PAS 1192-3:2014

Incorporating Corrigendum No. 1

Specification for information management for the operational phase of assets using building information modelling

bsi.

Publishing and copyright information

ISBN 978 0 580 86674 6

ICS 91.010.01

Publication history

First published March 2014

Amendments issued since publication

Date	Text affected
31 July 2014	Corrigendum No. 1 to correct references in introduction and wording in Figures 8 and 10

Contents

Foreword

This PAS was sponsored by the Construction Industry Council (CIC) on behalf of the Building Information Modelling (BIM) Task Group. Its development was facilitated by BSI Standards Limited and it was published under licence from The British Standards Institution. It came into effect on 31 July 2014.

Acknowledgement is given to the following organizations that were involved in the development of this PAS as members of the steering group:

- AEC3
- Atkins Limited
- BAM
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- CIC
- ECS Limited
- The Facilities Society
- FSI (FM Solutions) Limited
- Government Property Unit
- Graeme Tappenden Consulting
- Hitherwood Consulting
- The Institute of Asset Management
- National Grid
- Network Rail
- Parsons Brinckerhoff
- University of Greenwich

Acknowledgement is also given to the members of a wider review panel who were consulted in the development of this PAS.

The PAS process enables a specification to be rapidly developed in order to fulfil an immediate need in industry. A PAS can be considered for further development as a British Standard, or constitute part of the UK input into the development of a European or International Standard.

Relationship with other publications

This PAS builds on the existing code of practice for the collaborative production of architectural, engineering and construction information, defined within BS 1192:2007.

It is a companion document of, and refers heavily to PAS 1192-2:2013, *Specification for information management for the capital/delivery phase of construction projects using building information modelling*.

It also refers heavily to the BS ISO 55000 series, *Asset management*, PAS 55:2008, *Asset management*, and to existing facilities management standards BS 8210:2012 and BS 8587:2012. BS 8536:2010 and BS 8572:2011 have also been useful source documents in relation to facilities management.

Use of this document

It has been assumed in the preparation of this PAS that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Information about this document

The start and finish of text introduced by Corrigendum No. 1 is indicated in the text by tags ⟦C1⟩ and ⟨C1⟧.

Copyright is claimed on the wedge element of Figure 3. Copyright holders are Mark Bew and Mervyn Richards.

Copyright is also claimed on Figure 2, which has been repurposed for this publication from Figure 14 in PAS 1192-2:2013. The copyright holder is Mervyn Richards.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in italic type, and does not constitute a normative element. The word "should" is used to express recommendations, the word "may" is used to express permissibility and the word "can" is used to express possibility, e.g. a consequence of an action or an event.

Spelling conforms to The Shorter Oxford English Dictionary. If a word has more than one spelling, the first spelling in the dictionary is used.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with this PAS cannot confer immunity from legal obligations.

0 Introduction

0.1 Background and context

The Introduction to this PAS sets the scene for the normative content. Whilst in this sense the introduction is informative, it is recommended that all users of PAS 1192-3 take the time to read and reflect on the topics discussed here since these affect the way that the body of the PAS has been written and the way that its requirements have been expressed.

In May 2011, the UK Government published the Construction Strategy aimed at reducing the cost of public sector assets by up to 20% by 2016. The strategy calls "for a profound change in the relationship between public authorities and the construction industry to ensure the Government consistently gets a good deal and the country gets the social and economic infrastructure it needs for the long-term". This is reinforced by the Industrial Strategy Construction 2025[1], published in July 2013.

PAS 1192-3 is a companion document to PAS 1192-2, which specified an information management process to support building information modelling (BIM) Level 2 in the capital/delivery phase of projects. In contrast, PAS 1192-3 focuses on the operational phase of assets irrespective of whether these were commissioned through major works, acquired through transfer of ownership or already existed in an asset portfolio. The operational phase of an asset is deemed to commence at handover, but the requirements within PAS 1192-3 may also be helpful during major works.

Like PAS 1192-2, PAS 1192-3 applies to both building and infrastructure assets. In addition, both PAS 1192-2 and PAS 1192-3 assume a certain level of knowledge regarding BIM and BS 1192:2007.

PAS 1192-3 makes extensive reference to the definitions and concepts in PAS 1192-2. All users of PAS 1192-3 are encouraged to obtain a copy of PAS 1192-2, which is summarized on http://shop.bsigroup.com/Navigate-by/PAS/PAS-1192-22013/ and available as a free download.

The discipline of asset management allows organizations to optimize the whole life cost of managing portfolios of assets which can be complex and varied in nature, distributed over extensive geographical areas and may be subjected to differing demand/utilization requirements. Integrating the management of information across the longer term activity of asset management with the shorter term activity of asset construction for a portfolio of assets should deliver real savings. These come about in a variety of ways, including:

- reduced costs as a result of the automated transfer of accurate, complete and unambiguous information at asset handover and during transfer of operation from one service provider to another;
- better awareness of the operational and maintenance needs of assets;
- better decisions regarding operation and maintenance expenditure based on actual asset performance and status;
- dynamic measurement and condition-sensing enabling poor energy performance, faults and impending failure to be identified;
- better organizational and strategic planning from more complete and accurate asset information, for example in the development of the health and safety file required by the [C1] Construction (Design and Management) Regulations[2] ⟨C1⟩;
- better information quality as a result of automation enabling an increased amount of verification.

It is up to each organization to decide for itself how and when to apply PAS 1192-3 to existing asset information, especially when a new project delivers a project information model (PIM) as defined in [C1] PAS 1192-2 ⟨C1⟩.

[1] Available from https://www.gov.uk

[2] Available from http://www.hse.gov.uk/construction/cdm.htm

0.2 Substantive issues

a) Despite similarities in the nature of the assets being managed, there are differences in approach between the asset management and facilities management disciplines. Both have generated their own standards or specifications (see Clause **2**, Normative references) and both have evolved their own language of preferred and defined terms. In their own ways, facilities management and asset management are concerned with managing the key assets of an organization at optimal whole life cost. These activities extend to the infrastructure and buildings needed by the organization and cover physical-, organizational- and people-related requirements. In facilities management this distinction is often made through the terms "hard FM" and "soft FM". This PAS concentrates on physical-related requirements and so, for clarity of intent, the terms "asset" and "asset management" are used in this document to reflect this emphasis.

b) The management of portfolios of assets will typically involve an almost continuous cycle of assets being created, operated, maintained/overhauled and then decommissioned or demolished prior to more asset creation activities.

   This PAS is fundamentally about the availability, integrity and transfer of data and information during the operational phase of an asset's life. Where assets are subject to a capital/delivery phase this means there is a link with those information management processes defined in PAS 1192-2.

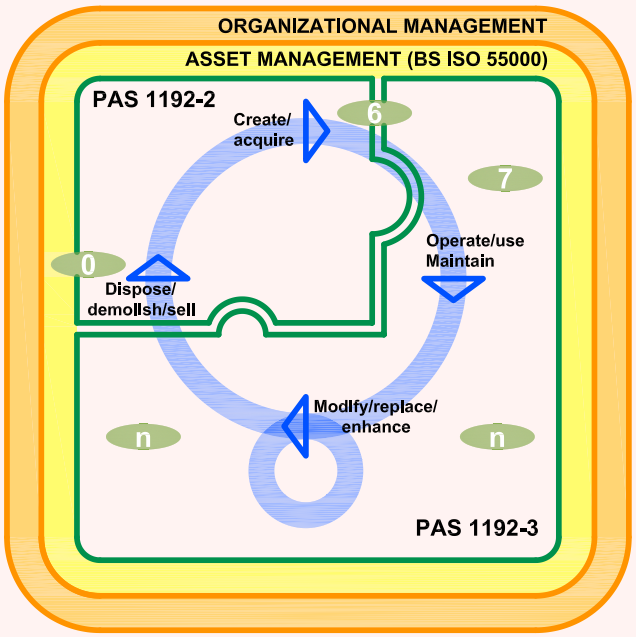
   There are still instances where organizations treat capital and operational expenditure separately and these practices present challenges to the strategic and holistic management of assets, as existing asset information should inform major works. However, the draft publication of the framework for the digital Plan of Work (available in early 2015) should start to change this custom and practice, as it includes a stage for strategic planning at the property or asset portfolio level and a stage for feedback and learning from a completed project. This mirrors the strategic asset management system and life cycle approach contained within PAS 55-1 and BS ISO 55001. It is important that the handovers between discrete time-limited project work and ongoing management operations, and vice versa, are properly designed and implemented.

c) PAS 1192-3 cross-references with other existing standards concerned with the management of assets, with the procurement of asset-related services and asset management services, and with the organization of information related to asset management. These standards are listed in the normative references in Clause **2**.

   In particular, this PAS is closely related to the BS ISO 55000 series of standards and their UK antecedents PAS 55-1 and PAS 55-2. These asset management standards provide one overarching framework for the adoption and implementation of PAS 1192-2 and PAS 1192-3. The relationship between these specifications and the concept of asset management is illustrated in Figure 1, with organizational and asset management shown around the interlocking requirements of PAS 1192-2 and PAS 1192-3. As such, PAS 1192-3 should be implemented within a management system that sets out requirements for policy, strategy, planning, implementation, organizational structure, people and IT systems in order to optimize the management of an organization's assets.

   Although the BS ISO 55000 series has been published, PAS 55 had not been withdrawn at the time of writing. PAS 1192-3 refers to BS ISO 55000 for general issues regarding asset management and to PAS 55 where the additional detail in PAS 55 is relevant.

Figure 1 – Relationship between asset management, PAS 1192-2 and PAS 1192-3



NOTE 1 *The cycle of activities shown in Figure 1 is based on that given in* Asset Management – an anatomy [1] *and also includes reference to the life cycle stage numbers shown in Figure 2.*

NOTE 2 *The inclusion of the disposal stage of the lifecycle within PAS 1192-2 covers the situation where demolition of an existing asset is part of the construction of a new asset. In other situations, disposal may be within the scope of this PAS or, in the case of very specialist disposal activities, may not be in scope of either PAS.*

NOTE 3 *The organization should consider how the land asset remaining after demolition of an asset is treated in relation to PAS 1192-2 and PAS 1192-3.*

NOTE 4 *It will also be for the organization to decide whether the modification, replacement or enhancement of an asset falls within the scope of PAS 1192-2 or PAS 1192-3.*

d) Where a suitable business case might exist, this PAS provides a mechanism for existing assets to enter the PAS 1192-3 management process without relying on a project information model (PIM) from a capital/delivery project managed using the PAS 1192-2 process.

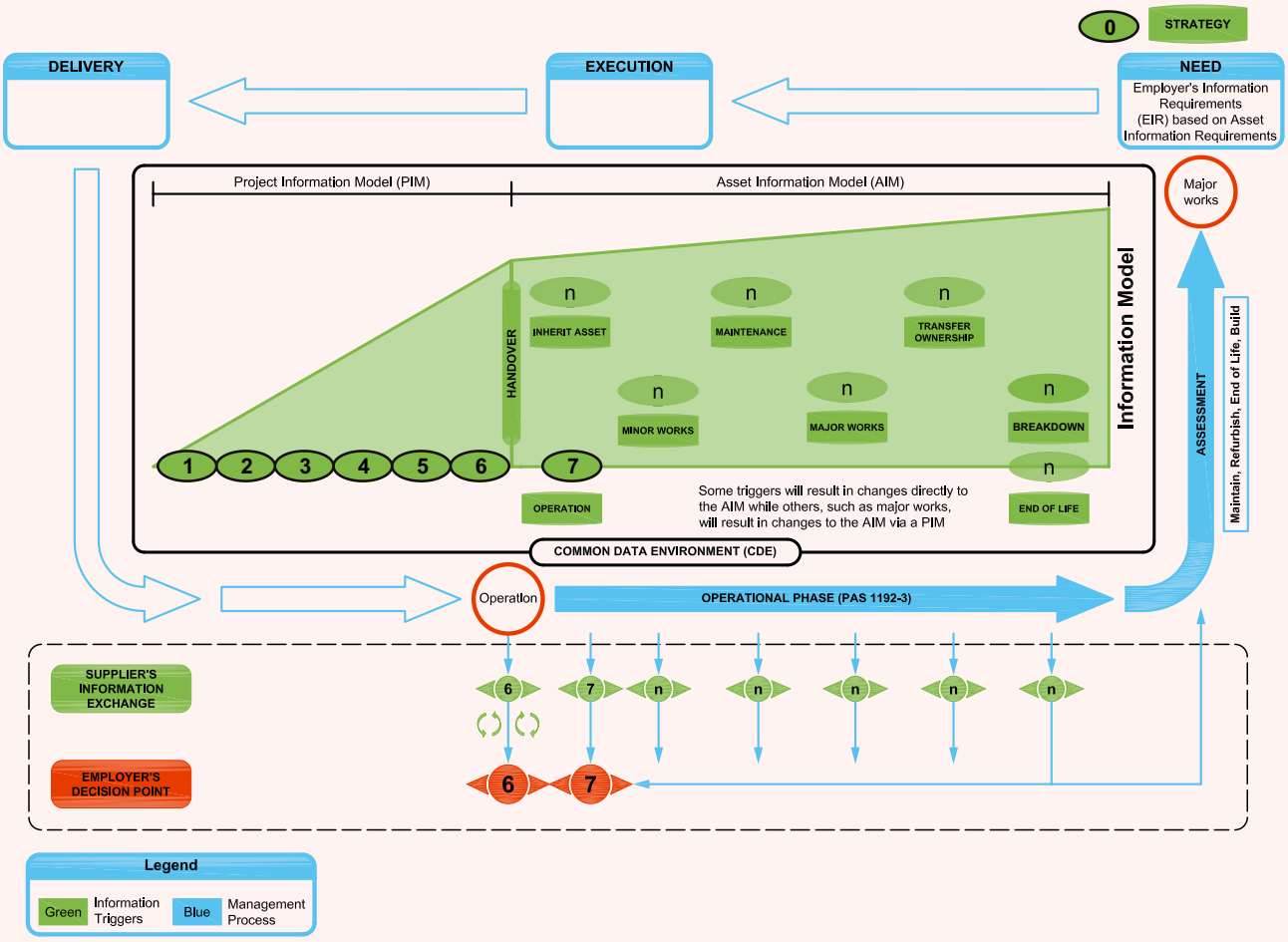
There are three different entry points to the information management processes set out in PAS 1192-2 and PAS 1192-3, and these are cross-referenced to the stage numbers shown in green ovals in Figures 1 and 2:

1) Stage 7 and n, operation and end of life – PAS 1192-3 information management in response to a trigger-related event (e.g. minor works);
2) Stage 6, handover and close-out – PAS 1192-3 information management in response to a capital/delivery project that has followed PAS 1192-2;
3) Stage 0, strategy – PAS 1192-2 information management in response to a major works trigger-related event.

NOTE *Some trigger-related events are listed in* ***A.5****.*

e) An obvious difference between PAS 1192-2 and this PAS is the more flexible sequence of activities throughout the asset life cycle. Whereas PAS 1192-2 is able to follow a clear and well-understood sequence, commonly defined by project stages, this PAS applies across a mixture of planned and unplanned events in the life of an asset that can happen in any order between the points of asset handover and asset disposal. The information delivery cycle shown in PAS 1192-2:2013, Figure 2, has therefore been adapted to convey these non-sequential triggers, each of which will have their own implications for the information management process, and this is shown in Figure 2.

Figure 2 – PAS 1192-2 information delivery cycle amended for asset management



NOTE 1 *The Execution and Delivery boxes in the outer management process are described in PAS 1192-2.*

NOTE 2 *Figure 2 is adapted from the information delivery cycle developed for PAS 1192-2, but operational information may be used to inform the early stages of a project, e.g. plan of work stages 0 to 3.*

f) PAS 1192-2 and PAS 1192-3 both support what has become known as BIM Level 2, in response to the Government's Construction Strategy published in 2011. The wedge diagram in Figure 3 is often used to describe what is meant by the different maturity levels of BIM, from Level 0 to Level 3. The levels were defined in *A report for the Government Construction Client Group – Building Information Modelling (BIM) Working Party Strategy Paper*,[3] with BIM Level 2 defined as:

"Managed 3D environment held in separate discipline "BIM" tools with attached data. Commercial data managed by an enterprise resource platform. Integration on the basis of proprietary interfaces or bespoke middleware could be regarded as "pBIM" (proprietary). The approach may utilize 4D programme data and 5D cost elements as well as operational systems."

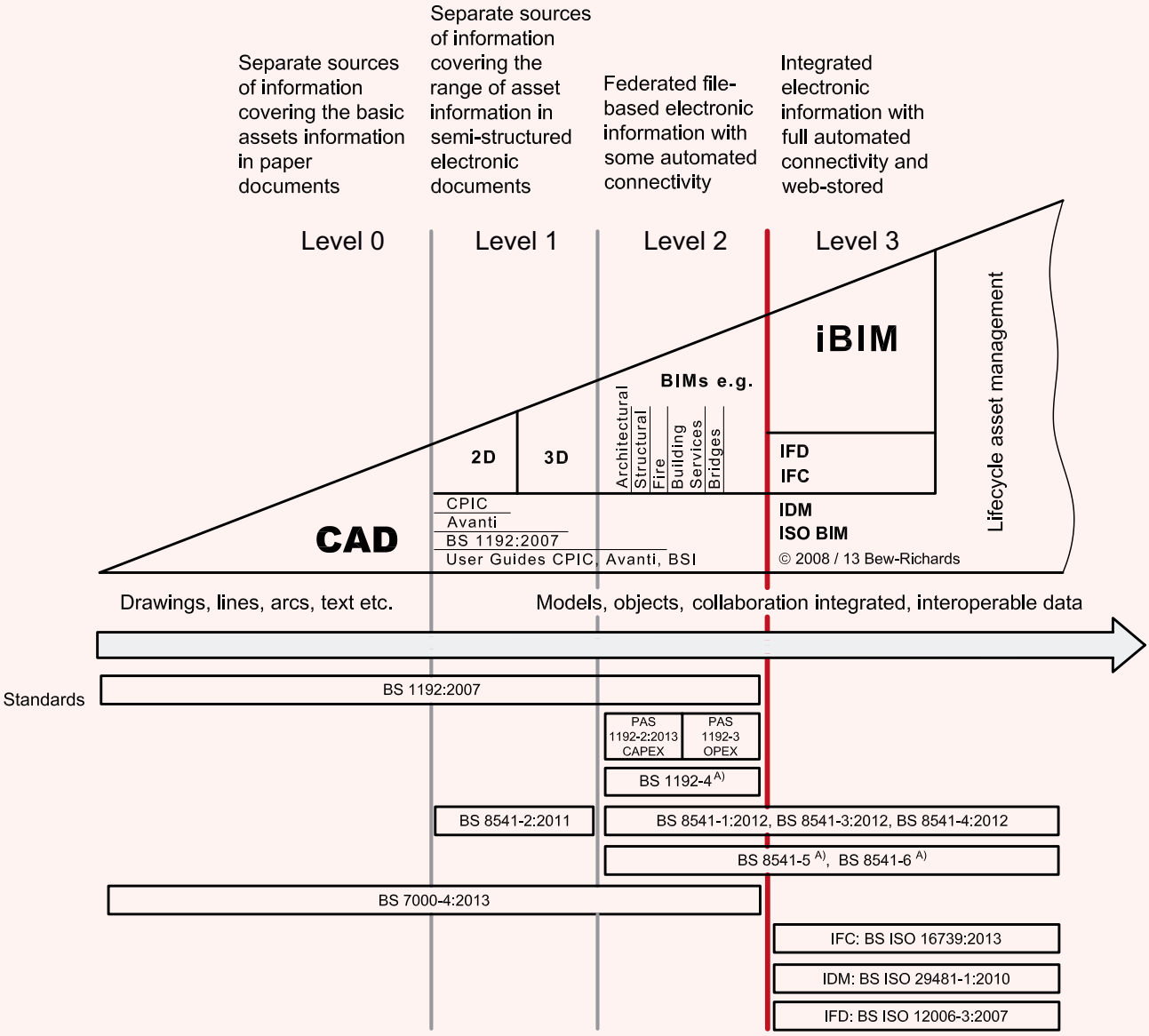
In addition, collaboration at BIM Level 2 is file-based as opposed to paper-based (BIM Level 0) or through integrated web services (envisaged as BIM Level 3 at the time of writing).

NOTE *Some organizations may not wish to or be able to adopt BIM Level 3 as currently envisaged if the use of a web-based approach conflicts with their own requirements, for example for information security.*

However, the wedge diagram in Figure 3 defines the BIM Levels in terms of design and construction terminology, with the acronyms at Level 2 standing for architectural information model, structural information model, building services information model, etc. Figure 3, therefore, shows the original wedge diagram and B/555 BSI technical committee's road-map with additional text appropriate for asset management, to help the user of this PAS understand the definition of BIM Level 2 in terms of asset information management.

[3] Available from http://www.bimtaskgroup.org/

Figure 3 – BIM maturity levels extended to asset information management



Key

A)	In preparation.	IFC	Industry Foundation Classes
IDM	Information Delivery Manual	IFD	International Framework for Dictionaries

__NOTE 1__ Copyright is claimed on the wedge element of Figure 3. Reproduction of this element and making products from it might infringe that copyright. Details of the copyright owners can be found in the Foreword.

__NOTE 2__ More information about BS 1192-4 is given in __7.1.3__, Note 2.

0.3 The relationship between project and asset information

PAS 1192-3 extends the information management concepts covered in PAS 1192-2. It sets out the need for information requirements and for an information model that is focused on the operational phase of an asset or portfolio of assets. The relationship between the key requirements of PAS 1192-2 and this PAS is shown in Figure 4.

The purpose of the asset information model (AIM) is to be the single source of approved and validated information related to the asset(s). This includes data and geometry describing the asset(s) and the spaces and items associated with it, data about the performance of the asset(s), supporting information about the asset(s) such as specifications, operation and maintenance manuals, and health and safety information. This PAS is flexible in allowing data and information to be stored within a discrete information model, or to be accessed via links to existing information systems.

0.4 Overarching requirements for BIM Level 2 asset information management

Asset information management should take place within the context of an asset management system, including the preparation of plans, organizational information requirements and plain language questions, see Figure 4.

The following overarching requirements for an asset information management process suitable for Level 2 have been adapted from BS ISO 55001:2014, **7.5**:

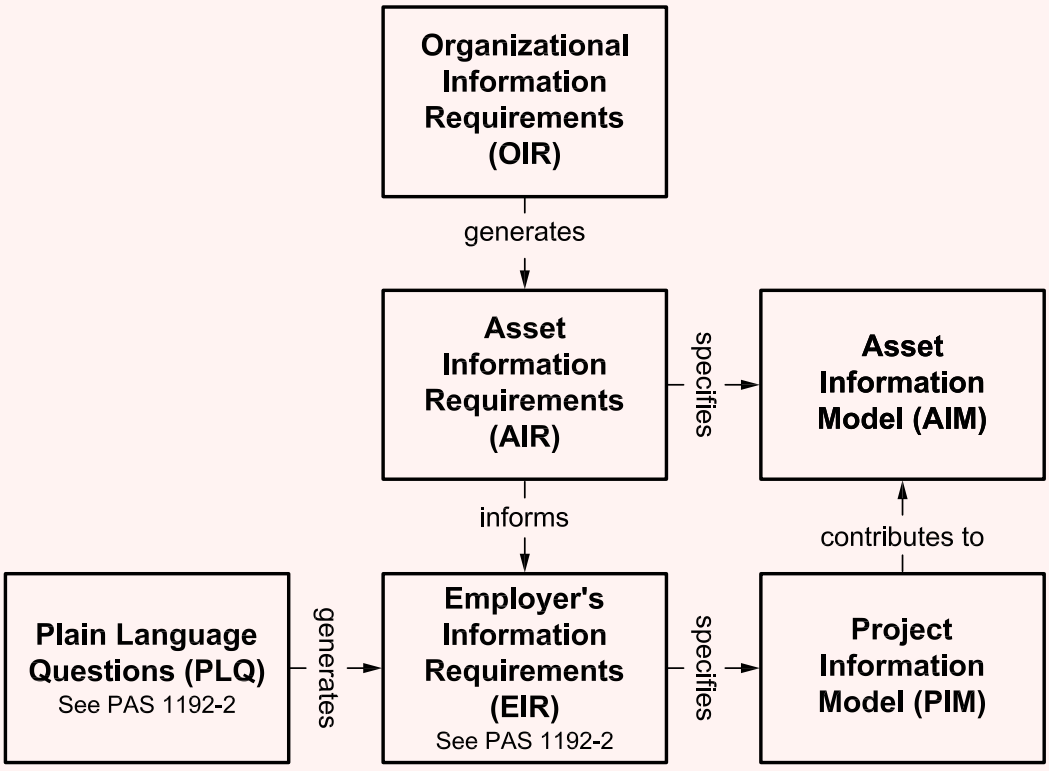
a) The roles and responsibilities for information management have to be considered;

b) The processes, procedures and activities for information management have to be considered and specified;

c) The risks related to information management have to be considered, including the impact of quality, availability and management of information on organizational decision making;

d) The exchange of information with stakeholders has to be considered, including the requirements for information quality, information attributes, method of exchange and the timing of information exchange.

Figure 4 – Relationship between elements of information management



These principles are reflected in the requirements of this PAS to reinforce the importance of asset information in asset management.

0.5 Overview of PAS content

This PAS specifies the information management requirements of the operating phase of assets in four different ways.

a) It specifies the information management processes by which data and information is specified through organizational and asset information requirements, is put into and retrieved from the AIM, and is passed on to or used with existing enterprise systems, where appropriate, to support the organizational information requirements (OIR). This is described in **4.1** to **4.7**.

   NOTE *Links and cross-references between the AIM and existing enterprise systems should be used instead of duplicating data or information.*

b) It specifies a federated model (see **4.6.3**) that contains the data and information required by the AIM and explains its relationship to the PIM that is defined in PAS 1192-2. This latter point is described in **B.1.**

c) It specifies the nature and types of data and information to be used in information exchange and within the AIM. Wherever possible, this is done through cross-reference to existing standards. Information exchange is described in Clause **7**.

d) It gives two examples of the detailed processes for implementing the BS 1192 common data environment, for different asset-related activities. These are described in Annex B.

In addition, it suggests how high-level responsibilities may be allocated to the various stakeholders participating in the information management processes, while recognizing that these responsibilities will be definitively specified in contracts or works orders.

The way these responsibilities are allocated to individuals or organizations will depend on the complexity of the asset or portfolio and the asset management system of the organization. It is not the intention of this PAS to create new positions in the asset management team. However it may be necessary for organizations to undertake a gap analysis to assess existing skills against the requirements defined within this PAS.

1 Scope

This PAS specifies requirements for information management to achieve building information modelling (BIM) Level 2 in relation to the operation and maintenance of assets (buildings and infrastructure).

It covers the data transfer processes to:

a) create an asset information model (AIM) for an existing asset or portfolio of assets;
b) exchange asset information with a project information model (PIM);
c) record information relating to the disposal, decommissioning or demolition of an asset;
d) use the AIM to support organizational requirements;
e) revise the AIM as the asset changes; and
f) hold the AIM as a resource for the organization.

This PAS does not cover data content as this is defined in the organizational information requirements (OIR) and asset information requirements (AIR) but does cross-refer to broad headings and documents which define data content.

This PAS is for use by organizations and individuals responsible for the operation, maintenance and strategic management of assets. It is of use to individuals involved in transferring data from the PIM to an AIM utilized by the organization. In addition, it is of use to individuals involved in exchanging data throughout the life of an asset.

***NOTE** An organization may apply this PAS without necessarily needing to use BIM Level 2. However, an organization required to apply BIM Level 2 to the operational phase of an asset should apply this PAS.*