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The manufacturing industry worldwide is facing constant pressure to increase productivity by reducing the utilization of raw materials and energy. Germany launched in 2011 the platform "Industrie 4.0" to tackle this challenge and to improve the competitiveness of its industries.

'Industrie 4.0' combines production methods with state-of-the-art information and communication technology (ICT). The driving force behind this development is the rapidly increasing digitalization of the economy and society.
The technological foundation is provided by intelligent, digitally networked systems that will make largely self-managing production processes possible.
In the world of 'Industrie 4.0', people, machines, equipment, logistics systems and products will communicate and cooperate with each other directly. Production and logistics processes are integrated intelligently across company boundaries to make manufacturing more efficient and flexible.

In September 2015, European Parliament issued this paradigm defining "**Industry 4.0**" as the fourth industrial revolution as develops new ways of organizing production across the entire value chain.
The Industry 4.0 factory operates according to six key principles:

- The factory is virtualized in order to simulate and monitor products, processes and the production environment in 3D
- Its systems are interoperable: they have the ability to communicate and interact with each other
- Decisions are decentralized: with cyber-physical systems taking autonomous decisions
- Analysis and decision-making take place in real-time, through continuous and instantaneous communication
- It is service-oriented: with better maintenance, and can offer new types of services
- It is modular and it rapidly adapts to changing demand conditions.

After Germany, other countries developed their own Industry 4.0 projects.
On September 21, 2016, the Italian Ministry of Economic Development, presented the "Industrial National Plan 4.0", for 2017-2020, which considers principles set out in Industry 4.0 issued by the European Parliament.
In this regard, the Italian Plan, to support Industry 4.0 developments,defines

four strategic measures:

1. **promotion of private investment in technologies**, support to research, development and innovation, promotion of investment in venture capital and start-up firms
2. **promotion of I4.0 education programs and skills development**, creation of Competence Center and Digital Innovation Hub
3. **implementation of the Ultra Broadband Plan**, and collaboration for the definition of IoT standard communication protocols
4. **adoption of public measures to ensure private investments**, support large investments in innovation; strengthen and innovate the supervision of international market.

At the outset the Industry 4.0 paradigm was almost exclusively articulated from a strict technological perspective. In the meantime, however, it became more and more evident that the transition to this new paradigm would have strongly affected the whole society. After six years from the launch of Industrie 4.0 in Germany it is clear that **constraining the "Industry 4.0" to just a technological breakthrough would be a mistake**. By involving trade associations and the unions, the German project has not fallen into this trap. The impacts on the organization of production, as well as on skills reconfiguration and disciplines cross-fertilization, are highly significant.

Industry 4.0 is a major challenge for the national production plan. However, it is not possible to accelerate the industry towards a new paradigm without this transition being in connection with society and territory. It will be necessary to develop a "4.0" environment ready to cope with the challenges posed by this transition.

While some analysts are concerned about the job displacement effects of these new technological solutions, a balanced view of the employment effects of Industry 4.0 should not neglect the fact that its introduction will generate opportunities for **new business models** that in turn could enable new jobs creation and productivity gains.

The introduction of cyber-physical based production systems will influence the human/machine interface, tasks organization and activity structures, as well as, ultimately, the overall **organization of the production process**. At the same time, the Industry 4.0 paradigm is expected to bring about major changes in labor markets – either inside or outside companies – and in the **relationships between enterprises and trade unions**.

1. Advanced additive manufacturing (AM) is one of the key factors in the development of smart production processes. However, the properties of AM parts are often inconsistent as compared to their conventional machined counterparts. This is due to a variety of factors including feedstock uniformity, microstructure evolution due to AM processing, and the overall ability of commercial AM machines to reliably form structural parts.
Without research and development into enhanced **new materials** (polymeric and metallic) specifically suited for AM will likely continue and further delay the transition from rapid prototyping to rapid manufacturing.

The high level of technology and process systems required by innovation typically involve large capital investments. **Capital budgeting and financial strategies** to support the Industry 4.0 transformation is crucial. **Tax planning** encompasses many different considerations, for example it is very important to consider measures to support innovative investments and empower skills, such as Super and Hyper amortization schemes.

The new industry will be characterized by developments of a range of new technologies such as artificial intelligence, robotics, nanotechnology and biotechnology. The resulting job displacement would likely occur in labour-intensive industries. Continuing education can cope with at least part of the unemployment problem created but also other critical social issues are connected with factory 4.0 and deserve specific analytical attention and coping strategies. **Skilled workforce** is key for the development, introduction and exploitation of the Industry 4.0 potentials. Post-graduate education and vocational training programmes provide the most appropriate environment to **human capital** that best fit with firms' requirements to effectively adopt new technological and organizational solutions.

In short, Industry 4.0 represents a radical change in the way things are designed and produced. It is based on global perspectives and involve not only all operational functions (production, supply chain, engineering, maintenance, etc.), but also the support functions (finance, human resources, and information systems). Accordingly, **academic institutions** should play the role not only of **technological pivots**, but also of **gatekeepers linking industry**, **society and territory**.

A new role of universities for innovation and local development has been largely recognized since the end of XXth century with the use of various concepts: triple elic, entrepreneurial university, community university, third mission. Industry 4.0 is a new promising chapter of this same tale.