

Industry 4.0 Ecosystem in the Veneto Region

In accordance with the Italian Industrial National Plan 4.0 2017-2020 from the Italian Ministry of Economic Development, the Veneto region has created a regional ecosystem aimed at spreading knowledge about the I4.0 plan among firms, helping firms in their digital assessment and digital strategy activities, creating new skills about 4.0 technologies, and supporting innovation and R&D activities. This ecosystem includes three main “species”, that operate at different levels and whose activity is most relevant for firms of different sizes.

1. At the **micro level**, and mostly operating with micro and small enterprises that need to implement micro projects aimed at increasing their level of digitalization, there are two main categories of actors:
 - The PIDs (Punti d’Impresa Digitale) managed by the local Chambers of Commerce aimed at spreading knowledge about I4.0 technologies and providing business support activities;
 - The Digital Innovation Hubs managed by the local business associations (CNA, Confartigianato, Confindustria, Confcommercio) aimed at providing training and managing technology transfer activities.

In Veneto, there are 5 PIDs (Padova, Treviso-Belluno, Venezia-Rovigo, Verona, Vicenza) and 4 Digital Innovation Hubs: t2i - Treviso (European DIH), Galileo Visionary District (Padua), DIH Belluno, DIH Vicenza, and DIH Verona.

2. At the **meso level**, operating with both large companies in the region and small companies, together with regional institutions such as Confindustria (Ecipa), t2i (European Digital Innovation Hub) and the Veneto Region, there is a regional innovation network called Improvenet, coordinated by the University of Padua. Improvenet is a regional network specifically focused on ICT technologies and their application to manufacturing firms, thus their activities are centrally aimed at increasing the adoption and relevance of I4.0 technologies in the region. Improvenet represents a **best case in the region whose model could be transferred to other regions/countries**, for three main reasons:

- The network includes **three different types of actors** (private companies, research organizations, and local institutional trade associations) with a common goal: building a Veneto Industry 4.0 model. Together, they have founded a network of companies aimed at accelerating the path of the Northeast manufacturing system to become more automated and interconnected. The cluster, launched in 2017, has about sixty members, of which six are founding members: the industrial groups Galdi, Santex Rimar and Desamanera, the Univeneto Foundation which brings together the four universities of Padua, Verona, and the Venetian Ca’ Foscari and Iuav, Confindustria Veneto Siav and T2i, the innovation agency participated by the Chambers of Commerce of Treviso-Belluno, Verona and Venice-Rovigo Delta Lagoon. The network is meant to be an ecosystem of skills that can be combined to realize valuable synergies, designed to allow the associates to access different skills, also through the relationship with research institutes, creating a unique chain of knowledge processes essential for business growth. By participating to the same network, SMEs can collaborate with companies with high knowledge content services and with universities to increase their capability to innovate and build joint initiatives, including joint participation in funding calls. An active role within the consortium is then represented by trade associations, effective in supporting the network in identifying the strategic needs of companies.

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- The activities of the network are **closely linked to the real needs of companies**. Associates meet periodically to discuss the needs of the participating companies, identify and select the most strategic ones for the entire supply chain, and propose pilot projects and initiatives to be developed with the collaboration of all partners. With this approach, the Improvenet's associates have already participated to different pilot projects in collaboration with other regional networks, including two projects that are well on the way: (1) the PREMANI program, which has a value of 5.3 million euros (of which 3 from the Region) and includes 18 partners, focused on predictive manufacturing, and aimed at using a branch of applied technology (e.g., complex forecasting models, infrastructures and algorithms) to assess the state of efficiency of machinery and processes and predict equipment failures and anomalies to prevent them; (2) The Admin 4D program, with a value of 1.8 million (of which 1.3 from the Region) through which Veneto aims to increase the smart component of additive printing systems (e.g., process control systems that can limit errors in the phases of realization of manufactured items) through IoT systems.
3. At the **macro level**, design primarily to suit the needs of companies (large companies and SMEs) and research organizations involved in **large and complex research projects**, the Smact Competence Center (whose name Smact-CC stands for “Social networks, mobile platforms and apps, advanced analysis and big data, cloud, internet of things”) is a public-private consortia aimed at providing advanced training and experimental research projects. SMACT was funded through a 7 million funding round from Mise (the Italian Ministry for Economic Development), with the aim to allow companies and universities to submit their joint research proposals focused on specific digital technologies (particularly IoT, Artificial Intelligence, and Big Data), and, if successful, provide co-funding for up to 50% of the value of these projects. The companies whose projects are co-funded can then benefit from the competences of eight universities, two research centers, as well as the skills of technology and service providers. SMACT is also actively working to realize three “Live-Demos”, small factories where companies can experiment and see first-hand how digital technologies can benefit them. Differently from the other 7 competence centers in Italy (located in Milan, Turin, Genoa, Bologna, Pisa, Rome and Naples), the Smact-CC's expertise is specifically focused on **four technology clusters**: (i) **social networks**, (ii) **mobile platforms and apps**, (iii) **advanced analysis and big data**, (iv) **cloud**, and (v) **internet of things**. The main goal of the competence center is to foster collaboration between large firms and SMEs whose resource endowments are limited, in order for them to work together and benefit from the co-funding and advanced skills of the researchers at the center.
4. At the **national level**, the Veneto region and the Improvenet network are also part of the “Cluster Nazionale Fabbrica Intelligente” – National Smart Factory Cluster, whose aim is to propose, develop and implement an innovative strategy that can guide the Italian manufacturing sector towards the creation of new skills, research activities, new products and services, processes and technologies. In addition to Veneto, seven other Italian regions are involved: Emilia Romagna, Liguria, Lombardy, Marche, Piedmont, Puglia, Sicily. Altogether, these regions represent a very significant slice of the Italian manufacturing system, with over 330 thousand companies employing about 3 million people: 2/3 of the total Italian industrial employment.

The Veneto region has also different **scientific and technology parks**, as well as **incubators and accelerators** aimed at developing innovative startups but also offering innovation consultancy services for established companies. The science and technology parks in the region include:

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1. **Galileo Visionary District**, which is also the Digital Innovation Hub of Padua, whose aim is to “facilitate and promote research, technology transfer and innovation among companies” (<https://www.galileovisionarydistrict.it/galileo-digital-innovation-hub/>) by offering services including R&D, education, and startup incubation. The district collaborates with local stakeholders in terms of innovation and industry 4.0 (chamber of commerce, university, living lab, competence centre, etc), and, on July 2018, it has obtained the certification of Technology Transfer Centre Industry 4.0 (Decreto Direttoriale MISE 22 dicembre 2017). GVD work with companies operating in traditional industries (Agrifood, Furniture, Mechanics, Fashion, Eyewear, Sportsystem, Carousel production, etc.), as well as in innovative sectors including Sustainable Packaging, Biomedical for digital Health, high-tech companies and Digital startups. Its main activities include:
 - Supporting SMEs in the definition and planning of strategic actions for their digital development. In this sense, the Galileo process operates as follows: first, the company is accompanied in a process of strategy reviewing in a digital and industry 4.0 perspective, aimed at supporting it in understanding its needs and identifying the correct pattern of innovative development using specific tools (e.g., design thinking, lean start-up machine, killer idea, etc.); second, according to the strategic plan, an operational program is drawn up; third, at the operational level SMEs are accompanied on the 4.0 innovation path identified in the strategic and tactical plan.
 - Offering technology transfer services, training, and technical consulting activities to enterprises in specific fields, including: (1) Solutions for advanced manufacturing; (2) Additive manufacturing; (3) Augmented reality and virtual reality; (4) Simulation of product and/or production and/or logistic systems; (5) Industrial Internet, Internet of Things and / or Internet of Machines; (6) E-commerce systems; (7) Geolocation; (8) RFID, barcode, tracking & tracing systems; (9) System integrator applied to process automation; (10) innovative materials (through MaTech). In these fields, Galileo offers: (1) Technological training; (2) Training and consultancy on organizational and/or business, technical and industrial models; (3) Design and planning of implementation interventions for Industry 4.0 technologies; (4) Industrial research and experimental development including virtual prototyping; (5) Analysis, monitoring and technological brokerage services.
 - The GDV also includes a startup incubator (IoT Cube) focused on the design of connected devices in the Industry 4.0 framework. Thanks to a partnership with Scuola Italiana Design in Padua, the GDV offers demonstration spaces on the subjects of additive printing and digital prototyping (e.g., a “digital gym” with 3D printers, and 60 workstations with state-of-the-art hardware and software). As explained in the district’s website, “the aim of creating these spaces is to provide companies with a practical example on the issues linked to the Industry 4.0 paradigms, seen as a fundamental element for relaunching competitiveness, not only approaching and informing potential users of these technologies, but also showing their use.” (<https://www.galileovisionarydistrict.it/galileo-digital-innovation-hub/>)
2. **The VEGA Science and technology park** (Venice Gateway for science and technology), the technological and innovation city of Venice operating through a network of universities, research centers and the production sector. Its specializations are nanotechnology, ICT and green economy.

The most important **startup incubators and accelerators** in the Veneto Region are:

1. **H-Farm**, based in Roncade, a private venture incubator born in 2005 with the aim of promoting the birth and growth of innovative digital businesses, now focused also on strategy and digital consulting projects mostly for large companies and education. H-Farm is one of the most important incubator and digital hub in Italy and Europe and has offices also in other countries. H-Farm supports the

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development of a culture of innovation through three main business areas. The first, Innovation, is aimed at helping companies activate renewal, digital transformation, and implementation of new business models. The activity of the innovation team focuses on corporate culture and strategy, and is aimed at creating together with its customers new ways of meeting with innovative companies very often from all over the world, who find here an expert partner in making possible meeting between corporates and start-ups and facilitating their dialogue, promoting the creation of value for both, thanks to dedicated scouting and exploration programs. The second, Education, is aimed at developing entrepreneurs and managers at the helm of the digital transformation of the future, providing school paths from kindergarten to the Degree course in partnership with Ca 'Foscari in Digital Management. Finally, Startup Ecosystem continues to invest in the most promising business ideas across Europe by providing them with the tools to become successful businesses.

2. **M31** in Padua, born in 2007 and active as both an incubator and as consultant for established firms;
3. La **Fornace dell'Innovazione** in Asolo. Founded in 2007 with the aim of supporting the development of high potential business ideas, today the Fondazione la Fornace dell'Innovazione has expanded its product portfolio to include services oriented to companies operating outside its own spaces. The Fornace Foundation today defines itself as a "connector between innovative ideas, companies, entities and organizations", which, by promoting collaboration between innovative companies and the territory is able to "generate value for all those involved." Two main channels through which processes of open innovation and meeting between start-ups and companies as well as strategic renewal are stimulated and supported: matching, and corporate culture. The matching services provide for the analysis of companies' innovation needs, the scouting of innovative start-ups that can respond to these needs, support in creating a dialogue between them, and support in managing the inter-organizational relationships formed as a result of these activities. Services aimed at stimulating corporate culture towards greater openness to entrepreneurship and business start-up, innovation, and strategies aimed at transforming the challenges of the future (linked, for example, to an increasingly pervasive influence of technologies digital both in business processes and in the consumption habits of end users) in opportunities for renewal.

Finally, the most important **technology transfer institutions** in the region are:

1. T2i, a consortium company based in Lancenigo di Villorba (TV), born in 2014 from the union of Treviso Tecnologia and Polesine Innovazione, promoted by the Chambers of Commerce of Treviso and Rovigo to encourage technology transfer and production innovation. From 2015, t2i also includes "Verona Innovazione" (Verona Innovation). T2i is also a European Digital Innovation Hub, offers incubation services, and is part of the ICT regional innovation network Improvenet.
2. Veneto Innovazione S.p.A., based in Venice, the in-house agency of the Veneto Region for the development of the territory. Its main objective is to promote innovation and the applied research system of the Veneto Region abroad. The agency favors the creation of public-private partnerships, opening knowledge transfer channels and opportunities for businesses, research centers and institutional actors. Both Veneto Innovation and actively t2i participate to several Central Europe Interreg projects focused on transnational innovation and competitiveness.

Regional Technology Specializations and expected Impact from Industry 4.0

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Concerning the regional technology specializations and the Veneto Industrial Plan, the region has nine main technology specialization clusters that are considered as the most strategic for the competitive development of its enterprises. These are:

1. Advanced Robotics & Machines
2. Predictive manufacturing
3. Technologies that can minimize production defects (zero defects manufacturing)
4. Additive Manufacturing
5. Big Data
6. Data analytics
7. Process optimization
8. Human---machine interfaces
9. Virtual prototyping
10. Internet of Things

The Smart Specialization Strategy (RIS3) of the Veneto region identifies four main regional specializations in which these technologies can be particularly beneficial: (1) Smart Agrifood; (2) Smart Manufacturing; (3) Creative Industries; (4) Sustainable Living. For each of these sectors, companies in the region have identified a detailed list of pilot projects through which I4.0 technologies could benefit them (attached in Annex 1). **Transnational cooperation could be a great opportunity to realize some of these actions (for instance, through transnational pilot, cooperation between technology-seekers and provides across regions, development of transnational open innovation labs focused on some of these strategic areas/industries).**

1. Smart Agrifood

The agri-food chain is the engine of the excellent tradition of quality of the Venetian food products. While being one of Veneto's most traditional sectors, it also represents an with great potential, excellence, and opportunities to develop research and innovation actions. The main weaknesses of this sectors are the prevalence of small-scale production realities, their consequent inability and often unwillingness to collaborate and create a system and, finally, the difficulty of these companies to seize innovation opportunities, and gather the resources and skills needed for their development. According to the Regional Innovation Strategy as developed by the Veneto region and its companies in this sectors, ICT technologies could enable agrifood companies in the region to increase their competitiveness in the following areas:

- Nutrition, health and food safety
- Sustainable agri-food
- Intelligent management of natural and energy resources
- Innovative and sustainable transformation processes
- Traceability and protection of the supply chains

2. Smart Manufacturing

Smart Manufacturing is a term that represent the set of processes, activities and knowledge that derive from the introduction of "intelligent technologies" within the design and production systems of manufacturing companies. These innovations, which constitute the heart of what the "Fourth Industrial

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Revolution” is about, can significantly increase companies’ production effectiveness and product quality, and improve workers’ experience in production facilities as well as business processes. Thus improving the “smart” component of machines by adding a digital layer to manufacturing facilities is strategic for a region which is already rich in small and medium-sized manufacturing companies, that must increasingly focus on increasing the efficiency of their organizations, their competitiveness both nationally and internationally through the very high quality of their products, and the well-being of employees. Industry 4.0 technologies can thus help those companies create efficient production processes by combining their traditional know-how with new IT systems, automation, energy efficiency and organizational innovations. The possible development areas identified by the Region in collaboration with the manufacturing sector companies are:

- Innovative and sustainable production and processes
- Cognitive systems and automation
- Innovative and inclusive workspaces
- New organizational and production models
- Advanced design and production technologies

3. Creative Industries

The Veneto region has a strong tradition of creative and cultural industries, which is one of the liveliest sectors and most excellent sector in the region. The fashion industry, for instance, is one of the well-known excellence of the Veneto, alongside associated accessories and services (e.g., glasses), quality craftsmanship, high-end industries, glass and other typical artistic artefacts of the area, fabrics and objects for the furniture, and the sport system. The digital age has significantly disrupted companies in these sectors, by revolutionizing the way these companies interact with their increasingly demanding customers – whose expectations and preferences change way more quickly than in the past; bringing rapid technological progress including innovation in materials, and changing the dynamics in commercial competition through significant variations in production costs resulting from global competitiveness.

The research actions planned for the benefit of this sector of specialization are mainly oriented towards the innovation of creative and sustainable production processes that can harness the power of digital technologies to increase the originality of the products and customer satisfaction (e.g., through increasing and financially sustainable customization). In this scenario, new environments for the display of products, 3D visualization and virtual or augmented environments, new tools for online marketing, shared digital spaces that allow multimodal and creative interaction are particularly relevant. The possible areas of development identified by the Region in collaboration with companies in the creative / cultural sector are:

- Innovative materials and biomaterials
- New business models
- Creative designs
- Innovative marketing and product virtualization
- Technologies and systems for the use of cultural heritage

4. Sustainable Living.

Sustainable living – including efficiency and environmental safety, housing conditions, and enhancement of cultural heritage – is an emerging area in Veneto. In this context, innovative technological systems for

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monitoring, optimization and innovation of living conditions (particularly with regards to the elderly and most vulnerable citizens) represent a critical development area. Technological tools of automation can ensure a safer and optimal management of homes, places and public spaces, an increase in security and possibility of economic savings. In terms of cultural heritage enhancement, innovative information technologies can also increase visitors' accessibility and innovative usage of the region's wide range of tangible and intangible cultural assets. The possible areas of development identified by the Region in collaboration with businesses in the sustainable living sector are:

- Smart and sustainable buildings and cities
- Architectural restoration recovery and regeneration
- Well-being in living environments
- Safety and health (independent and active life)

Across all industries, the most urgent development opportunities for the region are:

1. Increasing companies' implementation capabilities of innovation projects (facilitating access to qualified resources, supporting not only the development of strategic plan but also their execution, increasing the financial sustainability of innovation projects for micro and small enterprises and their access to financial resources);
2. Increasing firms and citizens awareness not only of the importance of ICT technologies, but also of the value and importance of data and of finding new ways to deploy them within their businesses in value creating ways – especially as a new competitive avenue for traditional sectors;
3. Fostering vertical and cross fertilization by identifying, mapping and fostering networking of “hidden” excellence and specializations, in order to help them overcome isolation and increase opportunities for collaborative innovation.
4. Rethinking the governance structure of regional innovation networks to increase their autonomy and ability to participate to innovation projects outside the region and collaborate with other entities;
5. Enhancing regional firms' attractiveness towards talent and exceptional candidates, foster people empowerment, exploit underused resources (e.g., managers that have lost their jobs and that have extremely valuable competences), and reducing the critical “brain drain” phenomenon;
6. Support innovative or knowledge-intensive start-ups and research spin-offs and foster their business opportunities with companies in the region.
7. Enhance the regional ICT infrastructure of European and international research infrastructures. These include, for instance, Ultra Broadband networks, security protocols and systems, API Management platforms, digital Identity services, and payment platforms.
8. Promote a more widespread use of ICT, also in the public sector.

Main regional Sources:

PIANO STRATEGICO REGIONALE DCR N.74 2016:

https://www.venetoclusters.it/sites/default/files/allegati/PIANO%20STRATEGICO%20REGIONALE_DCR%20n.74_2016_0.pdf

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RIS3 Veneto (SMART SPECIALISATION STRATEGY OF THE VENETO REGION):

https://www.venetoclusters.it/sites/default/files/allegati/RIS3_Veneto_Febbraio_2016.pdf

<https://www.venetoclusters.it/sites/default/files/RIS%203.pdf> (presentation of the RIS3 strategy and development trajectories)

<https://www.venetoclusters.it/sites/default/files/approfondimenti/Evoluzione%20RIR%20Distretti.pdf> (presentation of the RIS3 strategy and development trajectories)

<https://www.venetoclusters.it/sites/default/files/allegati/PercorsoFineTuning.pdf> (development trajectories, particularly important from page 38)

<https://www.venetoclusters.it/content/approfondimenti> (list of useful documents/presentations)

<https://www.venetoclusters.it/sites/default/files/approfondimenti/Verso%20nuove%20traiettorie%20RIS3%20Veneto.pdf>