experiment and co-create new businesses, innovations and services. This support aims to lead to processes that can survive without public funding or which can be co-financed on a PPP-basis. Stakeholders include municipal governments, research organisations, development agencies, firms, public administration organisations and higher education institutions (HEIs). This initiative was launched in 2013, and by 2015 it had 500 people active with programmes and projects, 180 companies and organisations involved. One platform generated more than 100 start-ups and attracted EUR 18 million in funding for start-ups and innovators (Interreg Europe, n.d.[53]). At the same time, the ad hoc and bottom-up approach of the initiatives, such as Tampere's OIP, may not always be compatible with national or international funding mechanisms that support innovation practices. Depending on the regional ecosystem, the OIP approach could be adopted to stimulate bottom-up innovation within existing economic or industry clusters. It could also operate in parallel to them, allowing for innovation in areas that are not currently covered by the different clusters. Facilitating the participation of individual citizens and community organisations in the OIPs can also facilitate inclusive innovation that aims to meet more social and environmental needs.

In order to promote greater diversification and integration, these platforms should be based on broader transversal themes already relevant and present in the region, rather than on specific industrial sectors. At the same time, they need to be future oriented, i.e. based on identified future societal, technological, and business trajectories. Thematic platforms oriented around the circular economy, design and digitalisation, and sustainable mobility would fulfil these two criteria for Piedmont, as they combine actors with various expertise from different industries already based in the region. There is certainly a role for Piedmont's innovation clusters in these innovation platforms, and cluster organisations could be responsible for coordinating or leading them. However, the platform should connect many actors beyond cluster organisation members, including those that may appear to be unrelated to the platform's theme. This could result in unorthodox combinations of knowledge, competencies, and other resources coming together to generate new regional combinations of knowledge. The membership of an innovation platform may change over time as needs arise, and the platform may invite new members to join. For example, a platform focusing on agriculture may invite a company with expertise in water to join if this emerges as a key issue in farm production. It is important to take a long-term perspective when considering innovation platforms, as engaging actors and developing relationships requires time and investment, as well as policy support.

Filling a leadership void with a regional innovation coordination body

Effective coordination of the different organisations and individuals contributing to innovation in Piedmont is considered among the most fundamental of challenges in the region's innovation system (OECD, 2020[19]). This means ensuring the coordination of activities among existing public organisations (e.g. clusters, CEIP, Finpiemonte, etc.), and managing collaborative initiatives among the wide array of innovation stakeholders (e.g. universities, private bank foundations, business associations and others). It is fundamental for an integrated regional innovation system, and should be one of the objectives for regional innovation policy in Piedmont (OECD, 2020[19]).

Innovation ecosystem coordination is usually undertaken by an innovation ecosystem leader (Dedehayir, Mäkinen and Roland Ortt, 2018[54]). The role of an innovation ecosystem leader is primarily to engage in governance-related actions, including to shape the role of other actors and coordinate their interactions (Dedehayir, Mäkinen and Roland Ortt, 2018[54]). This role is currently vacant in Piedmont's regional innovation ecosystem. Some experts attribute this void to the labour force reductions at Fiat (now Stellantis), which leaves it unable to play the leadership role it has in the past, particularly vis-à-vis other firms and public sector bodies such as universities. In addition, Fiat itself may be limiting its role in promoting innovation, for example by not incorporating an innovation dimension into its local procurement strategy. If this is the case, it can limit the incentive for suppliers to develop more complex innovation capabilities. The innovation cluster organisations have not been able to fill the horizontal coordination vacuum left by Fiat. Individually they are too small and narrowly focused to catalyse and accelerate the performance of the entire innovation ecosystem. While taking on this leadership role has not been part of the mandate of cluster organisations, given their importance in implementing Piedmont's innovation policy, proactively stepping in, at least partially, could have been valuable. To move innovation performance to the next level through the upcoming policy, Piedmont will need to give additional thought to the mechanisms that could coordinate and integrate innovation activities among the region's extensive set of innovation actors (e.g. firms and other private sector actors, the public sector, universities, non-profit organisations, social organisations, etc.) (Marques, P., 2020[2]), as well as the resources necessary to sustain such mechanisms and innovation performance itself.

A regional coordination body that is not associated with a specific industrial sector may provide stronger and more sustained leadership within the ecosystem and an individual firm, regardless of its size. It could function as a coordination hub for the activities of existing public organisations (including cluster organisations, CEIP, Finpiemonte, etc.), and manage collaborations with the universities, private bank foundations, business representatives and other stakeholders. In addition, such a body could support policy implementation across the different productive sectors and with different types or categories of firms and actors. Overall, such a body can serve a number of purposes, including to:

- Bridge the strategic aims of the innovation policy and the practical activities of innovation actors, including clusters, and private sector entities.
- Advise regional decision makers on innovation policy design, implementation and performance measurement.
- Actively support the regional-level implementation of national level innovation-supporting policies.

There are a number of forms that this type of coordination mechanism can take, ranging from a broad coordination body, such as a regional development agency (RDA), to a regional innovation agency (RIA), to something "lighter in touch", for example a regional innovation council. These are not mutually exclusive options, and one model is not necessarily better than another. Regardless of the model, however, the activities undertaken by the ecosystem leader should include building relationship-specific assets and inter-organisational trust while forging partnerships, including with new actors that join the innovation ecosystem.

Consider establishing a regional development agency

Currently, regional development agencies (RDAs) are growing in popularity and can play a strong role in supporting policy implementation. However, establishing an RDA requires a clear political mandate, strong government support, sufficient resources (including time), and well aligned interests across government sectors. The focus of an RDA frequently includes innovation but is broader and can encompass regional development planning and implementation, urbanism and transport planning, competitiveness and enterprise growth, SME and business support, etc. RDAs are a good option to link distinct sector policies, such as innovation, with overall regional development policy and objectives. They can also be useful for supporting cross-sector policy coordination and implementation for regional development. However, given the more immediate need for effective coordination of Piedmont's innovation ecosystem and very real resource constraints, it may be better, for the moment, to consider the merits of a regional innovation agency or a regional council for science, technology and innovation.

Consider establishing a regional innovation agency

Regional innovation agencies (RIA) can be particularly effective innovation policy implementation mechanisms given their proximity to innovation actors, which gives them a good understanding of specific local situations. They can also be brokers, promoting and reinforcing regional partnerships and social capital among actors. In addition, because RIAs generally work alongside, rather than within, traditional regional government departments, they enjoy a degree of autonomy. Unlike an RDA, an RIA focuses exclusively on delivering innovation policy. Yet, similar to RDAs, they require political commitment, adequate resources and highly qualified staff (Prota, F., A. Fiore, and M.J. Grisorio, 2012[55]).

In France, Picardie's RIA and Transfers Languedoc-Roussillon (Transfers LR) in Occitanie can serve as examples. The former, a RIA created in 2007, works to reinforce the ability of Picardie's businesses to detect and develop innovative approaches that can be integrated into their activities, in collaboration with other innovation support actors. Funded by the EU, and by the national and regional governments, the agency intervenes at all stages of an innovation project. This includes helping firms apply for EU funding. One of the agency's main activities relates to the coordination of the Regional Innovation Network that convenes advisors and practitioners from a wide variety of organisations specialised in the field of business development and innovation and offers assistance for the creation of technology partnerships for innovation (European Commission, n.d.[56]). Transfers LR, in France's Occitanie region, provides the same services as Picardie's RIA, but also evaluates innovation projects and supports firms by conducting feasibility studies and market surveys (European Commission, n.d.[57]).

RIAs are often closely linked to the regional authority and are generally mandated to:

- Develop an innovation-friendly environment, particularly by creating operational networks between universities, research laboratories, technology centres and the productive sector
- Improve the region's knowledge base and support knowledge dissemination
- Assist in enterprise growth and encourage start-ups and spin-offs via innovation projects

There is no standard RIA model. They can differ depending on the region, the country, the institutional context, degrees of decentralisation, the region's sectoral specialisations and the presence of innovation actors (e.g. firms, clusters, universities, etc.). This said, as exemplified by the two French RIA's mentioned above, they share the common purpose of reinforcing the governance of a region's innovation ecosystem to ensure that innovation policy is effectively delivered. Furthermore, there is evidence that RIAs can help enhance regional innovation performance (Prota, F., A. Fiore, and M.J. Grisorio, 2012[55]).

When considering an RIA it is important to keep the following in mind (Morisson and Doussineau, 2019[58]):

- The private and public sectors must share the same vision for the RIA
- Establishing the RIA within the appropriate level of governance

- The RIA must have the legitimacy, credibility and capacity to mobilise the region's most important innovation actors within the private sector, public sector, academia and civil society, and manage political motivations
- The RIA should be able to monitor not only its RIS but also stay abreast of what is happening in successful RIS around the world, facilitating the identification of internal weaknesses and practical solutions on how to address them
- The RIA must have the mandate and capacity to coordinate many quadruple helices simultaneously, at varying levels of decision-making capacity, and in a wide range of areas, from identifying strategic priorities to implementing and evaluating policy

In theory, an RIA in Piedmont could help address problems of institutional thinness by generating and coordinating arrangements that reinforce the innovation network, bringing together the private sector, the public sector, higher education institutions, bank foundations and/or civil society, fostering cross-sector relationships, and building new relationships among existing actors. It could also serve to constantly monitor or scan the RIS for weaknesses, and identify how to address these and by whom before the risk to the system becomes too great. It would also be important that an RIA be tasked with the diversification of regional economic structures by encouraging the development of new sectors of economic activity that could add value to the regional economy and generate jobs.

As such, an RIA's value added would lie in various areas: in its ability to contribute to policy initiatives that encourage cross-sector cooperation, in expanding innovation stakeholder networks and cooperation, and in facilitating the emergence of new sectors of economic activity.

A new institution does not necessarily need to be founded. An RIA could be created within an existing body. One option would be to create a coordination body within Finpiemonte, for example, as it already has experience working with local firms and stakeholders in the innovation space. Doing so could mean expanding its mandate to include coordination of the innovation ecosystem, of course providing it with the resources (human, financial and infrastructure, if necessary) to do so. By expanding the scope and scale of Finepiemonte's activities (or those of another public institution), the risk of "agencification" is lower (Marques, P., 2020[2]).

Notwithstanding the above, creating an RIA or assigning similar tasks to an existing regional institution, might not be realistic due to financial, administrative or political constraints. In this case, the creation of an advisory innovation council could be a practical alternative.

Consider establishing a regional innovation council or council for science, technology, and innovation

Innovation councils can be national, regional, or even local, and help catalyse and coordinate regional innovation ecosystems. They are frequently structured as advisory bodies to government, composed of representatives from the public and private sector, investors, academia, researchers, and civil society. They can provide strategic guidance on the territory's science, technology, research and innovation needs to improve economic performance and competitiveness, and might also contribute to policy design, propose potential actions for policy implementation, and help establish relevant networks. This is the case with Spain's national Council of Science, Technology and Innovation Policy, and two different regional innovation councils in Greece. The national council in Spain focuses on improving the coordination of research and innovation policies between the national government and Spain's Autonomous Communities. It is responsible for developing the country's science and technology strategy and for prompting joint activities between the national and regional administrations in order to maintain a coherent scientific policy (European Commission, n.d.[59]). In Greece, the Innovation Council of Ipeiros is comprised of representatives from the regional and municipal governments, academia and different chambers of commerce, among other actors. It helps draft the Regional Strategy for Research and Innovation and

establishing a network of cooperation among the different relevant public and private stakeholders (European Commission, n.d.[60]). The innovation council of Thessalia region is also a relevant example, in particular with regard to its institutional structure. It is comprised of representatives from the public sector, academics and the private sector. To support the Council's work it created different thematic working groups on topics such as logistics, health services and the primary sector (European Commission, 2014[61]). There are also several examples of metropolitan areas that have created an advisory body to support local innovation. One example is the Amsterdam Economic Board, which convenes representatives from the Amsterdam municipal government, CEOs of major companies located in the metropolitan area, and deans of HEIs to identify and promote innovation opportunities and set (social) innovation targets, for example in the field of sustainable procurement (European Commission, n.d.[62]). Depending on how innovation councils are set up, they can give innovation stakeholders the chance to come together, identify common strategic goals, shape policy direction, and exchange knowledge, as well as contribute to impact evaluation, as is the case with the San Diego Innovation Council (San Diego Innovation Council, 2021[63]). There are many examples of national and regional innovation councils, however, very few cities have created similar advisory bodies.

When considering coordination mechanisms for innovation policy and the RIS overall, it is important to keep the objective of such mechanisms in mind. Merely establishing one or more coordination bodies does not guarantee the efficient coordination of innovation policy and innovation activities, nor should coordination bodies be considered a panacea. Too many bodies, for example, can add to the RIS complexity and amplify the fragmentation rather than reduce it. In sum, while an RDA might be more effective in linking innovation policies with regional development through its broader mandate than an RIA. Indeed, both require resources, strong cross-sector agreement and multi-stakeholder agreement, and a clear political mandate.

A regional innovation council for Piedmont may be just as relevant and effective. While these councils rely on institutional support in order to operate, for example with a technical secretariat, funding, and infrastructure, it could be a less resource-intensive and still effective coordination option for Piedmont. The value-added of a regional innovation council lies in its potential to provide strategic guidance, participation, advice and promotion of innovation in Piedmont. It can also provide strategic guidance on how innovation can contribute to dealing with grand societal challenges, such as global warming (Fagerberg and Hutschenreiter, 2020[64]).

In the medium to longer term, Piedmont may also wish to consider developing a suite of coordination mechanisms, as is the case in Spain's Basque Country (Box 3.8). Regardless of the model chosen, the effectiveness of the body will depend on having a clear mandate, adequate resources and a set of responsibilities clearly distinguished from those of the innovation clusters and other public agencies, including the regional government.

Box 3.8. Innovation policy coordination in the Basque Country, Spain

Similar to Piedmont, the Basque Country's regional government not only implements policies gear towards other administrative levels (mainly national and European), but also designs, finances and implements its own policies. Consequently, the Basque innovation system includes diverse actors of very different natures, which act as developers, implementers and beneficiaries of the regional innovation policy.

The region has established several coordination mechanisms to manage innovation complexity. Its main horizontal coordination mechanisms are:

- **The 2030 Science, Technology, and Innovation Plan**, which provides the smart specialisation strategy for the region. The plan tries to overcome a lack of coordination between regional government departments, which is one of the weaknesses of the Basque region. The plan is intended to coordinate the policies within different STI domains: (i) science policy, managed by the Department of Education; (ii) technology and R&D policy (including research policy in the energy domain), managed by the Department of Industry and its corresponding agency (i.e. the Society of Industrial Promotion and Restructuring); and (iii) research policy in the health domain, managed by the Department of Health. The Basque Innovation Agency (Innobasque) designed and implements the plan.
- **The Basque Innovation Agency (*Innobasque*)**, whose mission is to foster, in collaboration with other stakeholders, the development of innovation practices and policies. It assists the Basque government in the design, implementation and evaluation of science, technology and innovation policies. For this purpose, it observes and evaluates the Basque science, technology and innovation ecosystem and provides suggestions for its policies and instruments, it also provides training for public sector agents on how to create a more innovation-favourable environment. In particular, it focusses on contributing to increase the number of innovative organisations in the Basque Country, particularly SMEs.
- **The Basque Council for Science and Technology** (*Consejo Vasco de Ciencia y Tecnología*), which is a multi-level mechanism within the region. Its main mission is to ensure the necessary inter-departmental coordination from the definition and design of regional innovation policy to its implementation, including the distribution of the budget. The Council includes: a) representatives from the regional government and the three provincial councils, b) representatives from two of the main innovation-related regional agencies (Innobasque, the Basque Innovation Agency and Ikerbasque, the Basque Science Foundation), and c) representatives of the three Basque universities. Recently, the two technological corporations, Tecnalia and IK4, and four representative companies of private investment in R&D were added. The Council has a Scientific Advisory Committee, which functions as an advisory body to the Basque Council for Science, Technology and Innovation. This Committee is composed of ten professionals of recognised standing in the field of science, technology, research and innovation, who are designated by the President of the Basque Government.
- **The Society of Industrial Promotion and Restructuring** (*Sociedad para la Promoción y Reconversión Industrial, SPRI*). SPRI supports industrial and industrially related companies and research institutes to: (i) improve their innovation capacities, (ii) generate process innovations, and (iii) adopt organisational innovations. It provides tools for companies to obtain financing, apply new technologies, and adopt an international focus. SPRI is also charged with attracting and facilitating foreign investment. Currently, it helps Basque companies in eight strategic areas, including cybersecurity, internationalisation, entrepreneurship, and technology and to attract investment.

The example of the Basque country shows that a variety of coordination mechanisms may be necessary for managing the complexity of innovation policy.

Source: (Morgan, 2016[65]; OECD, 2011[66]; Morisson and Doussineau, 2019[58]; European Commission, n.d.[67])

Reinforcing the governance of innovation policy in Piedmont

Over the past 20 years, the increasing importance of EU regional policy, its instruments and financing resources have progressively strengthened the role of regional governments in shaping their region's development (Bellandi and Caloffi, 2016[68]), including through enterprise and innovation policy. At the same time, this has generated a need for even more effective multi-level governance systems to manage the complex, and mutually dependent relationships among multiple levels of government. In the Italian case, this matrix includes the EU, the national government, regional governments, provinces, metropolitan cities, and local authorities[11]. The previous section highlighted the primary governance challenge found within Piedmont's innovation ecosystem: the need for more effective coordination among actors and institutions. Consideration also needs to be given to how the region's multi-level governance system supports or advances decision-making with respect to Piedmont's S3 and innovation policy, their design and implementation.

When considering a multi-level governance system, in this case for innovation policy, there are three main areas to look at: the framework conditions (the structural and generally fixed parameters for action), the institutions (institutional context), and the governance practices, which when combined shape how policy decisions are made and implemented. In Piedmont, the largest challenges lie in the framework conditions surrounding innovation policy design and implementation. Challenges in the institutional context stem from national and regional concerns regarding quality of governance (QoG). Finally, perhaps among the most urgent practice to consider is the monitoring and evaluation of outcomes associated with innovation policy and initiatives. These various challenges are not insurmountable, but they can be difficult for the regional government to address on its own. At the same time, it is important for the government to identify the limitations and opportunities regarding where it can act to generate change and what it can influence.

Working within the established framework conditions

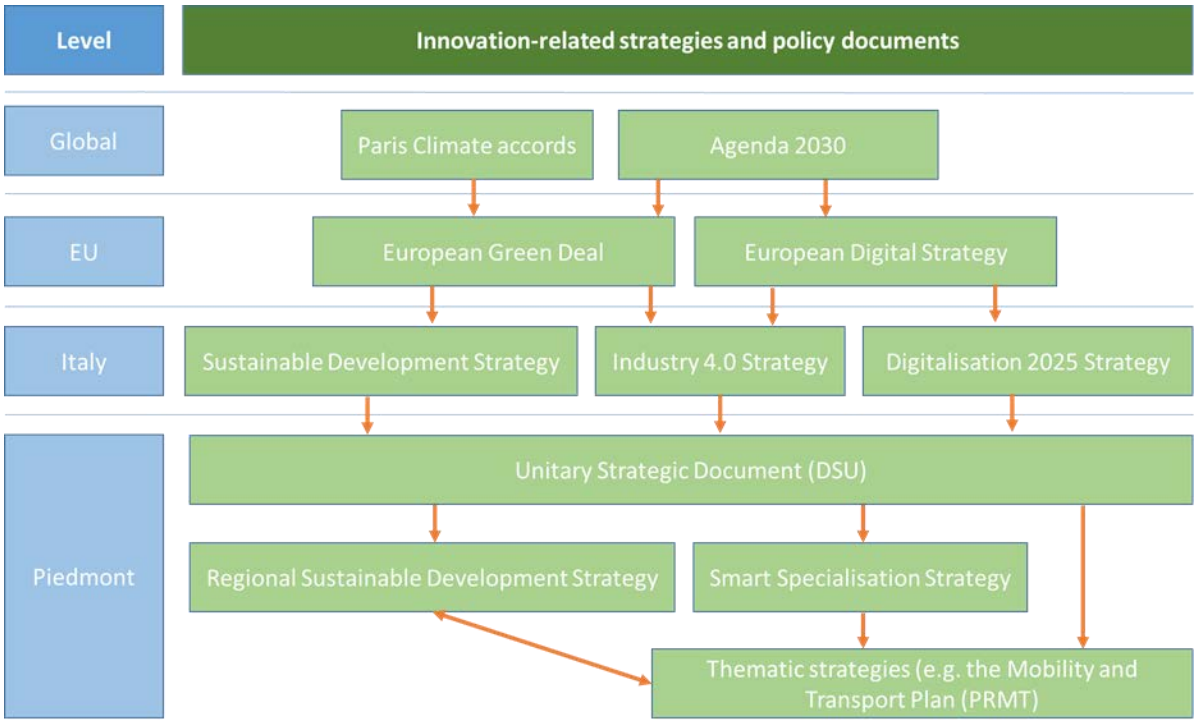
Piedmont's innovation system is governed by a series of externally established agreements, as well as strategic, regulatory and financing frameworks (e.g. the 2030 Agenda for Sustainable Development, the Paris Climate Accord, EU and national regulations and innovation financing mechanisms). Even though many of these fall outside the control of Piedmont's regional authorities, they condition its actions.

Working within multi-level strategic frameworks

Strategic frameworks represent both a strength and a governance challenge for Piedmont, which the regional government can influence with its upcoming S3 and innovation policy.

Each level of government in Italy, plus the EU, directly or indirectly contributes to Piedmont's innovation policy. Piedmont's innovation activities coexist with, and to a degree are embedded in, the Agenda 2030, European initiatives, and in national programmes managed by the Italian government (Figure 3.4). The 2030 Agenda for Sustainable Development and its 17 corresponding Sustainable Development Goals (SDGs) provide the umbrella for action at the global, European, national and regional levels. At the European level, the European Green Deal and the European Digital Strategy shape national and regional innovation strategies. Nationally, and regionally, Piedmont aims to meet similar but also uniquely Italian or Piemontese objectives. This places a complex set of demands on innovation policy, requiring effective multi-level governance. The strategic and framework documents are useful for coordinating the governance of innovation policy.

Figure 3.4. Overview of main global, national and regional innovation-related strategies and policy documents in Piedmont, 2021



Source: OECD elaboration

Piedmont's innovation policy is firmly linked to EU Cohesion Policy and the EU's S3 concept. This has the advantage of ensuring the policy benefits from Cohesion Policy financing. However, it has the disadvantage of placing the region's innovation activity within a relatively tight regulatory framework that can affect action and limit the activity of actors in the innovation space (see below). Both, the region's S3 and innovation policy should also help advance national level strategic objectives found in a variety of innovation-relevant strategies and plans, such as the National Sustainable Development Strategy, the National Plan for Industry 4.0 (*Industria 4.0)* and the upcoming Digital Innovation Strategy 2025. Piedmont does not lack in strategic frameworks to guide innovation, and these documents, for the most part, appear to be well aligned and complementary, at least on paper.

The strength of Piedmont's strategic frameworks as support to innovation policy lies in the regional government's initiatives to ensure that the multiple EU, national and regional strategic initiatives, including innovation policy, are linked to one another, and to articulate these links in an effort to identify strategic and cross-sector synergies. This is well developed in Piedmont's Unified Strategy Document (*Documento Strategico Unitario – DSU)*. The DSU outlines the region's development ambitions for the EU 2021-2027 Programming Period. It establishes the priority lines of intervention for development, and sets the strategic parameters within which the European funding resources will be used in the 2021-2027 Programming Period. It also, very importantly, highlights the synergies among the various strategic documents guiding the region's development initiatives financed by the EU (Box 3.9). It would be important to ensure that the type of dialogue between government actors that supported the DSU's development becomes an on-going cross-sector conversation.

Box 3.9. Linking different EU funding streams in a coherent regional strategy: the Unitary Strategic Document of Piedmont

The Unitary Strategic Document (DSU*)* is a programming document for the region of Piedmont for the EU funding period 2021-2027. The document lays out the regional planning and development vision and objectives, including territorial, economic and social development, and how different regional development tools can help achieve the region's development objectives. These tools include different regional strategies, such as the Regional Strategy for Sustainable Development, the regional Smart Specialisation Strategy (RIS3) and the regional Smart Mobility Plan. It also includes an assessment of how to make best use of the different EU financing streams for Piedmont. These include the Cohesion Fund Operational Programmes, notably the ERDF, the ESF and the European agricultural fund for rural development (EAFRD), and the Next Generation EU – COVID 19 recovery package. Furthermore, the document also describes how regional objectives are aligned with and embedded in national, European, and international policy and development visions, in particular the European Green Deal and the 2030 Sustainable Development Agenda.

The DSU is, therefore, an extraordinary programming document providing coherence and synergy between different strategies and instruments available for strategic regional planning and development. It offers not only a development vision for a smart, sustainable, and inclusive regional development, but also a pathway to achieving the vision through concrete actions that maximise synergies and minimise trade-offs between policy objectives and instruments.

Source: (Regione Piemonte, 2020[69]).

The challenge Piedmont faces with respect to strategic frameworks and innovation policy is to ensure its own regional innovation policy, which reflects the region's priorities, needs and capacities, is effectively carried out. The region's DSU, its S3 and its innovation policy are all fundamental to establishing objectives and providing guidance on how they can be met. However, they are also still "on paper" and moving from planning to implementation is a big step. The institutional context, in this case, becomes critical, and will be explored later in this section.

There is another strategic framework consideration for Piedmont: the need to ensure that its vision for innovation – the role that innovation can play in regional development, and the role of actors in helping achieve its ambitions – within the region is well communicated. This is a challenge in Piedmont where actors, including public agencies such as CEIP and Finpiemonte, operate without a clear strategic view of their place within the innovation ecosystem, and how their organisation fits within the broader picture of the region's development activities (OECD, 2020[19]; Marques, P., 2020[2]). This leads to an inability on the part of critical players to articulate a wider view of future strategic directions for innovation and development policy in the region, and how, as stakeholders, they can contribute to such directions. Instead, they tend to focus on how to improve current actions rather than how they can make substantial contributions to innovation and development policy. There are two aspects to this challenge. The first is within the innovation ecosystem. Often, innovation initiatives are designed as individual activities rather than a suite of related and complementary projects. This can generate effective projects that nevertheless lack building critical mass and capitalising on potential synergies (Interreg Europe, 2020[12]). This is why effective leadership and coordination within the innovation ecosystem are critical. The second aspect is within the overall regional governance system, where agreeing on common, as well as sector objectives can reinforce the regional development policy approach. The DSU can help meet this latter challenge. However, it will be important that the upcoming S3 and innovation policy address the former and break down the "silos" of activity among the various innovation actors. The regional innovation coordination body introduced in the

previous section – an RDA, RIA or Regional innovation Council – could be particularly valuable in this respect, as well.

Working within EU and national regulations

The very close ties between Piedmont's innovation policy and EU Cohesion Policy places the region's innovation activity within a tight regulatory framework. This can limit the activity of the actors involved, including the regional government, in the innovation space.

European-level regulations and requirements for programming and funding are frequently found to be unclear, excessive and can generate a heavy administrative burden. In addition, European regulations are often incorporated into national legislation, adding another layer of complexity, reducing the room to manoeuvre with respect to regional policy implementation and potentially increasing red tape. This can increase the administrative burden for the regional government as it administers Cohesion Policy and other funds to support innovation, as well as imply higher transaction costs for any intermediate body supporting implementation or the beneficiaries receiving the funds (OECD, 2020[70]).

The impact of the regulatory environment on the governance of innovation policy in Piedmont is two-fold. First, it can affect the regional government's ability to ensure that resources are optimised as it implements its innovation policy. An excessive amount of legislation and guidance or the proliferation of multiple conditions coupled with weak capacities can lead to inefficient investment, be it for innovation or any other policy area. The implication is that all levels of government need to work together to find the right balance between systems that are sufficiently rigorous to detect and prevent irregularities in EU financed initiatives, and not too demanding or complex for administrations to manage (OECD, 2020[70]; Ferry and Polverari, 2018[71]). Second, the complexity and bureaucracy associated with EU financing opportunities, such as ERDF or ESF, makes interacting with the system difficult and can exclude smaller (or micro) firms that do not have the capacity to engage with the bureaucracy. At the same time, it can also exclude large players that do not need to seize such funding opportunities, and perceive the cost of engaging with the system to be higher than the benefit it may generate. The result is that valuable actors and potential partners, such as private foundations, prefer to advance innovation and innovation projects on their own or together, but not with public sector actors. For example, Compagnia di SanPaolo and Fondazione CRT, in a partnership the Intesa SanPaolo Innovation Centre, recently attracted the US-based TechStars Foundation to Turin. This foundation specialises in funding start-ups and high-tech entrepreneurs (OECD, 2020[19]; Marques, P., 2020[2]). Regulations and the types of projects that can be financed by "outside" or private sector actors also limit their ability to fully participate in and integrate into the current innovation environment.

These regulatory-based challenges can be particularly problematic in Piedmont as there is a need to increase the engagement of micro and small firms with the innovation policy and in the innovation environment, and project financing can be a powerful incentive. In addition, in order to create a dynamic innovation ecosystem, it will be important to better incorporate large players – be they firms, investors or other financiers. Excluding them or limiting their capacity to engage, for example through restrictive project financing rules, is a disincentive and ultimately counterproductive for all actors concerned.

Framework challenges associated with regulations may be difficult for the regional government to address on its own. The European Commission has proposed several reforms to reduce the administrative burden in the 2021-2027 period. These include establishing one single rulebook, introducing the Common Provisions Framework, and having fewer rules and lighter control procedures for beneficiaries (OECD, 2020[70]). At the same time, consideration must be given to national and regional level regulations and practices. To influence the process, the regional government should consider mapping the EU, national and regional rules and regulations that affect innovation policy implementation, to determine where the burden originates and if it has the ability to streamline procedures.

Working within Cohesion Policy and other investment funding parameters

Potentially the greatest framework challenge within the multi-level governance system of innovation policy in Piedmont is the financing and investment mechanism. Throughout Europe, spending on innovation-related activities has increased, and dramatically. In the 1988-1994 programming period, such activities accounted for about 8% of regional policy expenditures. In the 2014-2020 period, they reached about one-third of total expenditures (Morgan, 2016[72]), and it is expected to be even greater in the 2021-2027 period. Much of this investment relies on EU Cohesion Policy funds[12], particularly on the ERDF, and to a lesser degree on the ESF. Overall, Italy received EUR 44.7 billion in ESIF funding in the 2014-2020 period, of which close to EUR 1.4 billion (a little over 3%) was allocated to Piedmont. This included some innovation-related EU funding from the EAFRD. While not all of this money was spent on innovation objectives, a large share was (Table 3.2).

Table 3.2. Allocated ESIF Budget for Italy and Piedmont by Fund: 2014-2020

Share of EU financing, in EUR

Funds	Piedmont (EU)	Italy Country Budget (EU)
ERDF	482 922 370	21 542 042 052
ESF	436 145 000	10 265 946 183
EAFRD	465 238 000	10 444 380 767
Youth Employment Initiative (YEI)	-	1 880 204 992
European Maritime and Fisheries Fund	-	537 262 559
Total	**1 384 305 370**	**44 669 836 553**

Note: The EU Youth Unemployment Initiative (YEI) and the European Maritime and Fisheries Fund (EMFF) are managed at national level only.
Source: (European Commission, 2021[73])

In the 2021-2027 EU Programming Period, the ERDF Programme for Piedmont will have an allocation of EUR 1.5 billion. The ERDF co-funding rate will be EUR 600 million (40%) and the national co-funding rate (which includes the regional share) will be EUR 900 million (60%). The allocation of funds for innovation – Policy Objective 1: "A Smarter Europe" will cover not only R&D but also digitalisation, SME development support, and skills. This is a shift from the 2014-2020 period, when these four dimensions were separate Priority Axes, and skills did not fall within the ERDF funding remit. In addition to the ERDF programme, the ESF programme will have a total allocation of EUR 1.3 billion. This brings Piedmont's total allocation of Cohesion Policy co-funded programmes for the 2021-2027 period to a total of EUR 1.8 billion.

The heavy reliance on EU funds as a source of financing for innovation activities can limit the region's ability to pursue its own, more territorially specific, innovation priorities. Indeed, in order to benefit from EU funding, the Regional Programme and other innovation initiatives must fit within the framework of the Programming Agreement between Italy and the European Union, the negotiated objectives, and the financing arrangements. Whether this is the case depends on how adept the regional government is in aligning its regional innovation objectives and priority investment areas with those negotiated between the European Union and the Italian government. In addition to the administrative burden associated with EU financial mechanisms, the heavy reliance on EU funds can limit innovation activity among smaller actors. Many may not be able to meet the co-financing requirements necessary to access EU Funds, thereby limiting their entry into the innovation space. It can also dissuade the Managing Authorities for Regional Programmes to accept more innovative projects, as they frequently wish to minimise the possibility of financial corrections and audits (OECD, 2020[70]). In addition, regulations associated with accessing the funds could limit the possibility of tapping into other financing opportunities.

Piedmont uses non-EU funds as indirect support to implement innovation policy. For example, some SMEs may benefit from specific SME support schemes that are financed jointly through the regional budget and ERDF or ESF via a credit guarantee fund (i.e. from Confidi and Tranched Cover), and in doing so advance

innovation-related businesses or projects (OECD, 2020[74]). Another example are the ITS, which are partially financed through the national education budget and which the region receives as a grant, partially through ESF, and partially from the private sector. The combination of these financing streams presents a set of challenges for the ITS and indirectly for advancing innovation policy. First, they are reported to be insufficient. Second, national-level grants are allocated on an annual basis, which makes longer-term planning, which is crucial for growing ITS activities, very difficult, as discussed earlier.

While increasing own-source revenues (i.e. revenue generated by the region through taxes, fees and user charges) to support innovation financing would be ideal, this can frequently be difficult and may not be realistic at the moment. Thus, it would be important to focus on optimising existing financing streams. There are also other EU financing opportunities relevant to innovation such as HORIZON 2020 and COSME, for example, which, perhaps so far have not been maximised by the region. Mobilising EU funds that are not part of the Cohesion Policy funds is an area that the next version of Piedmont's innovation policy should explore further. One such source will certainly be the Next Generation EU COVID-19 recovery package, and specifically the funds associated with the Recovery and Resilience Facility. This temporary instrument was designed to boost the post-COVID-19 recovery. It is the largest stimulus package ever financed through the EU budget, and includes support for research and innovation with a focus on fair climate and digital transitions.

Undoubtedly, increasing public financing and investment for innovation in Piedmont will always be welcome. However, given the framework conditions, it may be more of a matter of optimising existing resources, making the most of the variety of EU and national financing sources, and – to the extent possible – using existing public and private financing opportunities in a more agile way. Identifying and optimising different types of funds and financing opportunities would be extremely valuable. The DSU can support this by highlighting complementarities and synergies across strategic frameworks and policies, each associated with financing. To the extent possible, loosening restrictions on the types of regionally sponsored projects in which the bank foundations or the private sector can participate would also help. Developing a public investment strategy, be it for innovation policy or more broadly for Piedmont's regional development could also be valuable. If specifically for innovation, it could help coordinate innovation investment planning and implementation processes across financing streams, ensuring greater coherence and helping identify complementarities. Given the number of strategies and plans Piedmont is working with and within, it may be just as effective to use the upcoming S3 and innovation policy for this purpose. One way to do so would be to ensure that these documents clearly articulate desired investment outcomes for innovation policy.

Reinforcing the institutional context and institutions to deliver innovation policy

Evidence indicates that institutional context and capacity are among the major barriers to effective S3 implementation (Interreg Europe, 2020[12]). The institutional context in Italy may be particularly challenging, especially with respect to QoG, as measured by the quality of government index.[13] According to the latest European QoG survey, between 2010 and 2021, Italy as a whole saw a drop in its QoG. Between 2010 and 2017, Piedmont was one of the country's regions to experience a significant QoG decline. It reversed this between 2017 and 2021, when Piedmont was among the top three regions in terms of improving their QoG (Charron, Lapuente and Bauhr, 2021[75]). While the regional government can do little to affect QoG at the national level, it could consider how its service delivery capacity, on which QoG measurement depends, is affecting innovation outcomes in the short and medium terms. There are two aspects to the institutional dimension of governance that merit particular attention in Piedmont: administrative capacity and ensuring active multi-stakeholder participation.

Administrative capacity among small municipalities and small enterprises

The administrative capacity of the authorities that design and implement innovation policy and manage its investment process can affect overall policy effectiveness. Generally, QoG contributes to better investment outcomes, which themselves depend on effective administrative capacity. Effective administrative capacity refers to good coordination, institutional stability, appropriate expertise, and effective policy or service planning and implementation (OECD, 2020[70]).

Smaller municipalities in Piedmont face shortages of staff and expertise in designing and implementing innovation initiatives at the local level, and limited technical expertise of staff has been acknowledged (OECD, 2020[19]). This affects the ability of smaller municipalities to be more innovative and engage with innovative mechanisms, such as using public procurement as a lever for innovation policy, for example. In addition, Piedmont also struggles with low capacity of small and micro companies to make use of EU funds. Several stakeholders agree that there are few training activities for small and micro companies to keep abreast of the latest developments with regard to legislation, regulations, procedures, and processes (OECD, 2020[19]). At the same time, the resource capacity (e.g. staff, finances, time) of small and micro firms to take part in training programmes — if and when they are actually offered —is also low. A strong understanding of training needs, and the development of well-targeted, hands-on learning, as well as peer-exchange opportunities sponsored by the regional government could be valuable. Developing such capacity-building initiatives will depend on the region's ability to engage with small municipalities, and micro and small beneficiaries of EU funds to identify their capacity gaps.

Boosting multi-stakeholder participation in the innovation and innovation policy process

Piedmont successfully identified its innovation policy priorities through an inclusive and evidence-based process grounded in the engagement of key innovation stakeholders, including regional universities, business associations, cluster organisations and other innovation intermediaries. These actors participated in the region's entrepreneurial discovery process, which the region used to define the priorities of its innovation and smart specialisation policy for the period 2014-2020 (Regione Piemonte, 2020[69]). The region is using similar consultative processes as it sets its next S3 and innovation policy. However, like many regions, Piedmont struggles to keep stakeholders engaged throughout the process, including refining priority areas, identifying implementation tools, and defining innovation governance and monitoring mechanisms (OECD, 2020[19]).

Effective stakeholder engagement is tricky, it requires time and willingness on the part of the stakeholder, an understanding as to why they are being engaged, as well as capacity and the ability to access the engagement process. In addition, too much engagement, or engagement that is poorly managed, can result in engagement fatigue and be counterproductive. The same applies for engagement processes that are not effectively linked to decision-making processes.

Developing an engagement strategy for innovation stakeholders is one option to be explored. Such documents can align conceptual understanding and definitions with respect to engagement (OECD, 2020[76]), clarify expectations, identify necessary resources and provide guidance for using and communicating the results from an engagement process. They can also build engagement capacity among civil servants and non-government stakeholders.

Engaging stakeholders on their own terms is also important. Online mechanisms and decision tools can be a particularly attractive alternative to traditional engagement methods, especially in the context of the COVID-19 crisis. The practical deployment of information and communication technologies has led to the rise – and increased the speed – of customised Internet platforms, such as social media, chat rooms, online fora, or e-voting. Such mechanisms can be used during the policy design stage, but also to guide policy implementation and monitoring (Fellnhofer, 2017[77]). ICT tools can be used by the region of Piedmont to help stakeholders better understand what the regional government does, including in innovation policy activities. They can also be used to actively involve and engage stakeholders, for example

through electronic participation, which can facilitate reaching out to a wider audience and be more cost-effective than traditional engagement practices (OECD, 2015[78]). Finally, ICT tools can also support inclusive stakeholder interaction. Although evidence on bottom-up civil society engagement efforts is still sparse in the context of smart specialisation (Uyarra et al., 2020[36]), more place-based policy efforts could be targeted to civil society engagement. Such policy efforts hold promise, since an engaged civil society with strong social capital can partly compensate for a region's weak institutional capacity (Rodríguez-Pose, 2013[79]).

Enhancing evidence bases and performance measurement practices for more successful innovation policy

Understanding what is happening in the innovation ecosystem, and the impact the ecosystem is having on a region's development is part of the multi-level governance system supporting innovation policy. To this end, Piedmont's next S3 and innovation policy should be supported by monitoring and evaluation mechanisms that include indicators and specific targets, which can be used to assess policy results and make policy adjustments when necessary

Building evidence bases for innovation policy

Building quantitative and qualitative evidence regarding the region's innovation capabilities, entrepreneurial activities and competitiveness can help regional policy makers better understand their innovation ecosystem and make the most of innovation opportunities. It also helps to match innovation needs – of the region and of the individual innovation actors – to innovation capacities and could be used to attract investment. The emphasis, however, should be placed on attracting investments that match the region's unique knowledge skills, to ensure that FDI is – or becomes – locally embedded. To do this, the region must be very clear on what its unique knowledge skills are and monitor their evolution. Public sector innovation labs that promote bottom-up and more experimental policy approaches are one mechanism that national, regional and local governments use to address this issue. In Piedmont, the Torino City Lab, launched two years ago, is a good resource (Torino City Lab, n.d.[80]). Its strong focus on innovative urban solutions may leave room for the regional government to partner with it in order to expand the model into other sectors and geographic areas. Another option is to support the development of an innovation lab at a regional level, potentially in partnership with the Torino City Lab.

Measuring innovation – frequently an elusive task – is another crucial element of a successful S3 and innovation policy. It may require, however, updating methodologies and indicators. Available measurements largely reflect the industrial era rather than the knowledge-based and digitalised economy. This can leave policy makers struggling to capture the impact of innovative efforts (e.g. the digital transformation). Strengthening monitoring and evaluation capacities and practices implies, among other things: improving consultation with stakeholders to develop goals and design programmes; more stringent collection of data (including the use of non-traditional sources of information); involving representatives from civil society, academia and the private sector in monitoring and evaluation processes; developing clear and publicly accessible monitoring dashboards; and linking investment planning and budget decision-making processes to monitoring outcomes. Regarding the collection and use of data for monitoring and evaluation purposes, it would be beneficial to improve data collection on the amount of public and private investment already in play, where it is channelled and its impact. This could shed light on how investment in R&D in the region benefits innovation and innovation policy, what is working, and where adjustments are needed. This would allow the regional government to further ensure that appropriate conditions are in place for private innovation investment, including FDI.

For Piedmont, it might be useful to identify a dedicated team that would be responsible for innovation monitoring and evaluation within the public administration. Furthermore, making use of analytical and informative tools, including big data, web semantics, etc. would help Piedmont gather and analyse different kinds of data faster. They also promote continuous policy learning, as is emphasised by the monitoring system in Catalonia, Spain (Box 3.10).

Box 3.10. Monitoring the S3 in Catalonia, Spain

The region of Catalonia, Spain, developed the RIS3CAT monitoring system to gain insight into how initiatives undertaken under the rubric of its S3 contribute to the strategic objectives shared by diverse innovation actors. The monitoring system is based on a governance structure that articulates the various initiatives, reinforces synergies and maximises collective impact. It also establishes a common system of indicators and monitoring mechanisms to support decision making by RIS actors. This monitoring system focuses on promoting learning, rather than on achieving objectives. The system itself is dynamic, evolving with the implementation of the strategy. It is also participatory: actors establish the objectives and indicators associated with their projects, provide the relevant qualitative and quantitative information that is useful in adapting the strategy, and determine the smart specialisation process supporting research and innovation in Catalonia. The emphasis on learning supports the continuous adaptation of the region's S3 as well as its implementation mechanisms in order to more rapidly respond to identified challenges and opportunities. It also enables the regional authorities to measure and evaluate the strategy's results and impact.

The RIS3CAT is supported by an interactive web tool – RIS3-MCAT – used to visualise the development of the sectorial and technological specialisation of the region's research and innovation financed by European funds. The platform functions as a data visualisation tool that integrates and interrelates open data from science and innovation projects, making this data interoperable with the aim of:

- Assessing the impact of European funds on the specialisation of the research and innovation ecosystem in Catalonia.
- Identifying opportunities to maximise the collective impact of research and innovation in Catalonia through synergies and the coordination of efforts.
- Providing new evidence to assist decision-making by stakeholders in the research and innovation ecosystem of Catalonia, encourage new collaboration dynamics and inspire new public policies.
- Raising the profile of organisations in Catalonia that participate in European research and innovation networks.
- Understanding how European funds contribute to Sustainable Development Goals (SDGs).

The platform maps the relations between organisations in the R&D+I system in Catalonia, as well as with international partners, and detects the structure and evolution of innovative networks and communities in the various areas of specialisation. For example, the region has used the tool to monitor the potential of its circular bio-economy.

Source: (Generalitat de Catalunya, n.d.[81]; Generalitat de Catalunya, 2021[82])

Reinforcing outcomes-based performance measurement at the regional level

Performance monitoring of policies associated with EU Cohesion Policy funds is particularly challenging. First, is the general and almost universal tendency by actors to perceive performance measurement as a control or compliance tool. Monitoring should ideally be designed as a learning tool, allowing policy makers and all organisations in Piedmont's RIS to assess the quality of their initiatives and adapt whenever necessary (Morgan, K., and C. Sabel, 2019[83]; Marques, P., 2020[2]). Second, is a general resistance to additional reporting by those who must also report to meet EU performance requirements. While EU funds have robust evaluation mechanisms, these focus on measuring investment project and investment outputs. They identify what activities or investments produce with respect to specific, agreed-upon funding objectives and commitments associated with innovation. They are not generally designed to capture the outcome, i.e. the expected or desired change arising from the innovation investment or policy intervention.

This limits their ability to offer insight into an action's broader success and may not help policy and decision-makers identify where to invest more or better (OECD, 2020[76]).

In Italy, strategic programming for ESIF in the 2014-2020 period, and now for Cohesion Policy funds in 2021-2027, falls under the direct responsibility of the Department for Cohesion Policies, which is part of the Presidency of the Council of Ministers. Operational responsibility for programming, coordinating, implementing and monitoring rests with the national Agency of Territorial Cohesion (OECD, 2020[6]). This matters because while the design and implementation of regional innovation policy is in the hands of the regional government, responsibility for its monitoring and evaluation is a national-level exercise, dissociating the policy design aspect from the objective setting and monitoring. While this may be coherent in the context of EU Cohesion Policy fund control, verification and audit, it leaves little room or incentive for the region itself to monitor the impact its policies are having within its territory. This can lead to the question of whether the regional government is expected to consider the impact of its policy beyond the objectives of Structural/Cohesion Policy funds.

While there is a recognised need by regional stakeholders to monitor innovation policy (and S3) results (OECD, 2020[19]), Piedmont is not alone in its limited approach to doing so. A recent study on selected S3s in the 2014-2020 programming period has shown that, throughout Europe, the practice of policy monitoring and evaluation continues to lag behind. The survey finds that most strategies have only been partially evaluated, if at all, which in turn limits learning and the development of an updated strategy that is based on S3 policy outcomes and impact (JRC, 2021[84]). Improving monitoring and evaluation practices is challenging, however, as regions often face limitations with regard to their financial and human resources, as well as gaps in technical knowledge of key staff with regard to defining performance indicators and setting quantitative objectives and targets.

Despite the challenges, it would be valuable for the region to complement its next innovation policy with an outcomes-oriented monitoring and evaluation system. This will require a very clear articulation of objectives that also have measurable components, and an even greater openness to transparency and accountability by regional government, and other pivotal actors that must provide data and information.

Conclusion and recommendations

The importance of S3 – and within these regional innovation policies – as drivers of regional development is likely only to increase. To make the most of the opportunities afforded by S3 and regional innovation, policy makers will need to embrace the complexity of innovation – from the innovation process itself, to its diversity of actors, to the environment in which it occurs.

Piedmont, as a moderate innovator+, and region in industrial transition with a strong history of innovation should seize the chance offered by designing and implementing a new S3 and innovation policy to transform what is currently an innovation environment into a dynamic and productive innovation ecosystem. The region has a number of innovation-related strengths, which should be reinforced. These include its organisational thickness (i.e. the number of organisations engaged in innovation-activities in the region) and the commitment of pivotal actors, such as its education institutions, incubators, and the private sector, to innovation. Its strengths, however, will need to be balanced by greater institutional thickness, and by innovating the current approach to innovation. This can include using a broader definition (or typology) for the kind of innovation the policy emphasises, attracting new players and building the capacities of existing ones, particularly micro and small enterprises, as well as investors. There are a number of ways to go about this. Balancing the current emphasis on R&D-driven innovation with process, product, and business-model innovation is one. Mainstreaming social innovation and by also giving greater consideration to public sector innovation are others. Greater support to SMEs currently outside of the innovation space will be important in this next policy period, as will finding a way to make the region even more attractive for innovation-related investment. Ensuring that the future innovation policy actively supports a more coordinated, networked and integrated approach to innovation will be an important step towards creating an innovation ecosystem and unleashing the innovation potential of the region.

Recommendations for action in innovation policy and its governance for Piedmont

1. Recommendations for broadening the definition (type) and approach to innovation within the new innovation policy

- **Actively support innovation in management, marketing, processes, business-models**, etc. in addition to technological/R&D-driven innovation.
- **Mainstream social innovation**, for example by:
  - launching project calls that are open to any social enterprise or non-profit organisation;
  - supporting partnerships between social enterprises and institutions funding social innovation;
  - building social innovation skills, including through the ITS or other higher education institutes;
  - encouraging cooperation and collaboration among social enterprises;
  - fostering networks between social enterprises and other organisations;
  - support coordination with small business associations.
- **Develop public sector innovation**, for example by:
  - building public sector capacity, skills for and comfort with exploration, experimentation and learning-by-doing, including using performance monitoring mechanisms;
  - encouraging cities in the region to develop innovation strategies; target innovation activities to certain demographic groups (e.g. youth) and in specific areas (e.g. rural communities);
  - making better use of existing public policy levers to advance an innovation agenda, for example through public procurement.
- **Attract new investment partners,** for example by:
  - promoting the region's unique assets and knowledge, e.g. by concentrating efforts on sectors or areas unique to Piedmont, based on a technological diagnostic of the region;
  - fostering networks and more collaboration in areas of complex specialisation, especially among firms currently not in clusters or where collaboration is limited;
  - identifying new, related sectors where there is potential to attract and generate investment.
- **Support innovation among micro and small firms** currently not active in the innovation space, for example by:
  - strengthening value chain relationships between multi-nationals and Piedmont's SMEs;
  - boosting the role of *Centro Estero Internazionalizzazione Piemonte* (CEIP) in building and nurturing relationships between small Piedmont firms and large multi-nationals and helping it develop innovation-related advisory services;
  - incorporating university-student and researcher placement schemes in innovation policy programming initiatives;
  - prioritising funding for projects that promote cross-sector activity and/or economic diversification among smaller firms;
  - further encouraging cross-regional collaboration, particularly among SMEs; expanding credit lines by Finpiemonte for internationalisation activities;
  - developing a one-stop-shop for innovation-related business activities.

- **Address a skill deficit by optimising what the ITS offer**, for example by:
  - stabilising ITS funding by piloting multi-annual budgets;
  - developing a targeted communication campaign to improve the image of VET;
  - partnering with social enterprises to attract "difficult to reach" or marginalised groups;
  - encouraging ITS to collaborate with each other;
  - expanding training to those already in the labour force.

2. Recommendations for moving from an innovation environment to an innovation ecosystem

- **Better link innovation actors and activities**, including by:
  - creating a single point of entry for regional innovation support in the form of a website/single point of entry portal for all actors, or one that distinguishes between start-ups/entrepreneurs and potential investors;
  - creating an innovation platform based on broad, future-oriented transversal themes present in the region (e.g. circular economy, sustainable mobility) that also connects actors beyond cluster members.
- **Improving coordination in the innovation space to fill a leadership void**, for example by:
  - introducing a coordination and/or advisory body that brings together representatives from the public sector, the private sector, academia and civil society, in the form of a regional innovation council;
  - in the medium to longer term consider a regional innovation agency or a suite of coordination mechanisms that address different aspects of the innovation space.

3. Reinforcing the governance of innovation policy in Piedmont

- **Continue and reinforce the good practice of identifying and strengthening links among global, EU, national, and regional strategic documents**, including by:
  - ensuring ongoing consultation and dialogue with government actors at all levels regarding innovation and regional development priorities;
  - more clearly communicating the region's innovation vision to regional innovation actors.
- **Begin to address concerns of administrative burden and excessive red tape,** for example by:
  - mapping EU, national and regional rules and regulations related to innovation policy and programming implementation to identify where procedures can be streamlined, and communicating these efforts to stakeholders.
- **Optimise existing streams of investment financing for innovation**, for example by:
  - loosening restrictions on the types of regionally sponsored projects in which non-government, non-cluster actors can participate;
  - introducing a public investment strategy component in the new innovation policy, ensuring that they also articulate the desired investment outcomes associated with the innovation policy.
- **Build the administrative capacity of municipal governments and micro and small firms** to be more innovative an engage with innovative/innovation mechanisms (e.g. innovative public procurement), including by developing well targeted, hands on learning and peer-exchange opportunities.
- **Enhance evidence bases and performance measurement practices** by:

- building quantitative and qualitative evidence regarding the region's innovation capabilities; developing an innovation lab for the region;
- more actively monitoring and evaluating innovation in the region to capture the impact of innovation efforts; improving innovation-related data collection;
- building an outcomes-based performance measurement system for the new innovation policy, independent of the monitoring undertaken for EU programming.

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Notes

[1] "R&D expenditure in the business sector as a percentage of GDP" (39 out of 40); "SMEs introducing business process innovations as percentage of SMEs" (37 out of 40); and "Employment in knowledge-intensive activities as percentage of total employment SME's" (19 out of 40).

[2] The Regional Innovation Scoreboard 2021 includes data on all Belgian, French, Spanish and Swedish benchmark regions. No aggregate data is included for the German benchmark regions of Baden-Württemberg, Bavaria and Saxony. These are represented by individual cities (NUTS 2 level). As such, it might be that, on the aggregate level, one or more of these three regions performs better on the selected indicators than Piedmont.

[3] European Structural and Investment Funds (ESIF) were adjusted for the 2021-2027 programming period and are now called Cohesion Policy Funds.

[4] Chapter 4 of this report explores Piedmont's cluster model in detail.

[5] The entrepreneurial discovery process is a bottom-up process of interaction among a region's universities, the public sector, private sector and civil society organisations (quadruple helix) with entrepreneurial knowledge (Interreg Europe, 2020[12]).

[6] The remaining 70% is allocated to technology platforms; IR2 – targeting large beneficiaries; SCUP targeting start-ups with high potential; IFRA-P and V-IR targeting research and technology infrastructure and SME access to them.

[7] A 'social economy organisation' refers to associations, cooperatives, mutual organisation and foundations with activities grounded in solidarity, the primacy of people over capital, and democratic and participative governance (https://www.oecd.org/cfe/leed/social-economy/).

[8] The DSU outlines the region's development ambitions, highlighting synergies among various EU strategic documents and regional policies, and helps define investment priorities for the EU 2021-2027 Programming Period.

[9] Innovation capacity is defined as the human, financial and institutional resources and skills that can generate, implement and advance cutting-edge, inclusive, long-term and bottom-up problem solving. The resources and skills could include data analytics, resident engagement, human-centred design or other iterative design methods, behavioural economics, and inter-sectoral and inter-jurisdictional collaboration.

Innovation goals are short- and long-term aspirational outcomes for residents, businesses and the community. Innovation strategies set the course towards achieving innovation goals (OECD, 2019[83]).

[10] The six nationally established areas are: sustainable mobility; new technologies for life; new technologies for "Made in Italy" products; innovative technologies for cultural heritage and tourism; ICT; energy efficiency.

[11] Provinces, metropolitan cities, and municipalities play a role in innovation policy, but to a lesser extent than the regions. The statutory autonomy of provinces, metropolitan cities, and municipalities, was recognised in 1990 and enshrined in the Constitution in 2001. However, Law 56/2014 "Reordering the Territorial Organisation of the Country" reinforced the role of regions and municipalities, limited the role of provinces and conferred more responsibilities to metropolitan cities. Provinces lost their status as elective bodies and became territorial bodies for wide areas (*ente territoriali di area vasta*), now responsible primarily for local planning and zoning, local police and fire services, and transport regulation (e.g. motor vehicle registration, maintenance of local roads, etc.). Metropolitan cities were recognised as government entities in charge of formerly provincial responsibilities. Smaller municipalities were encouraged to merge with larger ones to reduce fragmentation at the local municipal level (OECD/UCLG, 2019[88]). Metropolitan cities and municipalities support innovation locally, though the capabilities for project design and implementation in smaller municipalities are often limited (OECD, 2020[7]).

[12] What was known as the European Structural and Investment Fund (ESIF) in the 2014-2020 programming period is now called the Cohesion Policy Fund in the 2021-2027 programming period.

[13] This index measures quality of governance (QoG) by asking a representative sample of the population in each European region for an evaluation of public services such as schools and police, and for their perception of corruption (Charron, Lapuente and Bauhr, 2021[75]). The argument sustaining this methodology is that quality of public services tends to be highly correlated with other measures of QoG, including levels of corruption, transparency, etc. As such, the authors claim that the measurement of the perception of the quality of public services can function as an indicator for QoG in general.