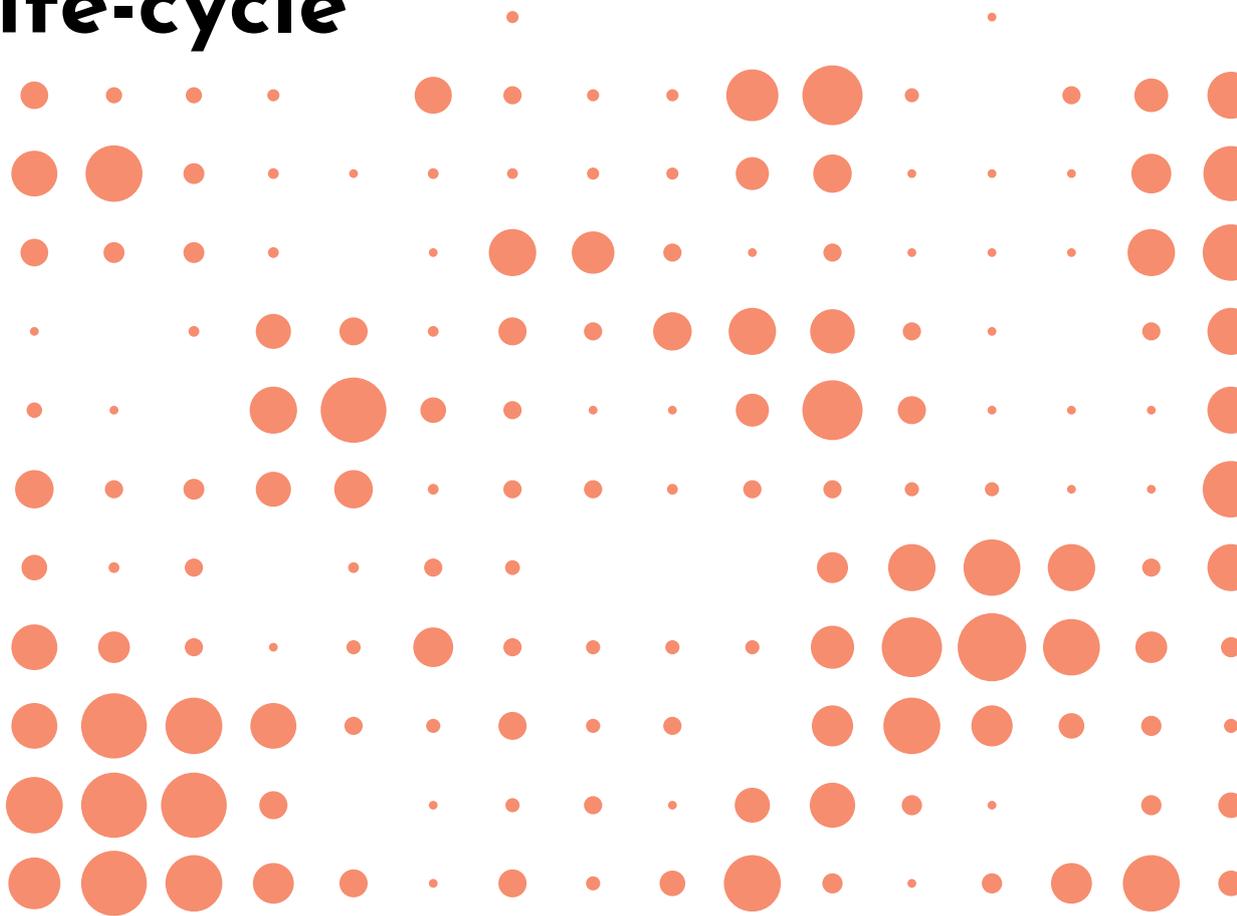


Information management according to BS EN ISO 19650

Guidance Part 3

Operational phase of the asset life-cycle



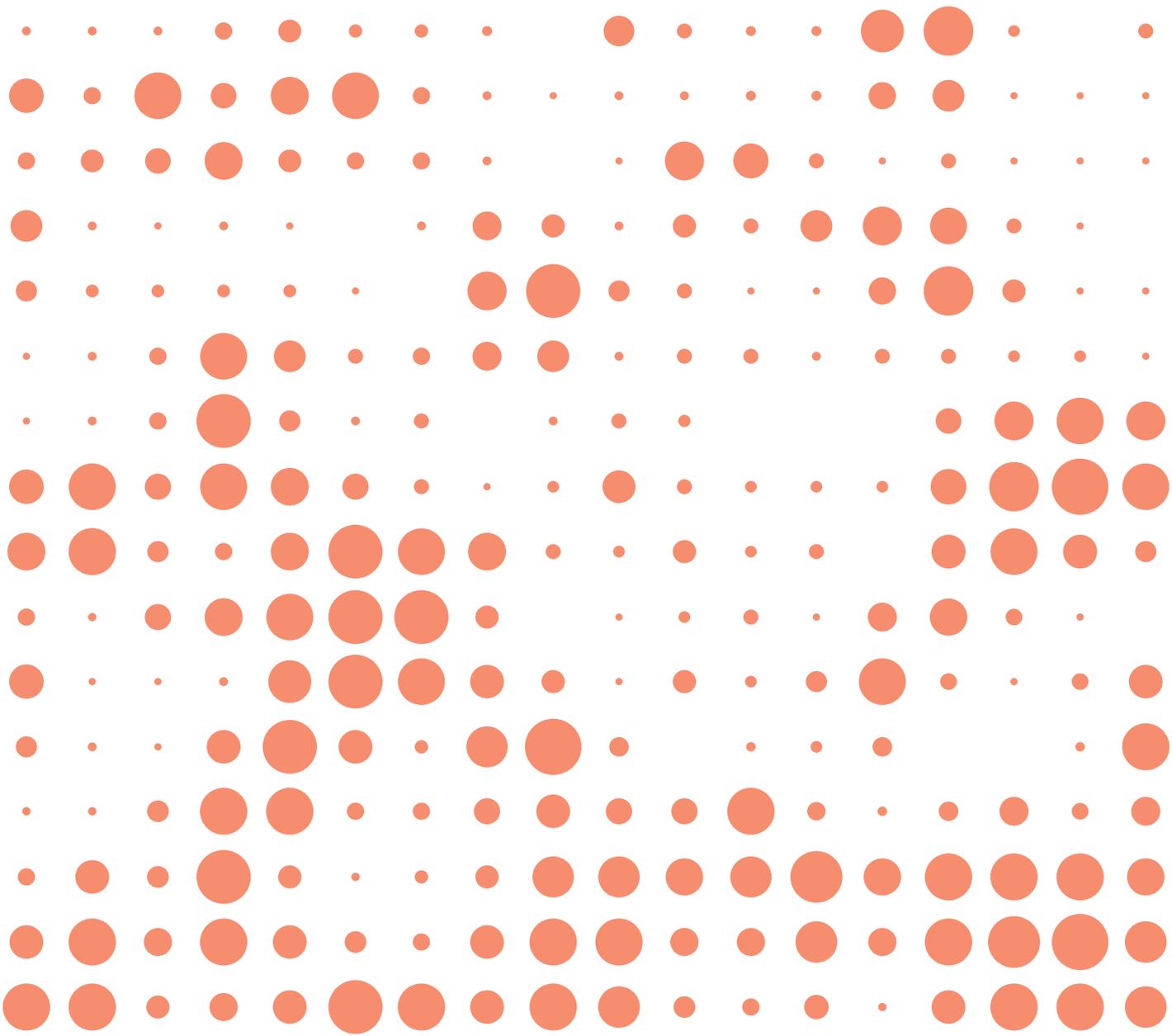
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Table of contents

Message from the UK BIM Alliance Chair	3
Acknowledgments	4
About BS EN ISO 19650	5
About this guidance document	6
Abbreviations and acronyms	7
1.0 Introduction	8
1.1 The purpose of ISO 19650-3	9
2.0 How ISO 19650-3 reflects the concepts and principles of ISO 19650-1	10
3.0 Similarities and differences compared to ISO 19650-2	11
3.1 Similarities	11
3.2 Differences	14
4.0 Summary	18

List of figures

Figure 1: ISO 19650 guidance framework	6
Figure 2: Information management during the life-cycle of an asset [SOURCE: ISO 19650-3 Figure 1]	9
Figure 3: ISO 19650-3 information management process [SOURCE: ISO 19650-3 Figure 4]	16
Figure 4: ISO 19650-3 arrangement of information requirements	17

List of tables

Table 1: Abbreviations and acronyms	7
Table 2: ISO 19650-3 clauses similarly worded to ISO 19650-2	12
Table 3: ISO 19650-3 clauses expressed differently from their equivalents in ISO 19650-2	13
Table 4: ISO 19650-3 clauses not contained in ISO 19650-2	14

Message from the UK BIM Alliance Chair

Author: Dr Anne Kemp OBE
Chair - UK BIM Alliance



The UK BIM Framework provides the fundamental step towards digital transformation of the UK's built environment industry. The Framework is based on the ISO 19650 series, which first developed out of the UK's former BIM Level 2, but incorporates and anticipates global and future digital perspectives.

The UK BIM Framework embraces and assists in the implementation of the standards for managing information for the whole life of assets of the built environment. The Framework anticipates the potential for integration across portfolios. The Framework provides extensive Guidance which continues to be developed, including the addition of supplementary tools and materials to enable a firm basis for the evolving National Digital Twin Programme.

This Guidance has been developed to help industry to implement the concepts and principles of the ISO 19650 series upon which the UK BIM Framework is based. It has been continually updated to keep track of the publication of the different parts of ISO 19650, and to reflect lessons learnt as further experience is gained in its implementation.

The key parts of ISO 19650 are now all in place, allowing us to realize information management throughout the whole life of built environment assets. It provides for traditional ways of working entailing exchange of information via files, but also caters for shifts towards data exchange. The key is being specific about what information is required and how it is to be delivered. This needs forethought around what should be

the "end in mind" and consideration from an organizational, whole life perspective. This then informs the detailed requirements right down to appointment level.

The work behind developing this Guidance has been considerable. I would like to thank Sarah Davidson and David Churcher for their tireless commitment in continuing to bring this work together - I so enjoy working with you both. Secondly, I would like to thank the many authors who have contributed so generously to the writing of the Guidance - and been so patient in the criticisms and changes that have been required of them. Finally, I would like to thank the many people who have spared time to review and feedback on the Guidance - the Focus Groups in particular, but also those who have contacted us separately. Without this feedback we would not be able to incorporate the wide-ranging experience and testing which is occurring around the industry.

We welcome your continued feedback and shared experiences. You can provide this via guidancefeedback@ukbimframework.org.

Acknowledgments

This guidance represents the collaborative efforts of the following people and organizations

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About BS EN ISO 19650

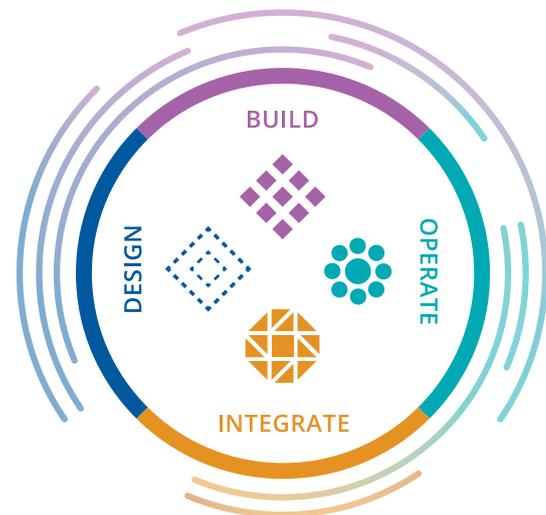
The BS EN ISO 19650 series of standards (herein after referred to as the ISO 19650 series) is an international standard of good practice. It defines information management principles and requirements within a broader context of digital transformation in the disciplines and sectors of the built environment (including construction and asset management industries). Its implementation in the UK is supported by UK National Forewords in ISO 19650 Parts 1, 2, and 3, and a UK National Annex in ISO 19650 Part 2.

The ISO 19650 series replaces some of the existing British Standards and Publicly Available Specifications relating to information management using building information modelling (BIM). It is part of a landscape, or ecosystem, of national and international standards supporting information management processes and technical solutions. It considers all information whether it is a construction programme, a record of a meeting, a geometrical model or a contract administration certificate.

Building information modelling (BIM) plays a key part in the management of information because it provides a methodology that helps us to structure information so that technology can process it.

Structuring information using industry standards helps to improve interoperability. This means that information can be joined-up by both people and technology, which then enables us to extract more valuable knowledge from it. Using the same information structures throughout industry generates consistency, repetition and predictability. This brings real efficiency gains for businesses and provides the data architecture for the connected future.

Standards within the ISO 19650 series are available at www.bsigroup.com. Visit www.ukbimframework.org to see how the ISO 19650 standards plus other standards within the UK BIM Framework map to the design, build, operate and integrate process.



About this guidance document

The guidance framework supports the UK implementation of the ISO 19650 series. This guidance document (guidance part 3) sits within an overall guidance framework as shown in Figure 1.

Guidance part 3 is written to support the implementation of BS EN ISO 19650-3, which sets out the information management process for the operational phase of the asset life-cycle.

This guidance gives a high-level view of the part 3 standard and explains the similarities and differences between part 3 and part 2 (which addresses the delivery phase of the asset life-cycle).

As with all guidance supporting the UK BIM Framework, we invite comment and feedback on this guidance part 3 at guidancefeedback@ukbimframework.org

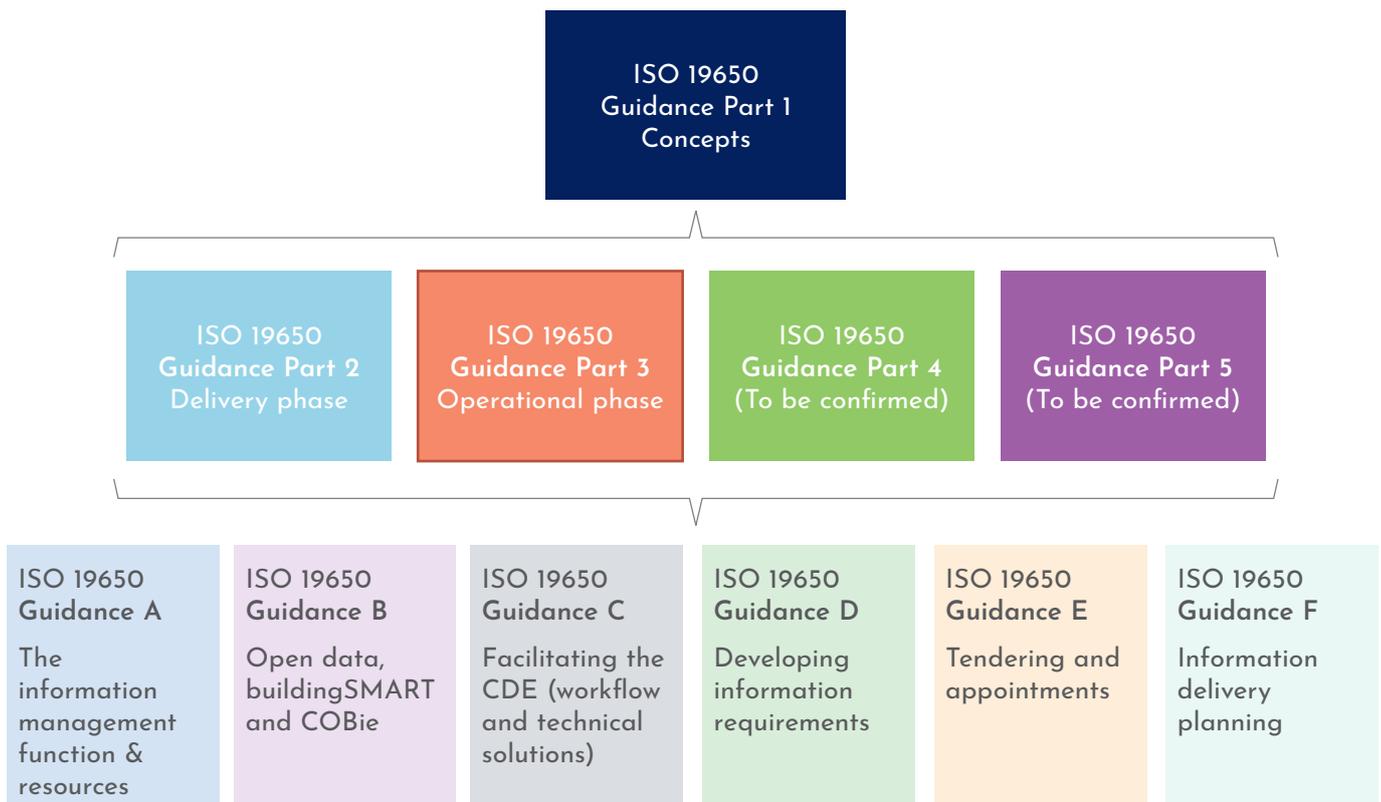


Figure 1: ISO 19650 guidance framework

Abbreviations and acronyms

This guidance includes a number of abbreviations and acronyms as set out in Table 1.

Table 1: Abbreviations and acronyms

Abbreviation or acronym	Term
BCF	BIM collaboration format
BIM	Building information modelling
bSDD	buildingSMART data dictionary
COBie	Construction operation building information exchange
IDM	Information delivery manual
IFC	Industry foundation classes
MVD	Model view definition

1.0 Introduction

This document is the first edition of guidance for BS EN ISO 19650-3 (referred to here as ISO 19650-3) and is part of the UK BIM Framework Guidance suite. The detail included in this edition is limited because ISO 19650-3 has only just been published. However, additional guidance will be prepared and published over the next 12 months.

This document focuses on explaining the overall approach of ISO 19650-3, briefly covering the concepts and principles explained in ISO 19650-1. It also explains the similarities and differences between ISO 19650 Parts 2 and 3. This should help all readers who already have some familiarity with ISO 19650-2 to put Part 3 into context.

Now that ISO 19650-3 has been published, it means there is a wholly international set of standards defining the information management process throughout the life-cycle of an asset (delivery phase and operational phase).

Transition from PAS 1192-3

In the UK, ISO 19650-3 has replaced PAS 1192-3, which had been available since 2014. Many asset owners/operators have become familiar with its requirements and they should be reassured that all the key principles from the PAS have been brought forward into the ISO.

BSI has published a short transition document to help organizations make the change from PAS 1192-3 to ISO 19650-3 and it is not the intention of this guidance document to replicate that transition guidance. It is recommended that the [BSI transition guidance](#) is read alongside this document.

1.1 The purpose of ISO 19650-3

ISO 19650-3 sets out the requirements for information management using building information modelling (BIM) during the operational phase of an asset's life. This means it is designed to be applied during the period an asset is in use and when an asset needs to be managed even if it is not being used, for example if it has been mothballed. The primary users of ISO 19650-3 are therefore expected to be asset managers and facilities managers, and the teams and contractors that work for them. The standard will also be helpful to those delivering capital projects to design and construct new assets, as it will help them understand why they are asked to produce operational information as part of their work.

ISO 19650-3 is written in the form of a specification and its main clauses set out things that have to be done or achieved.

The text uses the word "shall" to convey each requirement. In line with many specifications there is very little guidance in the standard on how the requirements could be satisfied - that is left up to each organization implementing the standard. But this is where the UK BIM Framework Guidance comes in, to provide a baseline for users of the standard when putting it into practice.

ISO 19650-3 is designed to be a companion to ISO 19650-2. As a member of the ISO 19650 series, Part 3 uses the same terminology as Part 2, and many of the detailed clauses are recognizably similar. This is intended to make it as easy as possible for both standards to be used together, as they should be, over the whole life-cycle of an asset as shown in Figure 2.



Key

- AIM asset information model
- PIM project information model
- A start of delivery phase – transfer of relevant information from AIM to PIM
- B start of operational phase – transfer of relevant information from PIM to AIM
- C post-occupancy/implementation evaluation or performance review
- D trigger events during the operational phase

NOTE Information can be transferred between PIM and AIM during the delivery phase as well as at points A and B

Figure 2: Information management during the life-cycle of an asset
[SOURCE: ISO 19650-3 Figure 1]

2.0 How ISO 19650-3 reflects the concepts and principles of ISO 19650-1

ISO 19650-3 defines the information management process through a series of eight steps with loops and branches defined by questions and decisions. Figure 3 in this guidance reproduces the process flowchart and some of the details in it are explained in section 3.

The process as a whole reflects the concepts and principles from ISO 19650-1. This means that it includes the following features:

- The **information management process is to be applied in a way that is proportionate** to the scale and complexity of the asset owner/operator, the asset(s) in question, the trigger events that occur in relation to the asset, the works required to respond to the trigger events, and the information required as a result of the work done.
- Information **deliverables are produced in response to information requirements** which themselves are developed from a clear set of information purposes
- **Information delivery has to be planned** in advance, starting during the tender process (for external contracts) or internal works negotiation and then continuing into a mobilization period before the technical work itself is started
- The **capacity and capability** of delivery teams to comply with ISO 19650-3 **are taken into account** when making appointments
- Information **deliverables are produced using an agreed asset information standard and** in accordance with **agreed methods and procedures**. This includes producing information deliverables to an agreed amount of detail, as defined through the level of information need framework

- Information deliverables are collated into **information models that are exchanged between delivery teams** (asset/facility contractors) **and the appointing party** (asset owner/operator), and may then be passed on to other stakeholders such as a regulator
- **Information production** and review, including authorization and acceptance, **uses the common data environment (CDE) workflow** and whatever CDE solutions the various parties wish to apply
- **Information models** from various delivery teams **are federated to generate the asset information model**, that can then be **used throughout the asset's operational life** for analysis, reporting or other uses that satisfy the information purposes
- The **asset information model needs to be maintained** during the operational life of the asset so that it continues to represent the state and condition of the asset.

All of these features will be familiar to users of ISO 19650-2 since the underlying concepts and principles are also all reflected in that standard.

Like most standards, ISO 19650-3 is a voluntary document. By itself it conveys no obligation to use it. But following the approaches defined in ISO 19650-3 should increase the efficiency and effectiveness of information management processes and support the objectives of all parties, particularly the appointing party (asset owner/operator).

The obligation to use ISO 19650-3 has to be created. This could be through it being included or cited in a contract between an asset owner/operator and an external contractor. It could also be through adoption of an organizational policy covering the departments and staff that act as asset owner/operator and as works teams/internal contractors.

3.0 Similarities and differences compared to ISO 19650-2

3.1 Similarities

ISO 19650-3 is designed to sit alongside ISO 19650-2 so that, together, they can be used across both operational and delivery phases of an asset life-cycle as easily as possible. This has resulted in a lot of similarities between the two documents and the key similarities are explained below. However there are also significant differences and these are explained in section 3.2.

The principal similarities between ISO 19650-3 and ISO 19650-2 are in:

1. The terms and definitions used in the text,
2. The eight high-level information management process steps,
3. The separation between asset/project level activities and appointment level activities within the overall information management process, and
4. Many of the sub-sub-clauses that define the detail within the information management process steps.

This all means that the two documents have a very similar look and feel - if a reader knows their way around one of the two documents then the other should be relatively easy to understand.

The following paragraphs explain each of these principal similarities.

1. Terms and definitions. ISO 19650-3 inherits all the terms and definitions from both ISO 19650-1 and ISO 19650-2. This means that the standard terms of appointing party, lead appointed party, delivery team and appointed party have all been used. Terms defined in ISO 19650-2 and used initially in relation to projects (delivery phase) have been reused in relation to the operational phase. This includes BIM execution plan,

master information delivery plan and task information delivery plan. These terms are just as appropriate in relation to asset/facility management works as they are to project works.

2. Eight information management process steps. ISO 19650-3 uses the same basic 8-step structure for the information management process as is used in ISO 19650-2. In both these documents:
 - step 1 is high-level preparation by the appointing party
 - steps 2 and 3 are the selection process for lead appointed parties
 - steps 4 and 5 are formalizing the appointment and the mobilization of a lead appointed party
 - steps 6 and 7 are production of information and its review and eventual acceptance into the project or asset information model
 - step 8 is the close-out of one pass through the process.

In ISO 19650-3, the detailed clauses defining the information management activities are all in clause 5, with a sub-clause for each of the eight steps. This is exactly the same arrangement as in ISO 19650-2.

3. Separation between asset/project level and appointment level activities. In both ISO 19650-3 and ISO 19650-2 there are activities that are intended to be completed just once for each project or asset - these are steps 1 and 8 in both cases. Albeit that the preparatory tasks in step 1 would need to be reviewed and possibly amended over time, as the asset owner/operator's strategic objectives change. These two steps bookend the sequence of steps that are completed for each new appointment that is made by the appointing party - these are steps 2 to 7 in both documents.

4. Similarity of sub-sub-clauses. Across both ISO 19650-3 and ISO 19650-2, the sub-sub-clauses that set out the requirements for each of the eight steps are as alike as they can be while still reflecting the difference between project activities and asset management activities.

Table 2 lists clauses that have the same intent in both ISO 19650-3 and ISO 19650-2 and are very similar in their wording.

Table 2: ISO 19650-3 clauses similarly worded to ISO 19650-2

ISO 19650-3 clause	ISO 19650-2 clause
5.1.1 (appointing party information management function)	5.1.1
5.1.6 (asset information standard)	5.1.4
5.1.7 (asset information production methods and procedures)	5.1.5
5.1.9 (common data environment)	5.1.7
5.1.13 (asset information protocol)	5.1.8
5.2.2 (appointing party's exchange information requirements)	5.2.1
5.2.3 (assemble reference information and shared resources)	5.2.2
5.2.4 (response requirements and evaluation criteria)	5.2.3
5.2.5 (compile invitation to tender/request to provide service)	5.2.4
5.3.1 (lead appointed party information management function)	5.3.1
5.3.3 (task team capability and capacity)	5.3.3
5.3.4 (delivery team capability and capacity)	5.3.4
5.3.5 (delivery team mobilization plan)	5.3.5
5.3.6 (delivery team risk register)	5.3.6
5.3.7 (compile delivery team response)	5.3.7
5.4.2 (detailed responsibility matrix)	5.4.2
5.4.4 (task information delivery plans)	5.4.4
5.4.5 (master information delivery plan)	5.4.5
5.4.6 (complete lead appointed party's appointment)	5.4.6
5.4.7 (complete appointed party's appointment)	5.4.7
5.5.1 (mobilize resources)	5.5.1
5.5.2 (mobilize information technology)	5.5.2
5.5.3 (test asset information production methods and procedures)	5.5.3
5.6.1 (availability of reference information and shared resources)	5.6.1
5.6.2 (generate information)	5.6.2
5.6.3 (quality assurance check)	5.6.3
5.6.4 (approve information for sharing)	5.6.4
5.6.5 (review information model)	5.6.5
5.6.6 (authorize information model for delivery to appointing party)	5.7.2

Table 3 lists clauses that have the same intent in both ISO 19650-3 and ISO 19650-2 but different wording.

Table 3: ISO 19650-3 clauses expressed differently from their equivalents in ISO 19650-2

ISO 19650-3 clause	ISO 19650-2 clause
5.1.8 (establish reference information and shared resources)	5.1.6
5.3.2 (establish pre-appointment BIM execution plan)	5.3.2
5.4.1 (confirm BIM execution plan)	5.4.1
5.4.3 (lead appointed party's EIR)	5.4.3
5.7.1 (submit information model for appointing party acceptance)	5.7.3
5.7.2 (review and accept information model)	5.7.4

These tables cover 35 of the 46 requirements clauses in ISO 19650-3, meaning that about $\frac{3}{4}$ of the text is similar (in wording and/or meaning) to ISO 19650-2. It is hoped this will make it easier to read across from one standard to the other.

3.2 Differences

ISO 19650-3 clearly addresses a different technical topic from ISO 19650-2 - the operational phase of the asset life-cycle rather than the delivery phase. This means there are some requirements that are not relevant or appropriate to projects, for example the requirements for the appointing party to establish an asset information model and then ensure processes are in place to maintain it.

Table 4 lists clauses in ISO 19650-3 that do not appear or have no equivalent in ISO 19650-2.

Table 4: ISO 19650-3 clauses not contained in ISO 19650-2

ISO 19650-3 clause
5.1.2 (establish organizational information requirements)
5.1.3 (identify assets for which information shall be managed)
5.1.4 (establish asset information requirements)
5.1.5 (identify foreseeable trigger events for which information shall be managed)
5.1.10 (establish links to enterprise systems)
5.1.11 (establish asset information model)
5.1.12 (establish processes to maintain asset information model)
5.2.1 (decide type of activity providing information)
5.5.4 (maintain resources in readiness for a trigger event)
5.8.1 (aggregate an accepted information model into the asset information model)
5.8.2 (review and continue maintenance of the asset information model)

In addition to these clauses, there are four principal differences to be aware of between ISO 19650-3 and ISO 19650-2.

1. Trigger events. ISO 19650-3 carries forward the notion of trigger events from PAS 1192-3. Trigger events are the occurrences during the life of an asset that cause new or updated information to be required. They provide the overall tempo for the information management process in the same way that plan of work stages do during a project.

By their nature, some of these trigger events can be foreseen and scheduled or otherwise planned for in advance of them happening, for example regular maintenance or inspections.

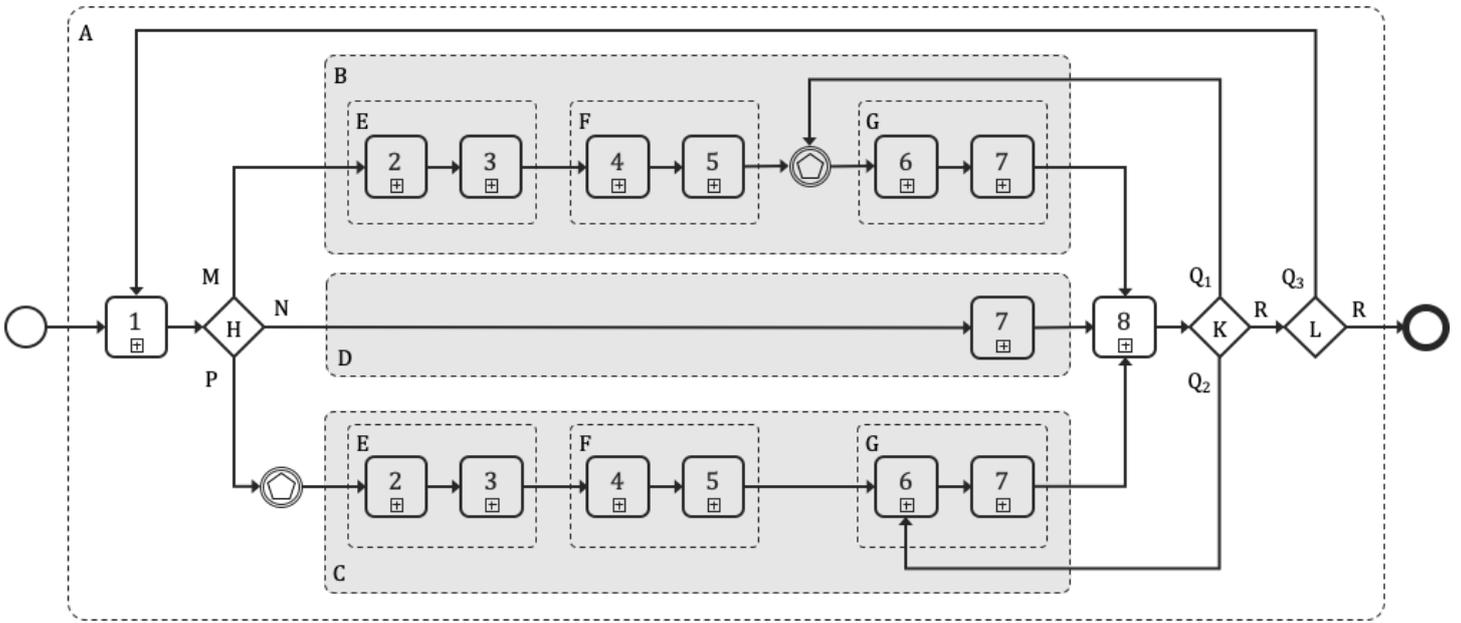
Other trigger events are acts of God, or random occurrences, or so infrequent or unpredictable that it is impractical to plan for them in advance, for example lightning strike. However, the plans made to respond to foreseeable trigger events could provide help when it comes to these unexpected events.

2. Multiple pathways. Focus on trigger events means that the detail of the information management process itself is very different from that in ISO 19650-2. The process flowchart, Figure 4 in ISO 19650-3, is reproduced in Figure 3 in this guidance.

The flowchart shows that there is more than one pathway through the information management process, depending on the circumstances in which the information is being acquired. These pathways are shaded and marked B, C and D. Pathway B is used for the foreseeable/plannable trigger events whereas pathway C is used for those that cannot be foreseen or should just be responded to when they happen. Pathway D is a particular kind of information acquisition, when the asset itself is being acquired from an existing owner (appointing party).

3. Long-term perspective. The loops around the flowchart, particularly the loop from decision L back to step 1, reflect that many appointing parties (asset owners/operators) have a long-term interest in their assets, during which many trigger events will occur. Each of these initiates some information management activities. It also means that an asset information model exists as an input for contractors/works teams responding to those trigger events, to help them plan their technical work.

This is in stark contrast to the process flowchart in ISO 19650-2 which is a single project beginning-to-end representation of information management, and where a project information model is the output from the process.



Key

Information management activities

- 1 assessment and need
- 2 invitation to tender/request to provide service
- 3 response to invitation to tender/request to provide service
- 4 appointment
- 5 mobilization
- 6 production of information
- 7 information model acceptance by appointing party
- 8 AIM aggregation

Activity groupings

- A activities undertaken during the operational phase of assets
- B activities undertaken for each appointment made before trigger event
- C activities undertaken for each appointment made after trigger event or delivery phase using ISO 19650-2
- D activities undertaken when acquiring an asset
- E activities undertaken during the procurement stage (of each appointment)
- F activities undertaken during the information planning stage (of each appointment)
- G activities undertaken during the information production stage (of each appointment)

Decision points, questions and actions

- H type of trigger event providing information
- K continuation of the appointment
- L continuation of this information management process
- M via an appointment made before a trigger event
- N received from another appointing party/asset owner
- P via an appointment made after a trigger event or delivery phase use ISO 19650-2
- Q₁ yes - lead appointed party waits for next trigger events
- Q₂ yes - lead appointed party progresses to next delivery milestone
- Q₃ yes - appointing party still has responsibility for the asset
- R no

Figure 3: ISO 19650-3 information management process
[SOURCE: ISO 19650-3 Figure 4]

4. Exchange information requirements at the appointment level. The final difference between ISO 19650-3 and ISO 19650-2 reflects a small development in the thinking around asset information requirements (AIR) and exchange information requirements (EIR) since ISO 19650-1 was published.

In ISO 19650-1 Figure 2, a hierarchy of information requirements is presented, with organizational information requirements (OIR) and project information requirements (PIR) as high-level expressions of need from which AIR and EIR are derived. The intention in ISO 19650-1 was that AIR would be used contractually in operational phase appointments, EIR would be used contractually in delivery phase appointments, and that AIR would also inform EIR when operational information was being produced as part of a delivery phase project.

During the development of ISO 19650-3 it was realized that EIR could also be used to specify information requirements in operational phase appointments. They could be issued to lead appointed parties to specify the asset information required in response to trigger events during the lifetime of the asset. AIR have not disappeared and are established at the asset level, which makes them more generic than EIR. The AIR are still derived from the OIR, which are established at an organizational level. This relationship is shown in Figure 4.

As EIR are now in both delivery and operational phases of the life-cycle, the EIR in ISO 19650-3 are identified in the text as “EIR (ISO 19650-3)”.

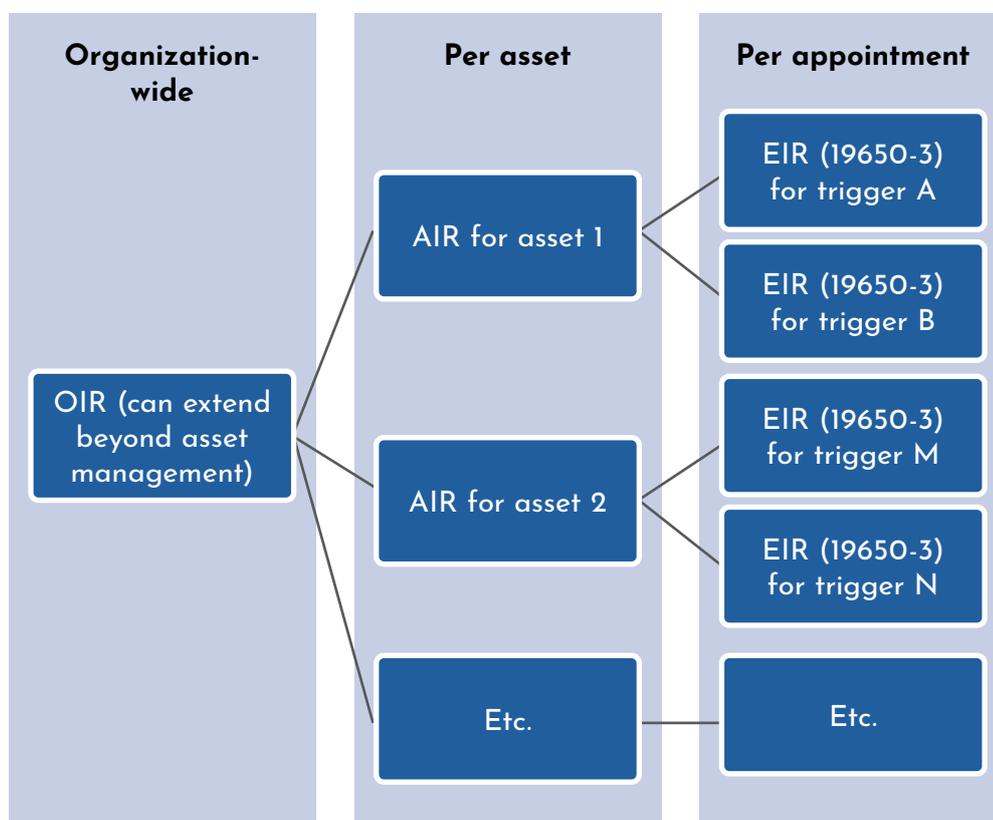


Figure 4: ISO 19650-3 arrangement of information requirements

4.0 Summary

This initial guidance to ISO 19650-3 has explained some of the key features of the new standard, particularly in how it resembles or differs from ISO 19650-2. It is hoped that the many similarities to ISO 19650-2 will help some organizations become familiar with ISO 19650-3 more quickly than would otherwise have been the case.

It also means that much of the guidance that has already been prepared for ISO 19650-2 can be applied to ISO 19650-3 with very little or even no modification. The UK BIM Framework Guidance group will be looking at this in more detail in the months ahead.

In future editions of the UK BIM Framework Guidance, it is intended to publish further guidance to give insight into the specific clauses of ISO 19650-3 and to explain the activities attributed to the various types of party in more detail.

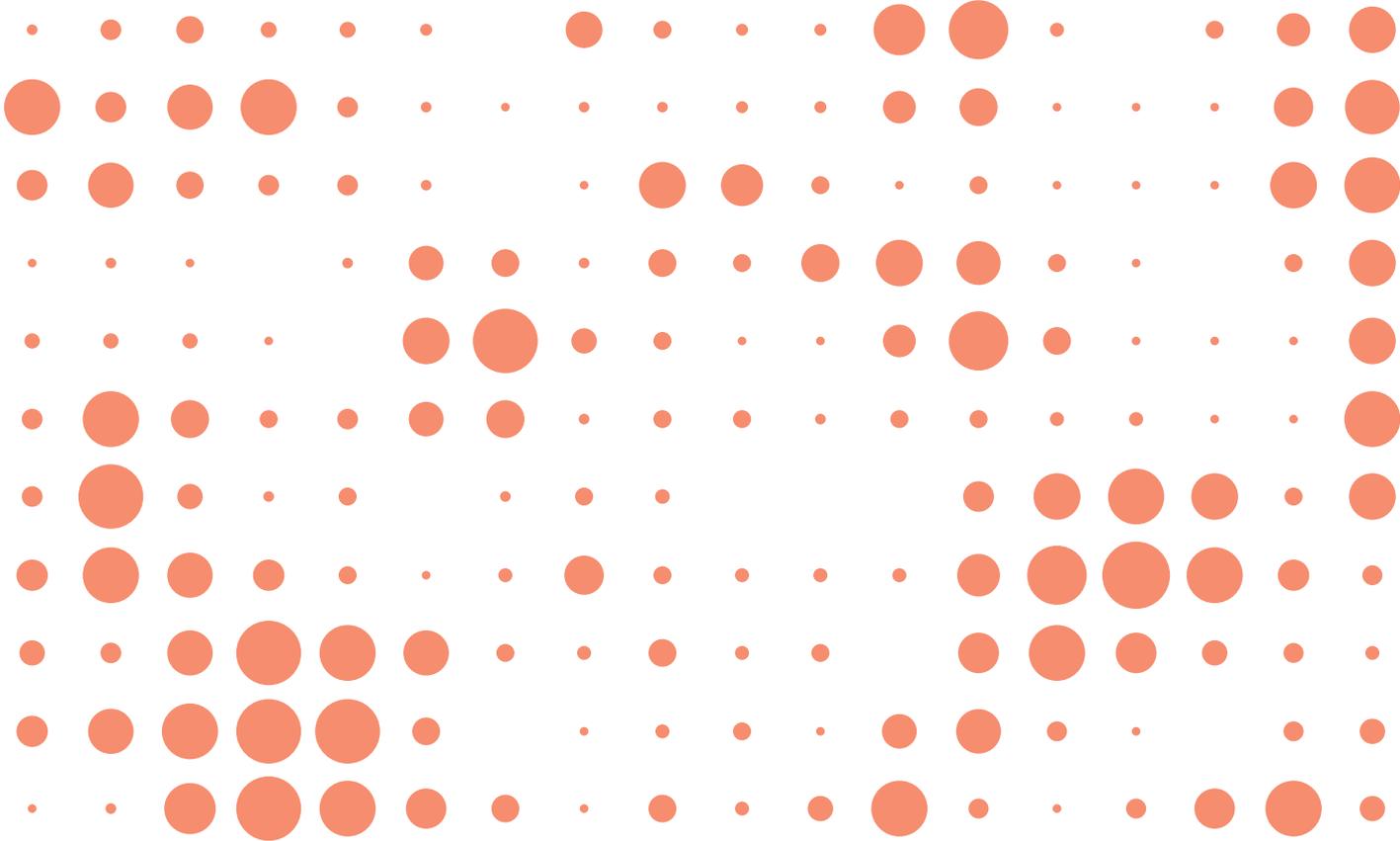
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