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The University of Torino and the local innovation ecosystem in the transition to the Industry 4.0

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In view of the wide scope of challenges and opportunities that the Industry 4.0 paradigm is expected to bring about in the society, UniTo will draw upon the key strengths illustrated above to stand as a key player in the local innovation ecosystem that facilitate the transition by maximizing the benefits and minimizing the potential side effects for the stakeholders.

The role of such an interdisciplinary research institution is crucial in view of the specific features of the regional and national economy, in which the size distribution of firms is strongly skewed due to the very large share of small and medium-sized enterprises (SMEs), most of which experience serious barriers to the successful adoption of digital technologies within the organizational boundaries.

The diffuse statement concerning the Industry 4.0 mostly focuses on technological change and spread out of innovations, and how these affect firms' performances. The contribution of an academic institution in this respect concerns both the generation and the adoption of new technologies. In addition, assets' sharing represents a new opportunity to provide local actors with access to expensive scientific infrastructures and machineries, without bearing the prohibitive purchasing costs.

On the one hand, as a key player of the innovation ecosystem, UniTo is clearly committed to collaborative R&D activities and to technology transfer. Large and multinational corporations operating in the area can find in our institution a bundle of scientific and technological competences that are at the frontier of scientific research. It's a unique mix blending a wide array of fields, ensuring productive cross-fertilization and creation of novelty. UniTo will promote **joint research efforts and technological partnerships to accompany firms in the local ecosystem to the new paradigm**.

On the other hand, most of SMEs do not have the resources to carry out independent or collaborative research. In most cases they stand as potential adopters of digital technologies to move towards the new paradigm. UniTo has developed sound experience in scientific collaborations with both large corporations and SMEs, and will be acting as a relevant **node of local**

digital innovation networks linking these different types of institutional actors.

Sometimes SMEs are even hardly aware of which technological solution is better suited to make a factory 4.0 out of their production plants. A key supporting activity in this respect concerns **technological intelligence, and the identification of technological needs, gaps and solutions** that fit best with the nature of their economic activity and their prospective strategies.

Moreover, the implementation of new technological solutions within firms' organizational boundaries involves much more than the command of scientific and technological principles to govern the new equipment.
Key complementary innovations concern the organizational structure. UniTo will provide **support in the identification of the organizational layout and/or management structure that fit best the new technological configuration**.

The opportunities for firms willing to adhere to the Industry 4.0 are also related to the massive production of data, and the way these are exploited.
On the one hand, the large amount of data can be analysed to monitor and improve the efficiency of the production process, reduce the environmental impact and/or implement changes in the organizational layout. UniTo will **help firms by searching models and algorithms for big data analysis**, and for the interpretation of the results. On the other hand, data are increasingly gaining economic value. Firms will be helped in the **identification of new business models based on data production**.

Industry 4.0 is not only about technologies but also, and mostly, about people working in firms that ought to be actively engaged in the design and implementation of the new paradigm. **Human resources** will still be crucial for firms to successfully cope with the change. Because of the interplay between new technologies and people, the implementation of Industry 4.0 is likely to have an important social impact, well beyond the mere productivity gains and profitability of industrial activities. Some jobs will become obsolete, while many other will be created. The net impact can hardly be foreseen.
To maximize the social benefits, Innovation must be coupled with **skills reconfiguration, human capital accumulation and lifelong learning programmes**. These aspects are part of the main mission of an academic institution, i.e. education and training.

UniTo will act as **pivotal node of an extended network** that will involve all relevant stakeholders, **to promote the Industry 4.0 paradigm as a social**

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innovation, i.e. a new configuration that makes contribution to social progress. This entails increased social added value not just for workers of future smart factories, but for citizens in general.

A comprehensive approach to the Industry 4.0 will call for close interactions with public institutions and policymakers, to provide **support to decision making concerning public policies** to promote social inclusion and sustainability in the wake of the digital revolution.

UniTo provide a unique blend of heterogeneous and yet complementary fields, which have been long working on topics that are relevant for the Industry 4.0 plan. In this context, such wide coverage makes **UniTo as an ideal partner to design, implement, manage and assess firms' strategies and to promote a shared approach that maximizes social benefits**.

To this purpose, a working group of experts has been recently established within our institution, to achieve comprehensive knowledge about the activities carried out in the past years by our researchers, and the competences developed accordingly, which are directly or indirectly related to the scientific and technological fields underpinning the Industry 4.0 paradigm.

A broad survey was launched, involving all of the University Departments, asking researches to show their distinctive competences and knowledge in view of their bearing on the implementation of the paradigm. The results of this survey are synthesized in the following section. More detailed information is available on request at the address **staff.ricerca@unito.it**.