# INTRODUCTION

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Nowadays, excavations constitute a significant part of the overall archaeological activity. Archaeologists conducting excavations face financial limitations on one hand, and the demand for a comprehensive and efficient execution of field work on the other. Because of the destructive nature of archaeology, high-quality archaeological documentation is of utmost importance in archaeological excavations. Given the characteristic present-day time pressure and resulting lack of on-site interpretations during the excavations, the accurate and exhaustive documentation becomes even more important, as post-excavation interpretations are entirely based upon it. The traditional measuring means and manual recording have been replaced by digital documentation, including the total station and Differential GPS. Three-dimensional (3D) recording stands at the front-end of modern technological innovations in archaeological documentation. A similar situation can be observed in the field of historical architecture survey. Current construction activities usually lead to a substantial change in the layout of historical structures. 3D data acquisition can be applied here as a way of storing 3D information on previously existing structures, which can in the future be used for further evaluation.

Although new technologies, such as terrestrial laser scanning, enable fast, accurate and comprehensive acquisition of cultural heritage data for subsequent analyses, the lack of financial means and technical knowledge of rescue archaeologists and conservators has so far hampered incorporation of 3D digitalization into the documentation workflows established over the years (which are generally based on the total station measurements combined with photographs and pencil drawings).

However, the recent boom in computer vision programs that combine Structure from Motion (SfM) approach with dense Multi-View Stereo (MVS) algorithms changed this

situation. These packages enable generation of accurate 3D models from a collection of photographs in a straightforward and cost-effective manner, without the need for extensive photogrammetric and computer vision knowledge of the user, or the information on geometrical properties of the scene. As such, they became a regular element in the documentation practice in many research and commercial fields, including cultural heritage monitoring and preservation. Furthermore, laser scanning technology nowadays demonstrates a remarkable progress, especially regarding user-friendliness, which makes it more accessible to a broader spectrum of potential users. Moreover, the increasing application of structured light technology, incorporated mostly into handheld scanners, causes substantial price drop and enables scanning to be affordable in the cultural heritage domain.

The main aim of this publication is to deliver a broad overview of technologies available for digital documentation, primarily focusing on 3D digital recording and its importance for preventive archaeology and other branches of cultural heritage management. The book is not intended to bring in-depth and comprehensive research evaluation of all digital technologies currently available. On the contrary, its objective is to present a practical approach to digital documentation, show its potential, limits and problems, as well as possibilities to overcome them. The core of the book is represented by case studies illustrating different strategies and practices of 3D digital recording in some particular fields of archaeology, art history and conservation. Different experience with the applied technologies is described, including problems encountered in the data retrieval and processing. Each category of the case studies is discussed separately and from the point of view of the relevance of the applied technological strategy, as well as possible practical improvements. Finally, remarks on the possibilities of 3D modelling for further documentation purposes are made.