Chapter 5
Emerging Ecosystems Empowered by AI and IoT Technologies

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ABSTRACT

As latest advancements signify the fourth industrial revolution, artificial intelligence (AI) and internet of things (IoT) became the focal points for innovators. IoT-enabled technology can be used to gather and explore huge amounts of data from both virtual and physical environments, and AI provides the means for effectively processing and manipulating resulting information to optimize or automate processes. In this chapter, the related state of the art is presented, along with the characteristics that enable the creation of hybrid innovation ecosystems. An overview of IoT and AI platforms is included, which can be utilized even by non-experts to compose advanced cost-effective services. Also, related notions such as interoperability and engagement are also discussed. Although such components can be applied in a multitude of domains, to provide a concrete example of innovation enablement, the smart grid ecosystem is employed. Here, participants, either from the supply or the demand side, take advantage of IoT and AI technology to address new business requirements that arise.

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INTRODUCTION

During the recent years, quite a few technological achievements that were once deemed as fiction now exist, either as laboratory prototypes, or as products with high technology readiness levels. Examples include autonomous vehicles and mobile robots of advanced capability, home and personal assistants that simplify a number of every-day processes, machines that are by far faster than humans in solving specific problems, and so on. Although such ideas have already been introduced during the past few decades (Kurzweil, 1992), their manifestation into real-world products and solutions was made possible only recently, mainly due to advancements in two broad domains of electronics and computer science, the Internet of Things (IoT), and Artificial Intelligence (AI).

Internet of Things is a result of breakthroughs in a multitude of fields, e.g. electronics and telecommunications, embedded systems, software engineering, web and cloud services, as well as finance and marketing (Ibarra-Esquer et al., 2012). Nevertheless, the main market requirement that provides a boost for IoT adoption is the fact that it enables enterprises to gather and make effective use of huge amounts of data originating from the real, physical world. This collected data is then turned into usable information and actionable knowledge regarding improvements in products and services, market analysis and various predictions, and can be employed for the optimization of a number of business and production processes within the enterprise or organization (Erevelles et al., 2016).

However, very large amounts of collected measurements and calculated indices cannot be easily processed and analyzed by the human brain. Thus, in parallel to the outspread of IoT technology adoption, the requirement for efficient manipulation and processing of the available data has also appeared. For this purpose, scientists, engineers, and decision makers turn their attention mainly to AI. AI is far from a new term and notion, as it has been conceptualized from the middle of the last century as computational methods that simulate the human brain's operations with respect to learning and decision making (Russel & Norvig, 2019). Occasionally being in and out of researchers' spotlights, AI is currently an "umbrella" term covering multiple sub-fields, such as natural language processing, machine learning, symbolic computation, intelligent agents, and multi-agent systems, among others.

Generally, such technologies can be considered as innovation enablers, e.g. concepts of the fourth industrial revolution can be made possible with the advent of 5G communications (Gundall et al., 2018), and adaptive/personalizable mechanisms can be improved by using machine learning techniques (Vermesan, 2017). Furthermore, these approaches are also characterized as disrupting, introducing this way the need for novelties in business model design and assessment as well (Amshoff et al., 2015), (Renda, 2019). However, this disruption is regarded by business and industries