# Chapter 1
# RFID-Based Robotic Process Automation for Smart Museums With an Alert-Driven Approach

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## ABSTRACT

*To facilitate the management process of many physical collections displayed and stored in a group of museums and collection storerooms distributed in a wide area in a visitor-driven approach, the commonly used collection management system (CMS) in the museum industry is insufficient to meet the management's needs. This study identifies key management issues in CMSs and designs a smart museum by applying electronic workflows with RFID-based sensors to accurately auto-collect and update data and timely auto-alert staff in various grades to perform visitor-driven collection management. The smart museum can improve operation accuracy, visitor satisfaction, and return rates. This smart museum solution is designed for three management levels, including the operational level, middle management level, and senior management level, to optimize the physical collection management and even the collection development of the museums to meet visitors' ever-changing needs.*

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## INTRODUCTION

Visitor-driven services play a much more important role in museums nowadays (Deng et al., 2022; Chen et al., 2018). Museums are no longer just preservation-driven, which can be discovered by the commonly accepted definition of a museum proposed by the International Council of Museums (n.d.):

*A museum is a non-profit making, permanent institution in the service of society and of its development, and open to the public, which acquires, conserves, researches, communicates, and exhibits, for purposes of study, education, and enjoyment, material evidence of people and their environment.*

This definition implies that besides preservation-driven roles of the acquisition, conservation, and conducting research for items meeting the museum's collection scope (A. K-k. Wong & Chiu, 2023), museums should also offer visitor-driven services through exhibitions and displayed items to fulfill education, enjoyment, and recreation purposes. For the educational role of museums, museums often facilitate visitors to conduct self-directed learning, regardless of visitors' ages (Banz, 2008; Henderson & Atencio, 2007; Meng et al., 2023). For the recreation role of museums, museums should contribute to society in a socially acceptable manner (McLean et al., 2019). Such functions require museums to be highly aware of and respond to the changes in visitors' minds and demands, such as the popularization of virtual reality and augmented reality technologies (Lo et al., 2019; Suen et al., 2020).

To create a satisfactory audience experience for potential visitors, museums should take timely actions to respond to these visitors' ever-changing needs, preferences, and expectations. However, it may be difficult for museum staff to respond promptly to visitors' ever-changing needs, preferences, and expectations because many museums' essential Collection Management Systems (Canadian Heritage Information Network (2012) highly rely on human inputs and controls and thus often lead to human bias, negligence, and errors.

Like other cultural organizations (Chiu & Ho, 2022a; 2022b; Gao et al., 2023; Li et al., 2023; Lo et al., 2020; K.C. Wong & Chiu, 2013; Wu et al., 2023; Xu et al., 2023; Xue et al., 2023; Zheng et al., 2023), many museums have been gradually transformed into smart museums to manage different services in museums and ensure the museums can be visitor-oriented, facilitating accurate, timely actions in various stages of collection management. Even though many studies covered education and recreation technologies (Bowen et al., 2008; Jiang et al., 2019; Lo et al., 2019; Liu et al., 2022), few studies focus on enhancing the collection management process to fulfill visitors' needs, preferences, and expectations. Therefore, it is meaningful to explore how to add various electronic workflows to existing information systems