LEARNING FACTORY

Learning by experimenting in a quasi-real environment — the enabling principle for understanding and acting in the context of the factories of the future.

ANA CORREIA SIMÕES [1]
ANTÓNIO HENRIQUE ALMEIDA [1]
AMÉRICO AZEVEDO [1,2]
[1] INESC TEC
[2] FACULTY OF ENGINEERING OF THE UNIVERSITY OF PORTO
ana.c.simoes@inesctec.pt
antonio.h.almeida@inesctec.pt
americo.azevedo@inesctec.pt

The digitalisation of industry is a trend of no return. Addressing the different dimensions underlying digitalisation is a challenge for both academia/researchers and industry, with associated elements one ought to consider:

1. Ensure the adequate availability of a qualified workforce.

2. Achieve a practical awareness and understanding of cost-benefit related to the adoption of digital solutions.

3. Ensure effectiveness in the development of suitable initiatives to transform organisations.

Regarding industry, we found two distinct poles. On the one hand, the large companies, with their prevailing power and availability of resources, launching wide initiatives of testing, evaluation and adoption of technologies, as well as operating and organisational practices, in order to increase their competitive position in the market. On the other hand, many small and medium size enterprises (SME), generally with limited resources, acting fundamentally on a regional niche basis and without a strategic orientation in terms of business evolution. They end up having a reactive attitude, very much supported by the need for survival in the markets where they operate.

SMEs are the backbone of the Portuguese and European economies. These companies represent an important subset of the entire manufacturing industry, compared with larger enterprises, accounting for over two-thirds (68.4%) of overall value-added and over three quarters (78.0%) of employment [2]. Therefore, research and adequate knowledge transfer mechanisms are mandatory for the successful implementation of Industry 4.0 technologies and concepts in SMEs[3].
Consequently, and despite the exceptional competitive opportunities that digitalisation strategies open to companies, the implementation of this digital transformation in SMEs is not risk-free or straightforward. A key obstacle in the digitalisation process is the decision makers' lack of awareness of the digital technologies' potential and impact/implications. Some decision-makers reject digital transformation simply because they do not understand how it can be incorporated into their businesses[1]. Therefore, research centres, clusters, and Digital Innovation Hubs (DIH) are responsible for building the infrastructures and providing the support and the services that will progressively change this mind-set. Within a secure/protected environment and, following an iterative methodology, the risk is mitigated by trust and collaboration.
Considering this reality and ambition, especially among Portuguese SMEs, innovative training programmes and specialised innovation laboratories for technology experimentation and demonstration in almost real scenarios are crucial[4]. These tools and infrastructures must be flexible and adapt to all levels of the companies' hierarchy and organisation structures, from management to technical staff. This vision drives the design and

development of the Industry and Innovation Lab (iiLab) at INESC TEC - an industry 4.0 learning factory. This i4.0 compliant infrastructure allows the installation of digital technologies in a plug & play way to foster the demonstration of technologies with low effort and cost. In this way, it is possible to provide new services, thus helping SMEs interested in evaluating/considering the adoption of new technology and attesting their return on investment, with the support of a multidisciplinary team of researchers and a network of technology providers carefully selected.

In addition, this Learning Factory also provides programmes targeting decision-makers, according to an active training methodology, firmly supported by state-of-the-art knowledge and reference cases, hands-on experience and real applications. During these training sessions, the trainees/participants are expected to become familiar with a comprehensive set of concepts, principles, methodologies and tools capable of significantly improving decision-making capability at both strategic and tactical levels.

The scope of said programmes is multidisciplinary, in order to explore different thematic areas (self-contained) and cross-cutting thematic subjects, focusing on Industry 4.0 and the Digital Transformation paradigm.

The questions addressed relate to the digital maturity assessment, smart factories and flexible production systems, big data and artificial intelligence for smarter decision-making in Industry, and new production processes for new business models. In the same line of thinking, technology-oriented training programmes have been developed to meet the need for the upskilling of employees and to leverage the introduction of new technologies in the manufacturing industry. For example, areas such as cognitive automation, augmented and virtual reality, collaborative and industrial robotics, artificial vision, Industrial Internet of Things (IoT), and interoperability, among other technologies, are explored.

In order to materialise this vision, INESC TEC has defined a strategy of participation in a series of educational projects within the scope of EIT Manufacturing and other European projects, which serve as a foundation for the development and continuous improvement of the training programmes to be provided by the iiLab.

The idea behind these projects is to design a wide range of teaching and learning activities, focused on the most advanced processes and ICT-enabled production technologies, to support academic education, advanced training, R&D and technology transfer activities to different audiences.

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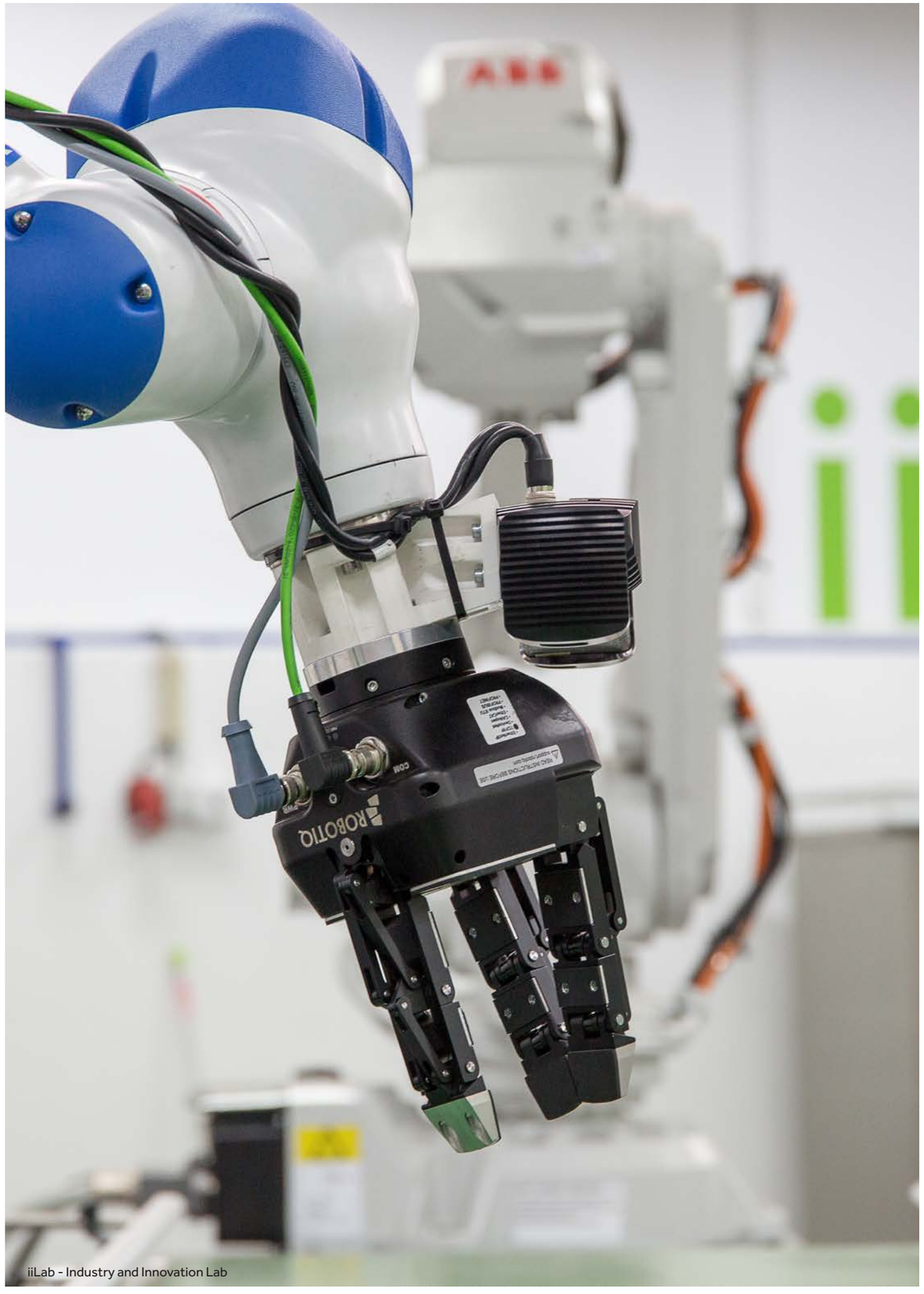

iiLab - Industry and Innovation Lab