# Chapter 89
# Industrial Occupational Safety:
## Industry 4.0 Upcoming Challenges

**Susana Pinto da Costa**
https://orcid.org/0000-0001-7440-8787
*University of Minho, Portugal*

**Nélson Costa**
https://orcid.org/0000-0002-9348-8038
*University of Minho, Portugal*

## ABSTRACT

*The new industrial revolution will encompass massive change. Manufacturing Companies are pursuing digitalization and trying to figure out how to implement collaborative robots, all the while trying to manage data safety and security. It is a big challenge to deal with all the needed infrastructures to handle the big data digitalization provides whilst having to account for the shielding of it. Even more so when one has to succeed at it while taking care of the workers, the sustainability of their jobs, the implementation of safe practices at work, based on the contributions of the whole, through efficient vertical communication, imbued with Safety Culture and aiming the sustainability of the Company itself. This chapter proposes to address the role of standardization in managing industry 4.0, where culture, Risk Management and Human Factors are key, and how the tools provided by these norms may contribute to nimbly balance each Company's needs.*

## INTRODUCTION

As the new industrial revolution sets in, competitive Companies find themselves overwhelmed with the Herculean task of diligently managing the traditional workers' safety and health, quality, environment, and the increasingly complex sustainability as they try to introduce into it the new challenges brought by industry 4.0. Starting with digitization, whereby all hard copies of product manuals, instructions, customer files and repair handbooks were progressively made available and accessible in a digital format, through digitalization, where the digitization of analog data was used for applications that simplify standard work

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practices, all the way into digital transformation, made possible because of digitization and digitalization, which enable data to be easily accessible for use across several interfaces, platforms and devices. Digital transformation entails the devising new business applications that integrate all this digitized data and digitalized applications, and has brought artificially intelligent finite-state machines (FSM), predictive maintenance, crowdsourcing and augmented reality tools. Digital transformation business innovations are revolutionizing industry, and are aimed at saving companies' time and money. Like the demise of Blockbuster® and Kodak®, this new industrial revolution will take a toll on companies who are unable to keep pace with the digital transformation, as they are in serious danger of becoming obsolete.

The advent of digital transformation, along with automation and the development of the Internet of Things (IoT) are believed to be the catalysts of this fourth industrial revolution (Lampropoulos, Siakas, & Anastasiadis, 2019). Furthermore, their synergetic effect promotes their faster development. Nowadays, the IoT is ubiquitous; it is present in everyone's daily life in the most varied work and leisure activities, through the smart devices whose embedded systems for sensing, communicating, data collecting, storing and processing, allow us to always be connected to work, to each other, to a wide range of services, and so much more, by bridging the physical world and the digital world. *Transformation* really is one of the keywords to characterize this fourth revolution; not only because it applies to the creation of a virtual world from the transformation of the physical, but also for what it allows. As a matter of fact, these evolving technologies present great potential to companies, whereby these smart systems are able to remotely sense an array of physical dimensions, collecting and storing a bulk of data, processing these data, interpreting it and acting on it, by adapting, readjusting, delaying, stopping, accelerating, or otherwise performing according to its decision-making autonomous process. Industry 4.0 is, therefore, characterized by bringing together more traditional industrial and manufacturing practices and processes, and state-of-the-art innovative, disruptive technologies like IoT, large-scale machine-to-machine (M2M) communications and cyber-physical systems (CPSs). Undeniably, *smart* would be the second keyword that would best describe this revolution; by fostering "self-maintainability, self-optimization, self-cognition, and self -customization into the industry", Industry 4.0 envisions the transformation of the classic industries into intelligent industries (Lampropoulos et al., 2019). CPSs provide the environment for machines to process data via a wireless connected embedded system, posing as the bridge between the tangible, physical world and the intangible, digital world. So, basically, CPSs embody the duality *transformation* and *smart* manufacturing. According to Lampropoulos et al. (2019), CPSs differ from the traditional embedded systems in that they contain control algorithms and computational capacities that make up for "cybertwined services", and other physical assets and differentiated computational skills, establishing networked interactions and encompassing a bulk of methodologies that are transversal to several disciplines. These systems are projected to accept physical inputs and provide physical outputs while interacting with humans and support them on their tasks through innovative communication modalities. Hence, the safety issue related to CPSs is paramount, for the success of these systems in tied to how seamlessly and effectively this interaction with humans performs. The amount of data that will be available for analysts to decide upon through these technologies is overwhelming. But it will not necessarily mean having to spend a tremendous amount of physical space to store all the information that can be gathered simultaneously at various locations within the company, in fractions of seconds timeframes, and process it. The *Cloud* (short for Cloud computing) will manage all the storage and computing necessary in the digital world, through several computer servers and within-Cloud resources.