



BSI Standards Publication

Internet of Things (IoT) — IoT-based management of tangible cultural heritage assets

Part 1: Framework

National foreword

This Published Document is the UK implementation of ISO/IEC TR 30189-1:2025.

The UK participation in its preparation was entrusted to Technical Committee IOT/1, Internet of Things.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

This publication is not to be regarded as a British Standard.

© The British Standards Institution 2025
Published by BSI Standards Limited 2025

ISBN 978 0 539 36238 1

ICS 35.200

Compliance with a Published Document cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 March 2025.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------



TECHNICAL REPORT

**Internet of Things (IoT) – IoT-based management of tangible cultural heritage
assets –
Part 1: Framework**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 35.200

ISBN 978-2-8327-0271-0

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions	6
4 Symbols and abbreviated terms	7
5 General	7
5.1 Cultural heritage management.....	7
5.2 Management of stand-alone cultural heritage assets	8
5.3 Considerations for IoT-based management of cultural heritage assets.....	9
5.3.1 General	9
5.3.2 Device	9
5.3.3 Platform.....	10
5.3.4 Application or service.....	11
6 Functional entities	11
6.1 General.....	11
6.2 Device	13
6.3 Network	13
6.4 Platform.....	13
6.5 Application or service	15
6.6 User	16
7 Information flows	16
7.1 General.....	16
7.2 Status monitoring operation.....	16
7.3 Location tracking operation	18
Annex A (informative) Examples of IoT-based CHM services	19
A.1 Status monitoring	19
A.2 Movement detection and location tracking.....	20
Bibliography	21
Figure 1 – Examples of cultural heritage assets.....	7
Figure 2 – Management for conservation of tangible cultural heritage assets.....	8
Figure 3 – System model for IoT-based management of cultural heritage	12
Figure 4 – Platform functions for IoT-based CHM	14
Figure 5 – Information flows for status monitoring operation.....	17
Figure 6 – Information flows for location tracking operation.....	18
Figure A.1 – Status monitoring service	19
Figure A.2 – Location tracking service.....	20
Table 1 – Examples of IoT-based CHM services	15

INTERNET OF THINGS (IOT) – IOT-BASED MANAGEMENT OF TANGIBLE CULTURAL HERITAGE ASSETS –

Part 1: Framework

FOREWORD

- 1) ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.
- 2) The formal decisions or agreements of IEC and ISO on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC and ISO National bodies.
- 3) IEC and ISO documents have the form of recommendations for international use and are accepted by IEC and ISO National bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC and ISO documents is accurate, IEC and ISO cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC and ISO National bodies undertake to apply IEC and ISO documents transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC and ISO document and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC and ISO do not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC and ISO marks of conformity. IEC and ISO are not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this document.
- 7) No liability shall attach to IEC and ISO or their directors, employees, servants or agents including individual experts and members of its technical committees and IEC and ISO National bodies for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this ISO/IEC document or any other IEC and ISO documents.
- 8) Attention is drawn to the Normative references cited in this document. Use of the referenced publications is indispensable for the correct application of this document.
- 9) IEC and ISO draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC and ISO take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC and ISO had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch> and www.iso.org/patents. IEC and ISO shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 30189-1 has been prepared by subcommittee 41: Internet of Things and Digital Twin, of ISO/IEC Joint Technical Committee 1: Information technology. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
JTC1-SC41/480/DTR	JTC1-SC41/492A/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1, and the ISO/IEC Directives, JTC 1 Supplement available at www.iec.ch/members_experts/refdocs and www.iso.org/directives.

A list of all parts in the ISO/IEC 30189 series, published under the general title *Internet of Things (IoT) – IoT-based management of tangible cultural heritage assets*, can be found on the IEC and ISO websites.

INTRODUCTION

Cultural heritage assets can include museums, historical landmarks, artworks, and other cultural artifacts. Effective management of cultural heritage is crucial for preserving these important assets for future generations. The cultural heritage management can include efforts to preserve and protect cultural heritage assets from damage, deterioration and theft.

The Internet of Things (IoT) technology can be used for management of tangible cultural heritage assets. In particular, IoT-based sensing, monitoring and location tracking can be performed for management of tangible cultural heritage.

In the status monitoring, IoT technology can be used to monitor the condition of cultural heritage or assets, such as the temperature and humidity of a museum. This is important because certain environmental conditions can cause damage to and deterioration of valuable cultural assets. By monitoring these conditions in a real-time manner, it is possible to take corrective action to prevent damage and ensure that the assets are being preserved in optimal conditions.

In the location tracking, IoT technology can be used to keep track of various cultural assets. By applying appropriate IoT sensors to these assets, it is possible to track their location and movement in a real-time manner. This can help prevent theft and ensure that valuable assets are properly protected. For example, if an artifact is removed from its display, the IoT sensor will trigger an alert, enabling museum staff to quickly take actions to secure the asset.

This document describes how IoT technology can be used to effectively manage a variety of cultural heritage assets. This document is purposed to provide useful information or guidelines for development of platforms or services on IoT-based management of cultural heritage.

In particular, this document focuses on management of stand-alone cultural heritage assets. A stand-alone cultural heritage is a single cultural asset that is not part of a larger collection or group of assets. Stand-alone cultural assets can be important to a particular community or group and can be preserved and protected in order to preserve the cultural heritage of that group. In the context of cultural heritage management, stand-alone cultural assets can be treated differently than assets that are part of a larger collection, as they possibly do not have the same level of institutional support or resources available for their preservation.

IEC TR 30189 consists of two parts.

- Part 1 describes a framework for the use of IoT technology for management of tangible cultural heritage assets, which includes the associated functional entities and information flows.
- Part 2 describes a set of use cases for IoT-based management of tangible cultural heritage assets, based on the framework, which include implementations and experimentations for the associated services.

INTERNET OF THINGS (IOT) – IOT-BASED MANAGEMENT OF TANGIBLE CULTURAL HERITAGE ASSETS –

Part 1: Framework

1 Scope

This document describes a framework for the use of IoT technology for management of tangible cultural heritage assets, which includes the associated functional entities and information flows.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

cultural heritage

legacy of physical objects and intangible attributes of a group or a society that are inherited from past generations, maintained and protected in the present and preserved for future generations

[SOURCE: ISO 18461:2016, 2.1.3]

3.2

Internet of Things

infrastructure of interconnected entities, people, systems and information resources together with services which processes and reacts to information from the physical world and virtual world

[SOURCE: ISO/IEC 20924:2024, 3.2.8]