

Chapter 76

Agile Approaches for Successfully Managing and Executing Projects in the Fourth Industrial Revolution

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ABSTRACT

The fourth industrial revolution utilizes artificial intelligence by automating large quantities of numbers to increase the chances of project success. The Project Management Institute lists examples of project outcomes, including but not limited to the Pyramids of Giza, the Great Wall of China, the Panama Canal, and the placement of the International Space Station into Earth's orbit. This chapter highlights how the fourth industrial revolution (Industry 4.0) impacted the evolution of agile project management practices. It discusses how these could be applied in conjunction with traditional waterfall project management or as a standalone approach. Topics discussed include a definition and elements of project management, waterfall vs. agile project management, transitioning to agile methods, developments in agile project management, agile practices, and leading agile projects and project managers.

DOI: 10.4018/978-1-7998-8548-1.ch076

INTRODUCTION

Project management (PM) practitioners often discuss the waterfall PM approach, which involves progressive elaboration of plans and scope of project (Project Management Institute, 2017). The evolving complex business environment requires a different set of knowledge and skills to effectively manage projects. Therefore, the agile PM approach serves as a bridge to connect the waterfall to the demands of the current business environment.

Industrial revolutions have been characterized by technological leaps and bounds that have led to paradigm shifts. According to Lasi, Fettke, Kemper, Feld, and Hoffmann (2014), the fields of mechanization, water power, and steam power represent the first industrial revolution. The intensive use of electricity through mass production and assembly lines represent the second industrial revolution (Lasi et al., 2014). The widespread use of digitalization and automation is the third industrial revolution. The fourth industrial revolution is advanced digitalization with the combination of Internet technologies and future-oriented technologies in the field of smart machines and products. Cyber-physical systems manage projects during the fourth phase. Iterative systems, like robotics and real-time cloud computing, are intertwined state-of-the-art autonomous frameworks offering a new approach for uncovering the possibilities in data (Reynolds, 2016). Pinkham (2017) wrote that the fourth industrial revolution is commonly referred to as Industry 4.0.

This chapter draws from researchers' extensive review of literature on PM practices, the waterfall method, and agile PM approaches. Researchers have synthesized their findings to highlight how the fourth industrial revolution supports agile PM as both a standalone and in conjunction with the waterfall PM methodology.

DEFINITION AND ELEMENTS OF PROJECT MANAGEMENT

A project is defined as a set of unique temporary interrelated activities that are executed within a fixed time (schedule), meeting a certain cost, and following limitations (scope) to achieve a specific goal (Project Management Institute, 2017b). PM is the application of knowledge, skills, tools, and techniques to project activities that meet the desired project requirements on time, on budget, and within a defined scope (ibid, 2017).

Although used by industries for many years, PM received minimal recognition until the 1950s and 1960s (Loucks, 2008). Over the last 25 years, PM has adapted to changes in society by increasing professionalism in special projects (Thomas & Adams, 2005). Organizations set and achieved goals with PM through an iterative four-step process of plan, do, check, and act (PDCA). These steps fall into the following process groups in PM: (1) initiating; (2) planning; (3) executing, monitoring, and controlling; and (4) closing (Project Management Institute, 2017b). These phases help the project manager understand the project scope, recognize challenges, and resolve issues connected to PM (Melton, 2004). This process has also assisted businesses and industries to recognize (rather than repeat) mistakes (Owen & Burstein, 2005).

The initiating process group is the first phase for PM. During this phase, the project manager communicates with other members of management to establish objectives and determine their project needs (Suttle, n.d.). When the team has decided on whether to accept or reject the project, they may use descriptive analytics, predictive analytics, and prescriptive analytics (Kelly, 2017). Descriptive analytics

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