



Analysis of National Initiatives for Digitising Industry.

Italy: Piano Nazionale “Industria 4.0”



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Disclaimer: The views expressed in this document are those expressed by the experts conducting the analysis of the national initiatives on digitising industry and do not necessarily represent the view of the European Commission on the subject.

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Executive Summary

General Background: The Italian economy is the 4th EU economy and the 8th worldwide one. The motors of the Italian economy are manufacture of motor vehicles, trailers and semi-trailers, production of rubber and plastic goods, manufacture of electronics and the production of computers, electronic and optical devices and equipment; accounting for 70% of the Italian exports. The Italian industrial sector holds some peculiarities (1) Few large industrial and ICT private players able to lead Italian manufacturing transformation (2) Limited number of industry champions able to coordinate the evolution process of value chains (3) Industrial sector deeply based on Small and Medium enterprises (4) Key role of illustrious universities and research centers in development and innovation (5) Strong cultural traits of finished products. Italian manufacturing companies represent the engine that drives the country's economic growth and development thanks to their ability to produce wealth and employment, make associated industries and services flourish, and contribute to the country's financial, economic and social stability. It is therefore in Italy's interest to create an environment that is favourable to business. Industrial policy is back on top of the Government's agenda. The "Industria 4.0" National Plan represents a major opportunity for all companies that are ready to take advantage of the unprecedented incentives offered by the Fourth Industrial Revolution. Italy ranks 25th in DESI 2017. The use of digital technologies by enterprises and the delivery of online public services is close to average. Compared to 2016 Index, Italy made progress on connectivity, in particular through improvements in NGA access. However, its low performance in digital skills risks acting as a brake on the further development of its digital economy and society. The Piano Nazionale Industria 4.0 (PNI4.0) initiative (2017-2020) outlines four strategic guidelines: (1). Innovative investments, (2). enabling infrastructures, (3). skills and research, (4). awareness and governance and (5) Public financial support instruments.

National Strategies towards "Digitizing European Industries":

The PNI 4.0 was launched in late September 2016 and was largely received by the 2017 Budget Law. The Plan puts in place horizontal measures, i.e. adopting a technology neutrality approach, addressed to all types of enterprises, regardless of their size or sector, with the purpose to boost the investment in new technologies, research and development, and revamp the competitiveness of Italian companies. This is complemented by: an Ultra Broadband Plan, to improve connectivity; international cooperation for the definition of IoT standard platforms; measures to trigger private investment to support I4.0, especially venture capital and private equity. In addition, the PNI 4.0 seeks to contribute to the empowerment of skills by promoting I4.0 education programmes, strengthening vocational training, skills development, Competence Centres, Digital Innovation Hubs and the financing of I4.0 Technology Clusters and Industrial PhDs. The PNI 4.0 governance involves several Ministries – with the Italian Ministry of Economic Development playing a pivotal role – and embraces a multi-layer – with Regions involved – and multi-stakeholder approach, encompassing a plurality of players ranging from academia and research centres to industrial associations and trade unions.

Digitising European Industry (DEI) - Pillar 1 – Digital Industrial Platforms and R&I actions

Digital industrial Platform actions: The PNI 4.0 considers the implementation of complementary guidelines with the objective of leveraging enabling infrastructures boosting the competitiveness of

the Italian industry and encouraging private investment in new technologies and innovative processes through fiscal. Beyond the national funds made available as part of research programmes and smart specialisation strategies, one of the main incentives consists in 50% tax credit on incremental R&D expenditure, up to an annual ceiling of €20 million a year per beneficiary. By doing so, the tax credit aims to boost R&D by more than 11€ billion within the 2017-2020 timeframe. The combination of super- and hyper-depreciation aims to increase private investment in capital goods by 10€ billion just in 2017. These two measures, jointly with the tax credit on R&D, costs about 13B€.

Digitising European Industry (DEI) - Pillar 2 - Standardization actions, regulation and testbeds

Standardization actions: The Piano Industria 4.0 promotes open standards and interoperability criteria that should ensure that Industrial IoT does not result in disconnected islands of equipment and data that would hamper data-driven industry 4.0 services and applications. As part of the international cooperation effort to promote standardization, in June 2017, at the Digitising Manufacturing in the G20, it has been announced that the key digitising manufacturing initiatives of France, Germany and Italy have agreed on a trilateral cooperation to support and strengthen the digitalisation processes of their manufacturing sectors as well as to promote according European efforts.

Digitising European Industry (DEI) - Pillar 3 - Digital Innovation Hubs actions.

Digital Innovation Hubs actions: The initiative Piano Industry 4.0 has defined in May 2017 the national network for Industry 4.0 and provides for different types of organizations aimed at supporting technology transfer and a broader cooperation between the academia and businesses. Notably, the newly-introduced network comprises (1) Digital Enterprise Points (PID). Local Dissemination of basic knowledge in the field of technologies for Industry 4.0. 45 M€ are budgeted as part of the support to the national network of chambers of commerce to deploy this digital one-stop-shop. (2) Innovation Hubs (DIH). Advanced training on technologies and development of industrial solutions for specific areas of competence. Consolidation and coordination of structures for digital transformation and technology transfer centers. (3) National Competence Centres. Higher education and research and experimental development of projects. The national initiative has already budgeted 200M€ for the establishment of selected I4.0 competence centers and 240M€ for the Strengthening of technological clusters "Fabbrica Intelligente" and "Agrifood". The national network for Industry 4.0 brings together the capabilities from chambers of commerce, national industrial associations and sectorial associations to leverage a harmonised and coordinated network for provision of high quality services for the digital transformation of Italian industry.

Digitising European Industry (DEI) - Pillar 4. Skills development.

Skills development: The Piano Industria 4.0 considers 6 actions for digital skills development addressing the implementation of the "Scuola Digitale" (budget 355M€), selected learning initiatives on "Industria 4.0", specialization of academic courses, masters and executive masters on "Industria 4.0" topics in partnership with industrial and technological players (100 M€), increase the number of students attending professional institutes focused on "Industria 4.0" topics and development of

working class skills through dedicated funds and programs. These 6 actions complement the two major actions for the development of a national support network of Industry 4.0.

Specific national measures

Innovation promotion: The Italian national plan for industry 4.0 provides and allows a combined application of such fiscal incentives, already approved by the 2017 budget law, which are intended to increase the investment, retrofitting and development of productive competitive advantages through industry 4.0 technologies and products. Moreover, the favourable tax scheme for digital businesses is also intended for the attraction of international investments in the country economy. Italy is the second most attractive country (from a tax perspective) for setting up and operating a digital business just after Ireland (effective 2017 tax rate of -8,84% compared to 22,81% of Germany or 12,39% from France and 12,85% from Spain). To **stimulate private investments in I4.0 technologies**, the national initiative considers the “*Nuova Sabatini*” to leverage more credit (up to 2M€ per project) for innovation supporting businesses requesting bank loans to invest in new capital goods, machinery, plant, factory equipment for use in production and digital technologies. They are also complemented by the *Patent Box* scheme with an optional special taxation system applicable to income from use of intangible assets (industrial patent rights, registered trademarks, industrial designs and models, copyrighted know-how and software) consisting a reduction of 50% in the corporate income tax (IRES) and regional production tax (IRAP) rates. These actions will be complemented by a new framework to **bolster the finance in support of I4.0, VC and Start-ups (2,6B€ activated in the Italian economy)**. In particular the initiative considers a *tax deduction for investments in start-ups and innovative SMEs*, that allows a 30% break on personal income tax for investments up to 1 million euros, or a 30% deduction from corporate income tax basis, up to 1,8 million euros and a “sponsor” company programme that in case of failure/bankruptcy the schemes exempts from regular bankruptcy regulations. To activate re-investment of company profits the national initiative is proposing “*PIR*” – *Detaxation on capital gains from medium/long term investments*, reducing fiscal pressure for companies that invest in the future by keeping profits in the company. The scheme reduces corporate income tax (IRES) cut from 27.5% to 24% and for individual entrepreneurs and partnerships to opt for a single rate of 24% (IRI) instead of the current personal income tax (IRPEF) rates of up to 43%. Finally, to **ensure the Italian industry competitiveness**, the national plan is making available a *Guarantee Fund (22,9B€)*, covering up to covering up to a maximum of 80% of the loan with a maximum contribution of 2,5 M€ per business. Finally, the national initiative considers the implementation of a *Productivity – salary taxation exchange (1,3B€)*, which allow a rate of 10% on bonuses that are awarded for productivity increases; up to 4,000 €.

Fiche of Italy

1. Introduction

General Background: Italy, with a Gross Domestic Product (GDP) of \$1.849.970 M, is the 4th largest European economy behind Germany, France, UK, and the 8th worldwide with the US leading the ranking. In terms of Industrial Aggregated Value, the ranking of Italian economy is very similar but in this case China takes the lead followed by the US¹. Manufacturing contributes to 16.2%² of the national GDP and for this reason in one of the most important engine of the Italian economy. According with this evidence, machinery, automotive, fashion and textile production, food and beverage production, the manufacture of electronics and optical equipment are accounting for roughly 54% of the Italian exports. The sectoral dynamics of national exports is diversified: last year, the automotive and pharma-chemical industries contributed to boost the overall growth (+1.2% in value), offsetting the weak performance of mining industry and waste management activities. Italy's export market shares rose in Central Asia (from 1.12% to 1.25%) and North America (from 1.75% to 1.84%). The top trading partners are Germany and France representing 12.6% and 10.5% of the total amount of Italy's export, respectively. U.S. ranks third, with a share of 8.9%.

The Italian industrial sector has some distinctive features: (1) Few large industrial and ICT private players able to lead the digitalization of the Italian manufacturing system; (2) Limited number of industry champions able to coordinate the evolution process of value chains; (3) Industrial sector deeply based on Micro, Small and Medium enterprises; (4) Quality universities and research centres in development and innovation; (5) Strong tradition in handicraft. Italian manufacturing companies represent the engine that drives the country's economic growth and development thanks to their ability to produce wealth and employment, make associated industries and services flourish, and contribute to the country's financial, economic and social stability. It is therefore in Italy's interest to create a policy environment favourable to business. Industrial policy is back on top of the Government's agenda.

The "Industria 4.0" National Plan (PNI 4.0) represents a major opportunity for all companies that are ready to take advantage of the unprecedented incentives offered by the Fourth Industrial Revolution. Results are still mixed: although, as highlighted in PWC-ZEW-University of Mannheim 2017 Global Tax Index, during the last year Italy climbed from the 23rd to the 2nd position among the most advanced economies in terms of fiscal attractiveness for digital investment, Italy still ranks 25th in Digital Economy and Society Index – DESI 2017. The use of digital technologies by enterprises and the delivery of online public services is close to the average rate reported at EU level. Compared to 2016 Index, Italy made progress on connectivity, in particular through improvements in NGA access. However, its low performance in digital skills risks to brake further development in digital economy and society. The PNI 4.0 initiative (2017-2020) outlines four strategic policy trajectories: (1) Innovative investment, (2) Enabling infrastructure, (3) Skills and research, (4) Public financial support instruments.

¹ World Development Indicators, The World Bank (July 2017)

² Chain-linked volumes (base year 2010) adjusted for seasonal and calendar effects

National Strategies towards “Digitising European Industries”:

The PNI 4.0 was launched in late September 2016 and was largely received by the 2017 Budget Law. The Plan puts in place horizontal measures, i.e. adopting a technology neutrality approach, addressed to all types of enterprises, regardless of their size or sector, with the purpose to boost the investment in new technologies, research and development, and revamp the competitiveness of Italian companies. This is complemented by: an Ultra Broadband Plan, to improve connectivity; international cooperation for the definition of IoT standard platforms; measures to trigger private investment to support I4.0, especially venture capital and private equity. In addition, the PNI 4.0 seeks to contribute to the empowerment of skills by promoting I4.0 education programmes, strengthening vocational training, skills development, Competence Centres, Digital Innovation Hubs and the financing of I4.0 Technology Clusters and Industrial PhDs. The PNI 4.0 governance involves several Ministries – with the Italian Ministry of Economic Development playing a pivotal role – and embraces a multi-layer – with Regions involved – and multi-stakeholder approach, encompassing a plurality of players ranging from academia and research centres to industrial associations and trade unions.



The PNI4.0 has identified 9 technology drivers:

1. **Advanced Manufacturing Solutions.** Autonomous, cooperating industrial robots, integrated sensors.
2. **Additive Manufacturing.** 3D printing, particularly for spare parts and prototypes. Decentralized 3D facilities to reduce transport distances and inventory.
3. **Augmented Reality.** Augmented reality for maintenance and logistics, and all kinds of standard operating procedure. Display of supporting information, e.g. through glasses.
4. **Simulation.** Optimization based on real-time data from intelligent systems.
5. **Horizontal/Vertical Integration.** Cross-company data integration based on data transfer standards.
6. **Industrial Internet.** Network of machines and products. Multidirectional communication between networked objects.
7. **Cloud.** Management and storage of huge data volumes in open systems.

8. **Cyber-security.** Ensuring data protection and secure access to online platforms.
9. **Big Data and Analytics.** Full monitoring and evaluation of available data (e.g. from ERP, SCM, MES, CRM, and machine data). Real-time decision-making support and optimization.

These 9 technology drivers should deliver clear expected benefits for industry 4.0:

1. Higher flexibility given by small batches production with the economies of scale of mass production;
2. Higher speed from prototyping to mass production using innovative technologies;
3. Increased productivity thanks to lower set-up time and reduced downtimes;
4. Improved quality and scrap reduction thanks to real time production monitoring through advanced sensors;

The PNI 4.0 considers the implementation of complementary guidelines with the objective of leveraging enabling infrastructures boosting the competitiveness of the Italian industry and encouraging private investment in new technologies and innovative processes through fiscal incentives. This is originated from some key policy challenges related to digital transformation and industry 4.0:

- **We may see more and more robots but no productivity gains:** diffusion and adoption of new technologies among SMEs is the big conundrum. How to digitally transform firms which were not born digital? Tech-transfer issues and infrastructures.
- **Automation and labour-saving innovations will destroy jobs?** Adjustment process is critical: job demand and supply may mismatch.
- **Skills empowerment and retraining are key:** STEM competencies, vocational education and on-the-job training: **workplaces as evolving learning places.**
- **Data-driven innovation and know-how are the real drivers:** while production factors dematerialize, taxation and regulation remain pre-digital
- **Data ownership and governance, open standards to ensure a seamless integration and secure interoperability for IoT:** new barriers to trade/entry and data related competition issues when data control rather than size matters.

The platform activities directly relate to growth issues at stake in Italy, in particular those related with:

- **Decreasing quantity of fixed industrial investments in the last 15 years:** increasing obsolescence in installed equipment.
- **Low quality of investment allocation:** resources going to low performing firms, misallocation within firms rather than sectors, rent seeking, and poor bank creditors' discipline.
- **Poor skills in STEM subjects:** only 14 out 1000 graduated in STEM and low appeal of vocational education: >200k students do not go to university nor to tertiary professional education, poor re-placement services.
- **70% of companies do not have adequate connectivity (>30 Mbps)** and are located in grey/white areas (where providers experience some degree of market failure).

Italy ranks 25th out of 28 EU member States in the Digital Economy and Society Scoreboard: only 6.5% of SMEs are selling online, although well positioned in cloud computing

Facts on the Italian National Strategy Piano Nazionale “Industria 4.0”	
Ministry in Charge	Ministry of Economic Development [Website]
Contact Person	Mr Stefano Firpo. Director General for Industrial policy, Competitiveness and SMEs stefano.firpo@mise.gov.it
Main Strategy Documents	Piano Nazionale “Industria 4.0” (English) ³
Related Strategy documents	Innovation “Industria 4.0” – Budget Law 2017 (December 2016) ⁴

2. Digitization level of the country

Qualitative analysis. Italy ranks 25th in DESI 2017. The use of digital technologies by enterprises and the delivery of online public services is close to the EU average. Compared to last year, Italy made progress on connectivity, in particular through improvements in next-generation access. However, its low performance in digital skills risks acting as a brake on the further development of its digital economy and society. Italy belongs to the cluster of medium-performing countries.

Quantitative analysis. In DESI 2017, Italy has an overall score of 0.42 and ranks 25th out of the 28 EU Member States (0.52). Concerning connectivity, Italy has a low rank in fixed broadband take up (28), while it scores higher (18) in 4G coverage and rank 11 in mobile broadband take-up. During the past year, Italy has even improved in fast broadband subscriptions (12%). Close to three quarters of the country (67%) are online and 44% of the population has basic digital skills. ICT professionals remain an stable share of employment (2,5%; rank 20), but the number of STEM graduates must significantly improve to enable companies to recruit the ICT specialists they need. Italy ranks low in the use of internet by citizens (27). Italian internet users exploit Internet very little for banking transactions and shop online (42% and 41% respectively); they use it more for content (music and video) and communication (social networks) on the European average (they rank 14th in both categories).

Italy is closing the gap with the EU on business digitisation. 30% of enterprises use e-invoicing, well above the EU average of 18%. SMEs, however, rarely use electronic sales channels. They show a good adoption rate of cloud computing (12%, ranking: 17th), but low (7%, ranking 26th) on selling online. 30% of Italian companies are using electronic invoicing (5th), and but only 5,2% are selling online cross-border (22nd). Italy scores well in the online provision of public services (Online Service Completion) and Open Data. Nevertheless, Italy has one of the lowest use of e-Government services in Europe (16%, ranking: 25th).

³ http://www.sviluppoeconomico.gov.it/images/stories/documenti/2017_01_16-Industria_40_English.pdf

⁴ <https://indd.adobe.com/embed/00d6d24f-5dcc-41ea-831f-4dd4f50d5e74?startpage=1&allowFullscreen=true>

3. Digitising European Industry (DEI) - Pillar 1 – Digital Industrial Platforms and R&I actions

Beyond the national funds made available as part of research programmes and smart specialisation strategies, one of the main incentives consists in 50% **tax credit on incremental R&D expenditure**, up to an annual ceiling of €20 million a year per beneficiary. By doing so, the tax credit aims to boost R&D by more than 11€ billion within the 2017-2020 timeframe.

An unprecedented set of fiscal tools has been introduced to foster investment in capital goods. Firstly, a **super-depreciation** scheme has been designed: it consists in a 40% increase of the ordinary depreciation deduction for investments in new industrial machinery, meaning that their acquisition costs are raised by an equivalent share for accounting purposes. As assets are subject to fiscal depreciation over the years, this leads to a substantial, long-lasting reduction in taxable income, and thus of the effective tax rate.

Similar to the former, **hyper-depreciation** consists in a 150% increase of the ordinary depreciation deduction. This massive increase of the acquisition cost calculated for accounting purpose results in a large reduction in the tax burden over several years. This incentive applies to selected industrial equipment with a “4.0” character (e.g. machinery that can exchange information with other systems through the Internet of Things). Its goal is to encourage firms to invest in the digital transformation of their production process and supply chain.

The combination of super- and hyper-depreciation aims to increase private investment in capital goods by 10€ billion just in 2017. These two measures, jointly with the tax credit on R&D, costs about 13B€.

As a plus, the **Patent Box** consists in a 50% reduction of the corporate tax on the income deriving from direct and indirect use of intangible assets (i.e. industrial patent rights, industrial design and models, know-how and copyrighted software).

In order to determine the benefit, there must be a direct linkage between R&D activities, qualified IP and the resulting income (so-called “nexus approach”). Except for a few cases, the incentive is conditional on a preliminary tax ruling from the Italian Revenue Agency.

As far as digital infrastructure is concerned, the **Ultra Broadband Plan** aims to ensure adequate network infrastructure for industry 4.0 businesses and machine connectivity by adopting a “Fiber-to-the-factory” approach).

4. Digitising European Industry (DEI) - Pillar 2 - Standardization actions, regulation and testbeds

Standardization actions: The PNI 4.0 promotes open standards and interoperability criteria that should ensure that Industrial IoT does not result in disconnected islands of equipment and data that would hamper data-driven industry 4.0 services and applications.












As part of the international cooperation effort to promote standardization, in June 2017, at the Digitising Manufacturing in the G20, it has been announced that the key digitising manufacturing initiatives of France, Germany and Italy have agreed on a trilateral cooperation to support and strengthen the digitalisation processes of their manufacturing sectors as well as to promote according European efforts. The strategic cooperation will work on three core subjects: (1) Standardisation and reference architectures, particularly for the integration of SMEs; (2) SMEs engagement and testbeds; (3) Creation of an enabling policy framework.

5. Digitising European Industry (DEI) - Pillar 3 - Digital Innovation Hubs actions.

The PNI4.0 provides for different types of organizations aimed at supporting technology transfer and a broader cooperation between the academia and businesses. Notably, the newly-introduced network comprises:

1. **Digital Enterprise Points (PID)**, for the local diffusion of basic knowledge in the field of technologies for Industry 4.0. 45 M€ are budgeted as part of the support to the national network of chambers of commerce to deploy this digital one-stop-shop. They must cover the following set of activities: (I) Integrated front desk of all the chamber of commerce services for the digitization of businesses; (II) Information, basic training and orientation on the digital transformation, also through digital “champion” and mentor; (III) Interaction with the other structures of the National Network of I4.0 guiding companies towards Innovation Hub and National Competence Centre ; (IV) Access to others technology services(legislation technical and standards, protection intellectual property, etc.).
2. **Digital Innovation Hubs (DIH)**, providing advanced training on technologies and the dissemination of the I4.0 culture. They also contribute to the consolidation and coordination of structures for digital transformation and technology transfer centres. This part of the National Network is currently being developed with the support of 4 main stakeholders; i.e. Confindustria, Confcommercio, Confartigianato and CNA (Confederazione Nazionale dell'Artigianato e della Piccola e Media Impresa) providing respectively access to a national network of industrial associations vertical industrial sectors, entrepreneurs and SMEs (See the picture below).
3. **National Competence Centres**, whose core is in higher education and research and experimental development of industrial solutions for specific areas of competence. The national initiative has already budgeted 40M€ for the establishment of selected I4.0 competence centres and 240M€ for the strengthening of technological clusters "Fabbrica Intelligente" and "Agrifood". The main activity fields are: (I) **Maturity assessment of digital enterprises** (e.g. measure the maturity of digital businesses, identify priority action areas, develop advanced training courses according to the needs and characteristics of participating companies); (II) **High-level training** (e.g. promote and disseminate skills through the application of technologies in Industry 4.0 pilot production lines, developing use cases as "first of a kind success stories" showcasing the benefits of Industry 4.0 technologies in terms of productivity, flexibility, efficiency, quality); (III) **Experimental research and development projects** (e.g. develop projects of industrial research and experimental development in order to meet the needs of innovation potential contracting companies, targeting the industrial research and experimental development on technologies and solutions market ready or close to commercialization).

Analysis of National Initiatives for Digitising Industry: Italy
 Piano Nazionale Industria 4.0.

Activities	PID	Hub	Center
Spreading knowledge about technologies for Industry 4.0 Industry			
Mapping of digital maturity of enterprises			
Training courses on basic skills			
Orientation towards Innovation Hub & Competence Centre Servicesand			
Sector specific courses on advanced skills			
Guide to the digital transformation facilities, technology transfer centers and Competence Centers			
Advanced training through pilot production lines			
Development of industrial research and development projects projects			

6. Digitising European Industry (DEI) - Pillar 4. Skills development.

The PNI4.0 considers seactions for digital skills development addressing the implementation of the "Scuola Digitale" (budget 355M€), selected learning initiatives on "Industria 4.0", specialization of academic courses, masters and executive masters on "Industria 4.0" topics in partnership with industrial and technological players (100 M€), increase the number of students attending technical courses focused on "Industria 4.0" field and the development of working class skills through dedicated funds and programs.

Strategic Actions:

1. National Plan "*Scuola Digitale*" implementation:
 - I4.0 competences: Creative ateliers, technology classes and I4.0 laboratories;
 - Territorial laboratories: School-enterprise meeting, digital skills development;
 - Digital curricula: Development of 25 *curricula* focused on digital and I4.0 technologies;
 - Computational thinking: Education in computational thinking starting from primary schools;
2. Focus of selected work-related learning initiatives on "*Industria 4.0*"
3. Specialization of academic courses, masters and executive masters on "*Industria 4.0*" topics in partnership with industrial and technological players
4. Increase of the number of students attending professional institutes focused on "*Industria 4.0*" topics
5. Strengthening of technological clusters "*Fabbrica Intelligente*" and "*Agrifood*"
 - Coordination with other technological clusters and industrial stakeholders
6. Leverage 1.400 new PhDs on "*Industria 4.0*" technologies by 2020.
7. Establishment of selected national I4.0 Competence Centers.
8. Development of working class skills through dedicated funds and programs

Targets. The objective of the competence development in the Piano Industry 4.0 includes the following targets:

- 200.000 academic students and 3.000 managers qualified on I4.0 topics
- +100% students attending "*Istituti Tecnici Superiori*" on I4.0 topics
- ~1.400 PhDs focused on I4.0 (out of ~5.000 included in NRP)

These KPIs should reinforce the DESI indicators on ICT specialist and STEM graduates, which are fundamental for a successful development of a workforce ready to capitalise on digital transformation opportunities:

Implementation agents. These actions will be performed throughout the agents being part of the national network of Industry 4.0. As enumerated above, the national initiative considers from high-degree education services but more focused training and (re/up)-skilling activities that should be provided by various entry points and agents in the national network of industry 4.0.

7. Specific national measures

With the aim of expanding credit opportunities this fund will support businesses and professionals who have difficulty accessing bank loans because they do not have sufficient guarantees. The **Guarantee Fund** grants of a public guarantee, covering up to a maximum of 80% of the loan, for short and medium to long-term loans both as a source of cash and for investment purposes. The Fund guarantees that each business or professional will be provided a maximum of 2.5 million euros for use in one or more operations up to the established ceiling, with no limit on the number of operations that may be performed.

The above-mentioned super- and hyper depreciation schemes are complemented by the **“Nuova Sabatini”** measure, the goal of which is to leverage more credit for innovation investment supporting businesses requesting bank loans to invest in new capital goods, machinery, plant, factory equipment for use in production and digital technologies (hardware and software). The financial instrument envisions a contribution partially covering interest paid by business on bank loans of between 20,000 and 2,000,000 euros, granted by banks approved by the Ministry of Economic Development, drawing either on a specific credit line of the Savings and Loans Fund (Cassa Depositi e Prestiti) or on ordinary reserves. The contribution is calculated on the basis of a conventional 5-year depreciation plan with an annual interest rate of 2.75% and is increased by 30% in the case of investment in “Industria 4.0” technologies. This goes hand-in-hand with the *Public Guarantee Fund for SMEs*, which covers up to 80% of bank loans, with a maximum contribution of 2,5 M€ per business. Both tools are associable with the super- and hyper-amortization schemes.

As regards labour relations, the national initiative considers the implementation of a **Productivity – salary taxation exchange** (1,3B€), which allows a beneficial tax rate of 10% on bonuses that are awarded for productivity increases; up to 3,000 euros, or 4,000 euros if workers are jointly involved in the organization of work. The scheme aims at promoting greater productivity by shifting negotiations to the company level and introducing a positive correlation between increases in efficiency and increases in workers' salaries or integrating company welfare with forms of public welfare (supplementary pension schemes, additional medical insurance, etc...).

To channel private savings into productive investment, **Individual Saving Plans (PIR)** aimed at financing SMEs over the medium/long term are incentivized through tax reduction on *capital gains*, in order to foster Italian industry competitiveness.

In addition, the **standard corporate income tax (IRES)** rate is reduced from 27.5% to 24%; as regards individual entrepreneurs and partnerships, they can opt for a single rate by 24% (IRI) instead of the current personal income tax (IRPEF) rates of up to 43%.

In order to **support seed- and early-stage investment**, *tax deduction for investments in start-ups and innovative SMEs* have been introduced, allowing a 30% break on personal income tax for investments up to 1 million euros, or a 30% deduction from corporate income tax basis, up to 1,8 million euros. Enablement of **“sponsor” companies** to embed losses of participated innovative start-up. In case of failure/bankruptcy the schemes exempts from regular bankruptcy regulations.

8. National Strategy towards “Digitising European Industries”: some preliminary results

The PNI 4.0 is already showing the first positive results. In the first half of 2017, the production index for industrial sector has increased both at a short and long-term, by +1.0% and +2.3, respectively. Moreover, the industrial turnover and new orders indices confirmed a good performance of Italian industrial sector. The first one grew by 5.5% compared with the first semester of 2016 due to the increasing in energy sector (+18.2%), intermediate goods (+6.3%) and capital goods (+5.0%); the latter showed a similar dynamic rising by 5.7%. New domestic orders of machine-tools are experiencing huge increases, with a 18% trend growth rate in the first nine months. This increase is due to the national orders' growth (+36,6%) and a narrower one of external demand (+4,3%). This positive trend of new orders occurs in the field of machinery and equipment n.e.c. (+12.0%) and electrical and electronical equipment (+10.7%). All these commodities are affected by the actions planned by PNI 4.0 (i.e. super-depreciation, hyper-depreciation and Nuova Sabatini).

Remarkable results are those on R&D expenditures: the 47.0% of enterprises which invested in R&D in 2016, states to have increased expenditure in 2017 and highlights the importance of public policy (Credito di imposta and Patent Box) in supporting these investments. Expenditure growth has been estimated between 10-15% on average.

Subsidised loans to SMEs are increasing compared to the first eight months of 2016. In detail, it has been detected that the total amount of loans financed increased by 8.9% - raising from 9.6 to 10.5 billion of euro. Turning to the total amount guaranteed, the growth has been even higher and equal to 10.7% (from EUR 6.7 to 7.4 billion).

“Contratti di sviluppo” is the most important instrument to support strategic and innovative investment programs. From September 2011 to 2017, 102 programs were financed, which include 88 contracts in Southern Italy and 14 in Central and Northern Italy. The total amount of the planned investments is about EUR 3.5 billion, allocated between food industry (21%), automotive (17%) and machinery (15%). The credit facility volume is equal to EUR 1.9 billion, until now, divided through southern regions (EUR 1.7 billion) and central and northern part of Italy (EUR 0.2 billion). It is estimated that 53.183 jobs have been protected or created.

There is still much to be done to support innovative start-ups and SMEs. Analysis show only a slight growth (+2%) in early stage and business angel investment, and this reveals how urgent the need to implement a plan of appropriate corrective action to improve the establishment and the development of new innovative companies is. Furthermore, turning to the ultra-wideband issue and in order to ensure the achievement of EU2020 targets, government allocated EUR 3.5 billion to enhance the IT infrastructure and support demand from families and companies.

One last tipping point concerns the limited involvement of micro enterprises and small businesses in PNI 4.0. The initiative is designed to provide an opportunity to all companies regardless of size, sector or location, to increase innovation but medium and large companies end up being more capable to make good use of the plan. The reason lies in the characteristics of Italian industrial base:

big enterprise are more capable in developing innovative projects compared to SMEs, and this is the reason why the former seems to fail in exploiting PNI 4.0.

Annex I – Research, Development and Innovation Programmes

Research, Development and Innovation Actions: The activities addressed by the PN4.0 are in line with those proposed in the National Operational Programme on Research and Innovation 2014-2020 (managed by MIUR), which is complementary to those covered of National Operational Programme on Enterprises and Competitiveness (PON I&C) managed by the Ministry of Economic Development (MISE). The PON is designed in coherence with the National Programme on Research, on research, innovation and technological development and it aims to create the framework within which the local production systems can improve their competitive performance. The Budget 2014-2018 for PON is 1.286 M€ (1,27 B€). The distribution of funds can be split in the following way (EU contribution of € 926,2 M€ (€ 203,7 via ESF and € 722,5 via ERDF) and national contribution of € 359,8 M€, creation of innovative PhDs (€ 114 million), measures to attract senior researchers towards lagging behind areas (86 M €) and mobility measures (€ 83 million), research infrastructures (€ 286 million), technology clusters (€ 327 million), research projects on key enabling technologies (KET's) (€ 339 million). These funds Complementary to this the PON I&C already budgets The PON Entrepreneurship and Competitiveness, with a total budget of 2,32 B€ , of which € 1,68 B€ come from the ERDF and 640,5M€ come from national co-financing.

Project funding in Italy is mostly channeled through the MIUR the Ministry of University and Research, while the role of other Ministries is less relevant except in the case of specific programmes as those concerning Health, where the Ministry of Health has a leading role, or those concerning the environment, mainly funded and coordinated by the Ministry of Environment, Land and Sea. Also the Ministry of Economic Development is involved as funder in joint initiatives aimed at improving productivity and market capability of small and medium enterprises in specific fields (textile, manufacturing, etc...). Nevertheless MIUR plays the leading role in number of instruments and amount of funds managed. MIUR ensures funds for Italian participation to several EU joint programmes and initiatives: COST, ERANET, JTI, EUREKA, art. 185 initiatives. Italy participates through the MIUR also to the EFDA - European Fusion Development Agreement, an agreement between European fusion research institutions and the European Commission to strengthen their coordination and collaboration, with the scientific and technical support of ENEA –National Agency for new Technologies, Energy and Sustainable Economic Development- and the CNR.

We can divide public funding of research in Italy, which is managed by the Ministry of education, Higher Education and Research (MIUR) in three main channels:

- **General funding to higher education institutions.** This includes the Ordinary Fund for Higher Education (FFO) provided by MIUR to public and private universities. FFO is distributed partly through non-competitive procedures (the so called historical component). FFO concerns expenditures for both teaching and research activities.
- **General funding of public research, excluded Universities.** This includes the core funding provided by the different Ministries to the Institutes under their control (more than 70 organizations).
- **Project funding.** Italy does not have intermediary funding agencies, with the exception of the ASI-Italia Space Agency- so almost all funding instruments for research are managed by the MIUR which plays a leading role in higher education, research and innovation policies. Other

Ministries, as the Ministry of Health (MOH) and the Ministry of Economic Development (previously Ministry of Productive Activities) and the Ministry of Environment, Land and Sea, are often responsible for research funding in their specific fields. At example the Ministry of Health finances the FSN, the Fund for the Finalized Research, devoted to the realization of the priorities included in the National Health Plan and also supports with funding several initiatives coordinated by the ISS (Istituto Superiore di Sanità-National Health Institute).

The MIUR has defined **Programma Nazionale per la Ricerca 2015 – 2020** (National Research Plan for R&D), for which the PON is a key financial resource. The Plan considers various funding sources as shown in the Table below.

The complexity of the direct funding of MIUR and falling within the PNR implementation tools are highly articulated and can be divided into two large segments:

1. Structural funding distributed in the various chapters of the Department for Higher Education and Research, including the **Fund for Ordinary Entities (Fondo Ordinario degli Enti - FOE)** and the **Ordinary Fund for Higher Education (Fondo di Finanziamento Ordinario delle Università - FFO)** as well as a number of other specific tools; e.g. **FISR (Special Integrative Fund for Research)**, the fund for research activities in cooperation with Regions and/or other State Bodies (Ministries, public research Bodies, etc.). **FIRST (Found for Investments in Scientific and Technological Research)** is intended to finance in particular interventions in support of fundamental research (i.e. to support the advancement of knowledge), interventions oriented mainly to industrial research (i.e. oriented to fostering specialization of the national industrial system), actions of social innovation, interventions integrated research, infrastructure, human capital formation, transfer technological and spin-off (aimed at the development of technological clusters), and projects of research included in Community and international agreements and programs; e.g. JTI ECSEL, which is co-financed for instance by MIUR, MSE and structural funds⁵.
2. Additional structural funding (**Development and Cohesion Fund-FSC**) and can be combined with all tools available to the development of the national strategy.

	2015	2016	2017	Totale triennio 2015-2017
FISR	9,20	25,80	25,80	60,80
FOE	113,30	113,30	113,30	339,90
FFO	215,30	218,70	218,70	652,70
FIRST	60,80	58,80	56,80	176,40
PON	232,00	233,00	233,80	698,80
Totale	630,60	649,60	648,40	1.928,60
FSC				500,00
Totale risorse	630,60	649,60	648,40	2.428,60

	2018	2019	2020	Totale 2015-2020
FISR	25,80	25,80	25,80	138,20
FOE	113,30	113,30	113,30	679,80
FFO	215,70	215,70	215,70	1.299,80
FIRST	54,80	54,80	54,80	340,80
PON	333,00	334,00	332,20	1.698,00
Totale risorse	742,60	743,60	741,80	4.656,60

The PNR 2015-2020 considers 12 specialisation areas: Aerospace; Agrifood; Blue Growth; Cultural Heritage; Design, Creativity and Made in Italy; Energy; Green Chemistry; Health; Smart Communities; Smart, Secure and Inclusive Communities; Smart Factory; Sustainable Mobility, Technologies for

⁵ http://www.ricercainternazionale.miur.it/media/22953/work_plan_ecsel_2016.pdf. In 2016 MIUR contributed 2,5M€ as grants and 5M€ as loans and 15M€ of structural funds as EU grants and the MSE 16M€.

Living Environments. However, it is worth noting that the plan identifies Aerospace, Smart Industry, Agri-food and Health as the high priority areas in relation with the application and adoption of Key Enabling Technologies (KETs) for the development of competitive advantages. As shown below, these 12 specialisation areas are further connected with the 5 smart specialisation strategies from the RIS3 regional development policies, where smart and sustainable industry, digital agenda and energy play also a prominent role.

The PNR 2015-2020 goal is the articulation in programs and actions, and the definition of areas of specializations and priority areas. The six programs considered are:

- **INTERNATIONALIZATION (107,4 M€).** Coordinate and integrate national, European and international resources. The goals are (1) Align national R & D programming to the European one; (2) Increase Italian R & D role in the global and European context, particularly in the Framework Program Horizon 2020; (3) Incorporate in a structured manner Italy into the international cooperation system of research. To achieve these goals a number of actions will be put in place (1) Strengthening the Joint Programming Process (JP) and Support to the Italian representatives in H2020 (2) Matching Funding Instruments based on national specialization strategies and shared geo-strategic priorities; (3) International co-operation and leadership role in strategic projects: e.g. PRIMA (Partnership for Research and Innovation in the Mediterranean Area) and Blue Med (marine and maritime research); (4) The National Space Program
- **HUMAN CAPITAL (1020,4 M€).** Focus people as protagonists of the research, favouring mobility, dynamism and generational replacement. The goal is (1) Educate, strengthen, and attract the best researchers, and make them the protagonists of the transferring knowledge from the research system to society as a whole. The following actions are considered to achieve this goal: (1) Improve the quality of training in research: Innovative PhDs (2) Increase growth opportunities for research doctors and researchers: through programmes such as FARE Research in Italy, Top Talents or RIDE. (3) Make researchers protagonists of knowledge transfer with initiatives such as Startup PhDs, Contamination Lab; Doctoral Placement and Proof of Concept programme.
- **RESEARCH INFRASTRUCTURES (342,9 M€).** Evaluate and support selectively research infrastructures, pillar of international research, in particular of basic research. The goals of the programme are (1) Valorisation of Research Infrastructures (IR), in line with the process at European level (European Strategy Forum for Research Infrastructures -ESFRI); (2) Selective support aimed at progressive rationalization and international strengthening of the IR system. These goals will be met through these selective actions (1). Development of mapping of National Research Infrastructures (IR) and launching a system of constant evaluation and monitoring; (2) Put in place a governance structure and a financial instrument to sustain and support the prioritised national IR network.
- **PUBLIC-PRIVATE (487,1 M€).** Strengthen public-private co-operation to strengthen research applied, the ability to innovate and the link between research and challenges society. The goal is to stimulate the creation of long-term networks for research and innovation that promote investment, participation and business co-ordination in the field of research, and

strengthen forms of public-private cooperation and ensure the networking of the available skills. The goal is also (1) to foster the industrial application of scientific results so that they can contribute to new solutions, services and innovative products on the markets, opening up new fields of research and innovation to give rise to new markets. (2) develop policies to stimulate research through the promotion of public demand for innovative solutions; (3) ensure the social reporting of research, ensuring opening, free access to results and responsibilities; (4) promote social innovation as a link between results in research and transformations that guarantee return to citizens of the value created with investment in research. The goals will be met with the support of the following actions: (1) Industrial Research and Sustainability of Private Investment in innovation with support to (a) national technology Clusters (b) Industrial Research in the 12 Specialization Areas, in coordination with National Technology Clusters and in line with demand policies. (2) Society, Research and Social Innovation with the support to programmes in (a) Responsible research and innovation; (b) Philanthropy for research; (c) Social innovation.



- **MEZZOGIORNO (436,0 M€).** Focus on the potential of the South, enhancing its specifics avoiding waste and overlapping. The objective is to improve the competitive repositioning of the southern territories, increasing the ability to produce and use R & D. This will programme will articulate a set of actions (1) Investments in human capital (a) Mobility of researchers; (b) Top Talents for Consolidated Professional Attraction. (2) development of Thematic projects: (a) Open Research Infrastructures and Research Projects on Enabling Technologies (KET'S).
- **EFFICIENCY AND QUALITY OF EXPENDITURE (34,8 M€).** Strengthen monitoring and transparency of investments, simplify procedures, strengthen administrative management.

For the first 3 years of the national Plan (2015-2018), MIUR has planned a distribution of the resources across the various programmes as shown in the figure below.

Linee strategiche/Strumenti		Budget Triennale Programma (Mln €)	Budget Triennale (Mln €)	Fonti di finanziamento					FSC
Programmi	Linee di azione			FIRST	FFO	FOE	FISR	PON	
Internazionalizzazione	Rafforzamento Governance	107,4	0,5	0,5	-	-	-	-	-
	Matching Fund (KIC, etc)		26,5	26,5	-	-	-	-	-
	Ruolo di leadership in progetti internazionali: PRIMA, Blue Med, ecc..		80,4	-	20,0	60,4	-	-	-
Capitale Umano	Dottorati innovativi	1.020,4	391,0	-	299,2	-	-	61,8	30,0
	FARE ricerca in Italia (ERC matching fund)		246,0	52,8	113,2	60,0	-	-	20,0
	RIDE: Ricerca Italiana di Eccellenza		150,0	50,0	19,5	30,5	-	-	50,0
	Top Talents		130,0	-	100,0	-	-	-	30,0
	Doctor Startupper e Contamination Lab		29,0	10,0	9,0	5,0	-	-	5,0
	PhD Placement		40,4	-	40,4	-	-	-	-
	Proof of Concept		34,0	10,0	9,0	5,0	-	-	10,0
PNIR - Programma Nazionale Infrastrutture	Co-finanziamento IR	342,9	341,9	-	42,4	109,5	40,0	-	150,0
	Sistema di valutazione		1,0	-	-	1,0	-	-	-
Cooperazione pubblico-privato e ricerca industriale	Cluster Tecnologici Nazionali	487,1	21,1	16,1	-	-	-	-	5,0
	Ricerca industriale nelle 12 aree dei Cluster Tecnologici Nazionali [ricerca industriale, dimostratori innovativi, living labs, pre-commercial procurement, challenge prizes]		432,5	-	-	54,0	20,8	177,7	180,0
	Società, ricerca e innovazione sociale [Ricerca e innovazione responsabile, filantropia per la ricerca, innovazione sociale]		33,5	10,5	-	3,0	-	-	20,0
Programma per il Mezzogiorno	Mobilità ricercatori	436,0	45,3	-	-	-	-	45,3	-
	Attrazione		46,6	-	-	-	-	46,6	-
	Infrastrutture di ricerca aperte		155,5	-	-	-	-	155,5	-
	Ricerca su KETs		184,1	-	-	-	-	184,1	-
	Open Data della PA		4,0	-	-	-	-	4,0	-
	Social PA e Governance		0,5	-	-	-	-	0,5	-
Efficienza e qualità della spesa	Trasparenza Azione Amministrativa	34,8	1,9	-	-	1,0	-	0,9	-
	Procedure di selezione e attuazione interventi		12,5	-	-	2,5	-	10,0	-
	Governance e Coopetition		1,9	-	-	1,0	-	0,9	-
	Capacità amministrativa beneficiari e attuatori		1,9	-	-	1,0	-	0,9	-
	Procedure semplificate di contrattualizzazione e controllo		7,5	-	-	2,0	-	5,5	-
	Monitoraggio e valutazione		4,8	-	-	2,0	-	2,8	-
	Strumenti di programmazione informata		4,3	-	-	2,0	-	2,3	-
TOTALI		2.428,6	1.928,6	176,4	652,7	339,9	60,8	698,8	500,0

An important element of the PNR as shown above is the National Operational Programme (PON), which in conjunction with the FFO (regular Higher education operational funds) account for circa 60% of the resources available for Research and Innovation (managed by MIUR). PON focuses its own action, in coherence with the National Programme on Research, on research, innovation and technological development and it aims to create the framework within which the local production systems can improve their competitive performance.

The actions undertaken with this funding instrument are complementary to those of National Operational Programme on Enterprises and Competitiveness (PON I&C) managed by the Ministry of Economic Development (MISE).

The actions of the PON programme are addressed to the following regions: Campania, Puglia, Basilicata, Calabria and Sicilia (the less developed regions); Abruzzo, Molise e Sardegna (the transition regions).

PON Research and Innovation aims **to overcome the "project logic"** of funding related to individual projects, with the aim of facilitating the creation of development opportunities for the territories of the regions concerned, with a view to launching initiatives of cooperative-competition (coopetition), aimed at promoting **collaboration between businesses and other subjects** (universities, research bodies, etc.) in order to achieve mutually beneficial information from the point of view of information, production, commercial and product, which can be very important from the point of view of the results.

All this is combined with the aim of **encouraging the development of new professional skills** required by the labour market through the activation of human capital interventions to favour the provision of a professional profile of adequate profile for start-ups and to young people.

An additional element of the Program's originality, the significant focus on **improving the effectiveness and quality of spending** with the introduction of streamlined and transparent procedures that speed up the procedural process in full administrative correctness.

Some peculiarities have been introduced in the NOP on Research and Innovation for the period 2014-2020. In particular, the need to enhance the national competitiveness has been emphasized. The innovative aspects of the programme can be individuated as follows:

- **Objectives of national relevance:** The programme aims to promote integrated interventions on research and experimental development in order to promote new manufacturing and service specializations, valorizing the competences and experiences already reached in Italy;
- **Interregional dimension:** according the National Smart Specialization Strategy, a strategical integration between national and regional dimensions and programmes shall be pursued. Collaborations between enterprises, universities, research institutions and other realities, public or private, of the Italian context are encouraged to obtain reciprocal advantages and avoid duplications of actions;
- The **technological quality and the experimental character** of the action;

- The **horizontal and integrated planning**, with priorities and objectives interconnected in order to focus the resources on more specific areas of interest.

The application fields mainly involved in the actions of the PON are those considered by the national strategy the bases of the future national challenges and opportunities to be competitive. They are the following: Aerospace, Agrifood, Blue Growth, Green Chemistry, Design, creativity and made in Italy, Energy, Intelligent factory, Sustainable mobility, Health, Smart, secure and inclusive communities, Technologies for life environments and Technologies for cultural heritage.

The MIUR has decided to concentrate its efforts and resources in only two priorities, defined with reference to the thematic objectives supported by the European Social Fund (ESF) and the European Regional Development Fund (ERDF).

1. **Investments in human capital (TO 10 ESF)**. Investing in education, training and vocational training for skills and lifelong learning. The actions concern:
 - innovative PhDs
 - attracting senior researchers to the less developed regions
 - mobility
2. **Thematic projects (TO 1 ERDF)**. Strengthening research, technological development and innovation. The actions concern:
 - **Research infrastructures**: implementation of the existing or new infrastructures, accessible to researchers, with the aim of attracting investments in research and innovation and increasing the national and regional competitiveness
 - **technological clusters: support to national clusters** in order to sustain excellence in strategic research fields. Moreover, promotion of the development of innovation systems as aggregations of enterprises, research institutions and other subjects significant for the enhancement of the competitiveness of the national economic system.
 - **research projects on key enabling technologies (KETs)**: development of a restricted number of projects of high technical and scientific quality on key enabling technologies, selected in coherence with the regional strategies and specializations, and support to the collaborations business-research.

The Budget 2014-2018 for PON is 1.286 M€ (1,27 B€). The distribution of funds can be split in the following way (EU contribution of € 926,2 M€ (€ 203,7 via ESF and € 722,5 via ERDF) and national contribution of € 359, 8 M€.

In terms of budget distribution of the PON Research and Innovation 2014-2020 across three priority axis of intervention:

- **Axis I - Investments in human capital (€ 283 million)** Axis I envisages the creation of innovative PhDs (€ 114 million), measures to attract senior researchers towards lagging behind areas (86 M €) and mobility measures (€ 83 million). This axis is mainly related to Digital Skills DEI pillar but it is described here for the shake of completeness.

- **Axis II - Thematic Projects (952 million euro).** Axis II aims to remove structural, business and contextual constraints, in line with the guidelines set out in the National Strategy for Intelligent Specialization (SNSI), through the financing of
 - research infrastructures (€ 286 million),
 - technology clusters (€ 327 million) and
 - research projects on key enabling technologies (KET's) (€ 339 million).
- **Axis III - Technical Assistance (51 million euro).** Axis III complies with the European regulatory provisions foreseeing the allocation of 4% of PON resources to technical assistance for the implementation of the Program.

Complementary to the PON, the Ministry of Economic Development has articulated the **National Operational Program - PON Enterprises and Competitiveness (PON I&C) 2014-2020** and aims to contribute to the goal of bringing the relative weight of manufacturing to European GDP from 15.6% in 2011 to 20% by 2020.

The **PON Entrepreneurship and Competitiveness 2014/2020** addresses the **thematic objectives**:

- OT 1, strengthen research, technological development and innovation,
- OT 2, improve access to and use of ICT, as well as their use and quality
- OT 3, to promote the competitiveness of small and medium-sized enterprises,
- OT 4, support the transition to a low-carbon economy.

These thematic objectives are translated into four axes of intervention:

- **Axis I (OT 1) – Innovation.** The thematic objective is to strengthening research, technological development and innovation. The Investment priorities include the promotion of investment in R & I by developing links and synergies between enterprises, research and development centers and the Higher Education sector, in particular by promoting investment in product and service development, technology transfer, social innovation, eco-innovation, public service applications, demand stimulation, networks, clusters and open innovation through smart specialization as well as supporting technology and applied research, pilot lines, early validation of products, advanced manufacturing capabilities and first production, especially in key enabling technologies, and the diffusion of general purpose technologies. The specific objective is increasing business innovation activity.
- **Axis II (OT 2) - Ultra-wide bandwidth and digital growth.** The thematic objective is improving access to information and communication technologies, as well as the employment and quality of the information. The investment priority lies on extending the diffusion of broadband and high-speed networks and support the adoption of emerging and emerging technologies and networks in the digital economy. The specific objective is the reduction of digital divide in the territories and diffusion of ultra wideband connectivity (European Digital Agenda).
- **Axis III (OT 3) - Competitiveness for SMEs.** The thematic objective is promoting the competitiveness of small and medium-sized enterprises, the agricultural sector (for the EAFRD) and the fisheries and aquaculture sector (for EAFRD). The investment priority is on

promotion of entrepreneurship, in particular by facilitating the economic exploitation of new ideas and promoting the creation of new businesses, including through incubators. The specific objective: is on the birth and consolidation of micro, small and medium enterprises. This Axis also considers investment priorities on the development and implement new business models for SMEs, in particular for internationalization, with the specific objectives of increase employment and productive development in territorial areas affected by a widespread crisis in productive activities; consolidation, modernization and diversification of the territorial productive systems and increasing the level of internationalization of production systems. Finally, this axis also considers investment priorities on supporting the creation and expansion of advanced capabilities for the development of products and services and supporting the capacity of SMEs to engage in growth in regional, national and international markets and in innovation processes. The objective is to raising the investments in the production system and enhancing access to credit, business finance and risk management

- **Axis IV (OT 4) - Energy Efficiency.** The thematic objective is the support in the transition to a low-carbon economy in all sectors with the investment priority on promoting energy efficiency and the use of renewable energy in businesses and the specific objective of reduction in energy consumption and emissions in enterprises and the integration of renewable sources

These operational Axis are complemented by **Axis V- Technical Support**, enhancing the capacity of the bodies involved in the management and implementation of the program and strengthening PON's strategic and communication capacity.

The PON Entrepreneurship and Competitiveness, with a total budget of more than 2.4 B€ (of which 1.7 B€ come from the European Regional Development Fund (ERDF) and 643 M€ comes from national co-financing), has been reprogrammed November due to the Italian accession to the so-called **SME Initiative SMEI** (formulated in the formulation and approval of a **Single Program**), and today presents a total budget of **€ 2 billion and € 316.5 million** , of which € 1 billion and € 676 million come from the ERDF and 640,5 million come from national co-financing, resources coming from Law 183/87.

The SME Initiative(SMEI)- launched in Italy in October 2016 - is co-financed by the Republic of Italy, the European Commission and the EIB Group - the European Investment Bank (EIB) and the European Investment Fund (EIF) - with EIF managing the scheme on behalf of the different contributors.

SMEI is a public-private partnership acting as catalyst for private investments and supporting economic growth and job creation in southern Italy (the so called "Mezzogiorno") which includes 8 Regions: **Abruzzo, Basilicata, Calabria, Campania, Molise, Puglia, Sardinia and Sicily.**

To this end, it entails an innovative use of **European Structural and Investment Funds (ESIF)** combining the latter with additional national resources, EU central budget (resources from the programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME) and EIB Group funds.

Through the use of securitisation structures (both funded and synthetic unfunded), the **202.5 M€ of contribution of the Republic of Italy** - of which 102.5M€ of ESIF from the European Regional Development Fund (ERDF) and 100M€ of national resources - **leveraged with commercial lending, are expected to generate about 1.2B€ of new SME loans at favourable terms in southern Italy.**

Under SMEI Italy, EIF will enter into securitisation transactions of existing portfolios of debt finance to SMEs and Small Mid-Caps. The selected financial intermediaries shall in turn undertake to provide new lending to SMEs located in the Mezzogiorno area, multiplying both the contribution of the Republic of Italy and of COSME allocated to the relevant underlying securitisation transaction. For details, refer to the Call for Expression of Interest below.

This financial envelope is complemented by the resources allocated to a **National Parallel Program**, the **National Complementary National Program (PNC) and Competitiveness**, funded entirely by national resources, for an amount of **700 million euro**, which intervenes exclusively in the regions of the South (Basilicata, Calabria, Campania, Apulia and Sicily).

Annex II – Economic Projections

This Annex reflects on some Industry 4.0 investment scenarios that integrate both actions described by the National Initiative on Industry 4.0. The data captured in the document is summarised in this table based on data provided by the National Initiative, complemented by data reported in National plan "Industria 4.0": Investments, productivity and innovation, September 2016 and some forecasting scenarios designed under the assumptions of the experts preparing this report and related to the additional investment on digital technologies planned by the Ministry of University and Research. It should be noted in any case that the national initiative for digitising industry is the Piano Nazionale Industria 4.0 and that these additional activities will reinforce the digitisation activities of particular regions in Italy and additional pillars. However, they do not pertain to the National Initiative per-se.

For the Pillar on digital platforms and R&I projects, there is not yet a budget allocated to the development of the Ultra Broadband Plan. However, MISE has already planned the investment on 6,7B€ to be matched by 6B€ from the private part on the deployment of the required infrastructure ensuring connectivity across Industries; i.e. Fibre to the Factory vision. As part of the support for the implementation of Industry 4.0 projects, MISE has already agreed for 2017 on a guarantee fund of 900M€, to facilitate to the access of guarantees to the implementation of Industry 4.0 projects. This in return should leverage 22B€ on the industrial side. Along the same line, 100M€ have been provisioned for the made in Italy programme, that is expecting a return of 1B€ in increase of revenue from Italian companies improving their digital sales chains.

The Pillar on standardisation and internationalisation is mainly related to the activities of the multilateral collaboration with Germany and France.

The pillar on Digital Innovation Hubs has already secured 30M€ over the next 2 years as part of the Italian budget Law. However, over the period 2017-2020 100M€ on both the private and public side are expected to be invested. Moreover, LPS; MIPAAF; MIUR have already secured 150M€ of the 170M€ planned on the public side for the development of the technology clusters on Industry 4.0 and Smart Agri-food. These 170M€ should be matched by an investment of 70M€ from the industrial side. In this area is also worth mentioning that Decree 219/2016 has secured 105M€ over the period 2017-2019 for the development of the Digital Contact Points. 45M€ (40%) of such budget will be implemented as vouchers for industry to enjoy the services of the Italian Network Industria 4.0, competence centres and structures of digital transformation. 30M€ will be devoted to the support of the common digital platform, training, communication and multimedia material required to support the operation of PID in close collaboration with National Network Industria 4.0.

Finally, on the Digital Skills pillar, the national initiative has already secured the 355M€ over the period 2017-2020 for the implementation of Scuola Digitale and Alternanza Scuola de Lavoro programmes to support primary education and apprentice training. In the area of Master and Executive Master education 100M€ will be mobilised in the period 2017-2020. Additionally, through the Innovation PhD programme, we can estimate that in the order of 100M€ will be mobilised on human capital education. Please note that even if some of the Excellence programmes on basic research could also accommodate and develop digital technologies and knowledge on advanced

manufacturing process and technologies, this has not been considered in the ex-ante estimation of the potential resources to be mobilised.

Additionally and as a strategic pillar of the PNI4.0, the Italian Government is proposing a comprehensive tax incentive scheme with a high impact on the operation of the Italian Industry. As a result, Italy is the second most attractive country (from a tax perspective) for setting up and operating a digital business just after Ireland (effective 2017 tax rate of -8,84% compared to 22,81% of Germany or 12,39% from France and 12,85% from Spain). The implementation of such Tax incentives has resulted in a number of provisions that are already part of the Budget law approved in 2017. The high bulk of tax incentives is related to the hyper- and super-depreciation schemes. These tax incentives will be reflected and applied in 2018 based on the investments (instrumentation, HW and SW platforms) made in 2017. Therefore, the provisions made in 2017 of 28M€ are related to the Nuova Sabatini programme that is to 2018 and that will see provisions of 112M€ in 2019. Equally, the impact of the depreciation schemes will see tax reductions over a period of 5 years . Having 140% and 250% depreciation rates the Italian government has made provisions of 1131M€ and 1923 M€ in 2018 and 2019 to cover the impact of the increased rates on the public accounts. Moreover, an accumulated value of 5702M€ is expected for the period 2020-2027 deriving from these policies. These will impose some burden in the public accounts in the order of 10.850M€. Along the same lines the reduction in Tax credit for R&I related activities has derived in 727M€ provisions for 2018 to be extended in 2019 with a leverage factor of 11.400M€ on the private side. Please, note that the tax effect could be applied on the very same projects that benefited from MIUR or MISE project support for collaborative public-private development. Equally, the Italian government is provisioning 1.108M€ over a period of 3 years (2017-2019) to leverage investments on start-ups, SMEs, reduction on PIR and compensation of losses from alienation of start-ups; the objective being here a leverage of 2600M€ over the same period from the private side to equal and surpass the investment rates on Industry 4.0 SMEs and start-ups currently hold by countries such as Germany and Spain.

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		Budget Law (Public Investment or provision)			PNI4.0 Plans		
		2017	2018	2019	2017-2020		
Digitising European Industry (DEI) Pillar	Action Lines (National Programme)				Total Investment	Public Investment (M€)	Private Investment (M€)
P1 - Digital Platforms (Infrastructures and R&I)	G3. Enabling Infrastructures complementary measure	- €	- €	- €	12.700 €	6.700 €	6.000 €
	G3.1 Ultra Broadband Plan				12.700 €	6.700 €	6.000 €
	G4. Public Support complementary measures	1.000 €	- €	- €	24.000 €	- €	23.000 €
	G4.1 - Guarantee Fund (i4.0 innovation projects)	900 €			22.900 €		22.000 €
	G4.2 - Made in Italy (digital sales chains)	100 €			1.100 €		1.000 €
P2 - Standardization actions, regulation and testbeds	G4. Public Support complementary measures	- €	- €	- €	- €	- €	- €
	G4.5 Trilateral Cooperation Programme	- €	- €	- €	- €	- €	- €
P3 - Digital Innovation Hubs	G2. Competence strategic measure	20 €	10 €	- €	440 €	270 €	170 €
	G2.3 Strengthening of technological clusters "Fabbrica Intelligente" and "Agrifood (Funding secured from MIUR)	- €	- €	- €	240 €	170 €	70 €
	G2.4 Establishment of selected national I4.0 Competence Center	20 €	10 €	- €	200 €	100 €	100 €
P4 - Digital Skills Development	G2. Competence strategic measure	- €	- €	- €	455 €	425 €	30 €
	G2.1 National Plan "Scuola Digitale" implementation (Budget already secured)	- €	- €	- €	355 €	355 €	- €
	G2.2 Specialization of academic courses, masters and executive masters on "Industria 4.0"	- €	- €	- €	100 €	70 €	30 €
	G4. Public Support complementary measures	1.211 €	392 €	385 €	5.311 €	1.300 €	- €
	G4.3 - Development Contracts	1.000 €	- €	- €	3.800 €	- €	- €
	G4.4. - Productivity – salary taxation exchange	211 €	392 €	385 €	1.511 €	1.300 €	- €
Tax Incentive Provisioning	G1. Innovative investments key guideline Public Investment includes the 2018-2024 values for the coverage of private investments backed up in 2017 as part of the Hyper-Amortization initiatives, Super Amortization and Instrumental Goods	37 €	2.039 €	2.904 €	37.000 €	13.000 €	24.000 €
	G1.1 Stimulate private investments in I4.0 technologies (Super-depreciation, hyper-depreciation, FRI, Nuova sabatini)	28 €	1.215 €	2.035 €			10.000 €
	G1.2.2. Increase private expenditure in research & development (Tax credit for research expenditures)	- €	727 €	727 €		13.000 €	11.400 €
	G1.3 Bolster the finance in support of I4.0, VC and Start-ups (start-up/sme investment tax deduction, startup losses absorption, PIR, acceleration programme, VC startup fund, innovative idea industrialization)	9 €	97 €	142 €			2.600 €
	G4. Public Support complementary measures	100 €	- €	- €	1.100 €	- €	1.000 €
	G4.2 - Made in Italy	100 €	- €	- €	1.100 €	- €	1.000 €

Figure 1 – Piano Nazionale Industria 4.0 estimated investments

Additionally, the next shows an estimation on the MIUR budget and programmes, as discussed for pillar 1. The budget has been detailed for the years 2015-2017. However, the overall budget 2018-2020 is already available and the plans are to increase slightly the yearly investment (over 700M€ yearly over a period of 3 years).

The experts have used an estimation of the resources that could contribute to the development of digital technologies, clusters, hubs, skill developments, internationalisation and joint programming; as well as the development of R&I projects. It is worth noting that this would be an ***ex-ante estimation*** of the potential resources that could be allocated such activities after the execution of competitive calls on the 12 priorities areas. The experts have taken a conservative approach based on the fact that Industry is on the top of the priority areas of the programme. However, as it will become apparent, in the following discussion, from the budget available from MIUR there have been already some resources that will be reserved and allocated to support the implementation of the PNI4.0.

As a consequence, the Table below reflects the budget distribution and estimation of potential resources to be devoted to Industry 4.0 projects from MIUR budget, the Budget law that has already secured some budget and provisions for the implementation of PNI4.0 and the potential impact that should be expected from the implementation of such actions in the horizon 2017-2020.

For pillar 1 on digital platforms and R&I projects, from the MIUR public-private programme, the experts expect that in the order of 146M€ (30%) out of the 432M€ are finally allocated to implement digital technology projects and Industry 4.0 interventions. These 146M€ will be matched, on average, with 219M€ of co-financing from the private side; based on the intensity of the support that the programmes provide and the typology of enterprises (micro, SME, large) that will engage in the programme. In the Mezzogiorno region and taking advantage of structural funds and overall mobilisation of 185M€ could be expected for the period 2018-2020.

For pillar 2 on standardisation, in terms of budget resources, it is also worth noting the budget mobilised as part of the joint programming initiatives in JTI programmes such as ECSEL and CleanSky. The budget mobilised in the period 2015-2017 has been 27M€ both in the public and private side.

For pillar 3 on Digital Innovation Hubs, the MIUR resources will be devoted to the valorisation of research infrastructure and the open access to such research infrastructures for the implementation of innovation projects. Such investment will both evolve both the digital and KET offer towards SMEs and Industry in general and with a focus on the Mezzogiorno region. The amount of resources mobilised based on the priority of the areas addressed by DEI have been estimated at 164M€ over the period 2015-2017; which could be equally matched during the period 2018-2020.

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		MIUR budget estimations		
		2015-2017		
Digitising European Industry (DEI) Pillar	Action Lines (National Programme)	Total Investment	Public Investment (M€)	Private Investment (M€)
P1 - Digital Platforms (Infrastructures and R&I)	MIUR - Programma Nazionale per la Ricerca 2015 – 2020	550 €	220 €	330 €
	Public-Private Programme 432M€ R&I. Assumption - 30% Funds allocated i4.0 & digital technologies. 60% private funding	365 €	146 €	219 €
	Mezzogiorno 184M€. Assumption - 40% Funds allocated to KET projects. 40% private funding	185 €	74 €	111 €
P2 - Standardization actions, regulation and testbeds	MIUR - Programma Nazionale per la Ricerca 2015 – 2020	53 €	27 €	27 €
	Internationalisation/Joint Programmes 26,5 M€. Matching funds KIC, ECSEL	53 €	27 €	27 €
P3 - Digital Innovation Hubs	MIUR - Programma Nazionale per la Ricerca 2015 – 2020	164 €	164 €	- €
	Mezzogiorno 155M€. Assumption - 40% Funds allocated to Open Infrastructures projects. 40% private funding	62 €	62 €	- €
	Reserach Infrastructure 342M€. Assumption - 30% Funds allocated to Research Infrastructure Valorisation projects. 0% private funding)	102 €	102 €	- €
P4 - Digital Skills Development	MIUR - Programma Nazionale per la Ricerca 2015 – 2020	98 €	98 €	- €
	Human Capital. Innovation PhD 391M€. Assumption - 25% Funds allocated to Digital Technologies & i4.0 projects. 0% private funding)	98 €	98 €	- €

Figure 2 – MIUR estimated investments on digital technologies and digital skills