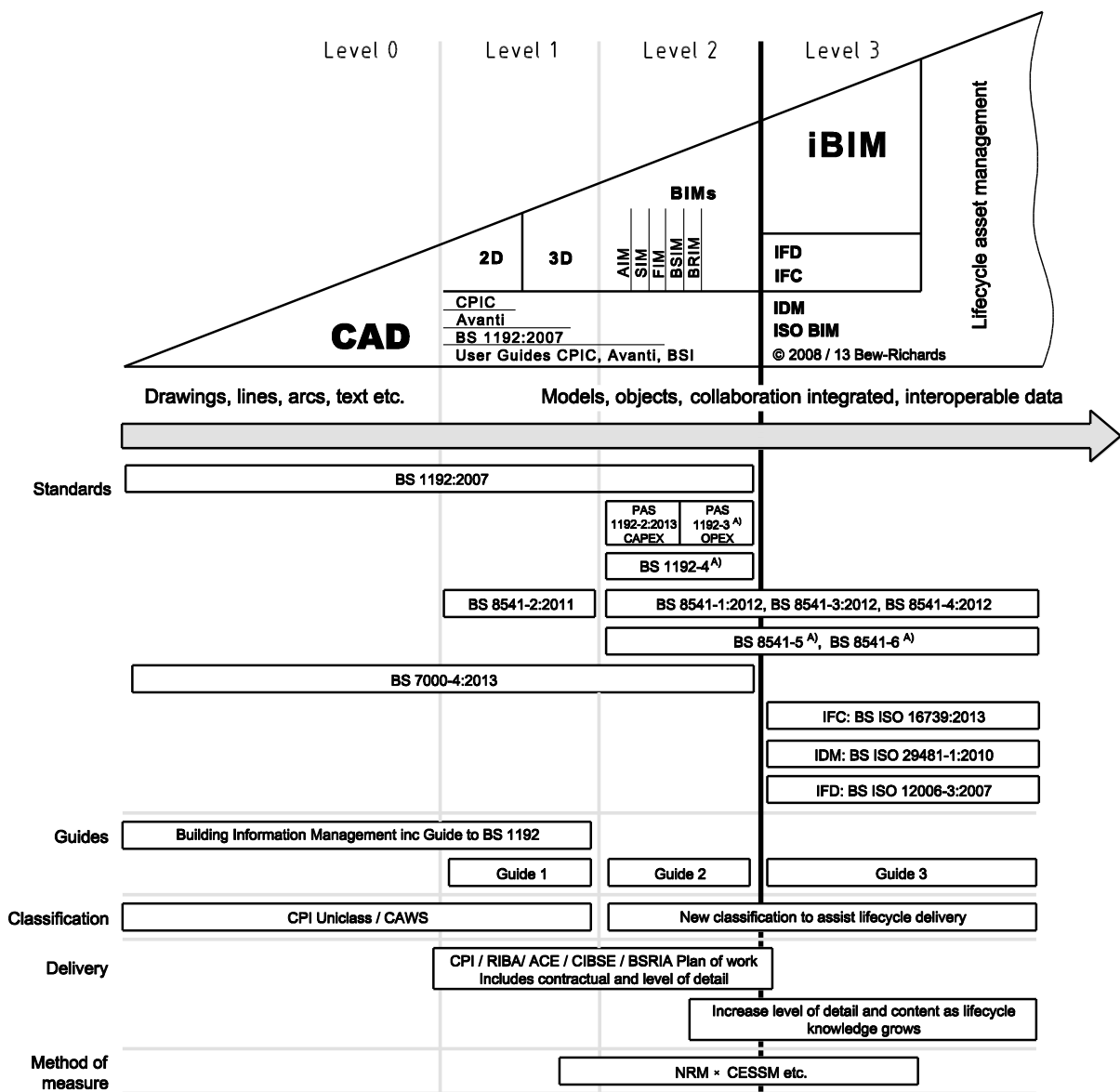# bsi.

B/555 Roadmap (February 2014 Update)

Design, Construction & Operational Data & Process Management for the Built Environment

Maturity Model:

A) In Preparation

IFD = International Framework for Dictionaries
IFC = Industry Foundation Classes
IDM = Information Delivery Manual

Introduction

The purpose of this "Roadmap" is to document and describe the activities of the BSI B/555 committee (Construction design, modelling and data exchange) in the immediate past, current and future in support of delivering clear guidance to the UK industry dedicated to providing and operating built assets. It also supports the vision and mission statement of the committee in the reduction of whole life cost, risk, carbon and the timely delivery of buildings and infrastructure projects. The document also incorporates the activities in support of the 2011 HMG BIM Strategy.

To illustrate the process a maturity model has been devised to ensure clear articulation of the standards and guidance notes, their relationship to each other and how they can be applied to projects and contracts in industry.

To simplify the description of technologies and ways of working, the concept of maturity "Levels" has been defined. The purpose of the maturity levels is to categorise types of technical and collaborative working to enable a concise description and understanding of the processes, tools and techniques to be used, thus allowing simple referencing as to where various documents should be applied.

Maturity Level Definitions

0. Unmanaged CAD probably 2D, with paper (or electronic paper) as the most likely data exchange mechanism.

1. Managed CAD in 2 or 3D format using BS 1192:2007 with a collaboration tool providing a common data environment, possibly some standard data structures and formats. Commercial data managed by standalone finance and cost management packages with no integration.

2. Managed 3D environment held in separate discipline "BIM" tools with attached data. Commercial data managed by an ERP. Integration on the basis of proprietary interfaces or bespoke middleware could be regarded as "pBIM" (proprietary). The approach may utilise 4D Programme data and 5D cost elements.

3. Fully open process and data integration enabled by IFC / IFD. Managed by a collaborative model server. Could be regarded as iBIM or integrated BIM potentially employing concurrent engineering processes.

Standards mentioned in this document

Standard	Date
BS 1192:2007 Collaborative production of architectural, engineering and construction information. Code of practice	2007
BS 7000-4:2013 Design management systems. Guide to managing design in construction	Dec 2013
BS 8541-2: Library Objects for Architecture, Engineering and Construction: Recommended 2D symbols of building elements for use in building information modelling.	2011
BS 8541-1: Library Objects for Architecture, Engineering and Construction: Identification and classification	2012
BS 8541-3: Library Objects for Architecture, Engineering and Construction: Shape and measurement	2012
BS 8541-4: Library Objects for Architecture, Engineering and Construction: Attributes for specification and assessment	2012
BS 8541-5: Library Objects for Architecture, Engineering and Construction: Assemblies	2014
BS 8541-6: Library Objects for Architecture, Engineering and Construction: Product Declarations	2014
PAS 1192-2: Specification for information management for the capital/delivery phase of construction projects using Building Information Modelling Early Adopter document to enable the delivery of HMG BIM strategy projects to Level 2 maturity indicator. Created as a PAS due to time constraints and low level of maturity in the practicing industry. Published in February 2013, with a full upgrade to a British Standard level expected before 2015, the document describes the Capital delivery phase of the project during design and construction. The document incorporates the principles of the Soft Landings delivery scheme to ensure a managed handover into post occupancy and operations. In December 2013, the PAS was proposed to ISO as a new work item proposal to fill the gap for international Level 2 guidance. (Results due mid March 2014)	Feb 2013
PAS 1192:3: Operational Asset Management – Processes and data for the commissioning, handover, operation and occupation stages. Early Adopter document to enable the delivery of HMG BIM strategy projects to Level 2 maturity indicator. Created as a PAS due to time constraints and low level of maturity in the practicing industry. Exact dates to be advised due to budget constraints. **This document will offer guidance on the use and maintenance of the asset information model (AIM) to support the planned preventative maintenance programme and the portfolio management activity for the life of the asset as well as the data transfer process between delivery and operational phases.**	March 2014
BS 1192-4 Collaborative Production of Architectural,	Summer

The application of standards is dependent on many often poorly understood or articulated factors. The maturity model is used to identify where standards and associated tools and guides are applied to develop a coherent solution to inform the delivery process.

The B/555 Roadmap deliveries are related to the appropriate "Level" to aid clarity of application within the operational and delivery market. July 2011 marked the formal release of the UK Government BIM Strategy. The effect of this has been to set a focused timescale for the adoption of technologies and process to deliver significant cost and carbon performance improvement across the industry. Key to the strategy is the need to deliver Level 2 BIM capabilities with combined model, drawing and COBie data deliveries to the client at key points throughout the delivery and handover process. To achieve this clear contractual and delivery guidance is being made available to the supply chain. The PAS 1192-2 and 3 documents form the first parts of this guidance. On successful completion of the Early Adopter programmes the documents and processes will be refined and converted into full British Standards.

Key Road Map Deliveries

Currently available in the market today is BS 1192:2007, which is a combined data and process standard and is equally applicable at level 0 and 1. It offers advice for the management of traditional CAD managed data delivery and works with both paper and electronic formats.

CPI and Avanti have produced guidance to support implementation of BS 1192:2007 and BSI/CPI jointly published a guide "Building Information Management - A Standard Framework and Guide to BS 1192" in September 2010.

Delivery 1 – 2011-present - Object Libraries

Symbol definitions for the presentation of 2D information have not featured in the B/555 document family since the withdrawal of BS 1192:3:1987, this situation has been rectified with the release of BS 8541:2:2011. These symbols are predominantly for use at Level 1 and as such form a useful reference in the current market as well as a consistency through the maturity levels.

There has never been a consistent set of 3D libraries or definitions in the UK. This is a significant gap as 3D technologies are now commonly available in the market. The BS 8541 series, in its various sections addresses this issue.

- **BS 8541:1:2012** Introduces library objects, represented in appropriate formats for use at level 0 (blocks, cells) through to level 3 (IFC objects). The document refers to draft PAS 1192-2 and object based principals for identification (naming) and grouping (layering and classifications), it also includes identification of source.

- **BS 8541:3:2012** Defines 3D symbols in multiple levels of detail. This is essentially focussed on levels 1 to 2, to represent the analysed and designed

output as the first level representation in a real world. The standard includes functional and geometric quantity measures (volume, projected area, plan area, effective length etc).

- **BS 8541:4:2012** Defines properties and multiple levels of information. This essentially focusses on levels 2 to 3. The document includes
    - Properties required for specification/selection
    - Environmental, cost and social impacts

- **BS 8541-5:2014** "Assemblies" will cover the sharing of sub-models representing combinations of components (with their associated types and systems) and spaces (with their associated levels and zones). It will cover naming, classification and nesting.

- **BS 8541-6:2014** "Product declarations" will cover the sharing of data expected from product declarations, labelling and environmental tables. The numeric values need to be supported with details of the relevant life cycle stage and details of its standard or special 'scenario'. This would offer IFC and IFCXML and COBie presentations and relate these to the standard printed forms. It will include data for waste.

Delivery 2 2013-14 – Process and Data Management

PAS 1192:2:2013 was published in February 2013 and PAS 1192:3:2014 (due in early 2014) will build on BS 1192:2007 and enable us to make use of the various new technologies and processes. It is clear that as new technologies and collaboration techniques come to market even more explicit guidance needs to be made available to the market to aid knowledge dissemination.

This guidance must be specific to its intended audience as the needs of clients, suppliers and users differ significantly. For this reason the documentation will be provided in two documents, the first focusing on the "Capital Delivery" phase and the second on "Operational Delivery" issues. Both will document both data and process management issues. Key issues dealt with will include:

- Process definitions
- Data management for data definitions used for
    - Production & operation
    - Libraries & specifications, properties and representations in various stages
- Generic Delivery Schedules identifying key deliverables at identified stages for all design, delivery and operational disciplines.

It is expected that existing classification and delivery schemes such as the RIBA stages etc. will start to align with these standards through work being undertaken by the institutions, BIM Task Group and the CIC.

The two documents will deliberately overlap to ensure there is documentation covering the whole lifecycle from end to end. The definition of open data exchange between all stages including construction to operation will be defined. As mentioned above the early releases of these documents will be in the form of Publicly Accessible

Standards (PAS) in recognition of the programme and adoption constraints driven by the HMG BIM strategy.

PAS 1192-3 will reference existing standards including PAS 55 and ISO 55000 The document Asset Management series as well as Facilities Management British Standards BS 8536, BS 8572, BS 8587, BS 8210 and BS 8544, to ensure no overlaps or ambiguities are introduced.

BS 7000:4:2013 Design Management Systems: Guide to managing design in construction. This is a revision of a 1996 standard, which documents the overall design coordination process and the planned management of the project data delivery synchronised across all participating disciplines. This document has been updated with references to the new BIM protocol at Level 2 BIM and PAS 1192:2:2013.

Further deliveries from BSI and B/555 in 2014 will include:

BS 1192-4 Collaborative Production of Architectural, Engineering and Construction Information Part 4 – Client information requirements (Summer 2014) will standardize the COBie-UK-2012 template formats recommended for use by the UK Government BIM task group as the delivery mechanism for Clients Information Requirements (contractually the Employers Information Requirement) leading up to handover and post-occupancy evaluation.

BS 8541-7 – Library Objects: " Specification templates". Scope to be decided.

BS 8541-8 – Library Objects: "Design engineering" MEP design parameters. Scope to be decided.

Delivery 3 2014-onwards – Guidance Documents

Guidance documents are not seen as part of the remit of B/555 but as documents that will be delivered in partnership with the British Standards Institution. Example: Building Information Management – A Standard Framework and Guide to BS1192.

With such a complex subject clearly a significant level of clear supporting guidance will be necessary, to ensure consistence and quality, B/555 will coordinate the production of this material. The following documents described are indicated on the Maturity Model.

Guide 1 Level 1

Building Information Management – A Standard Framework and Guide to BS1192 (2007) was published in 2010. It offers clear and detailed guidance as to the application of the standard in a pragmatic and clear form.

Guide 2 Level 2

Will offer guidance on the design, data management and the workflow processes to deliver the CAPEX & OPEX standard. The requirements and content as defined in the 'Delivery' documents to be produced by CPI/Avanti. These will contain the coordinated deliverable of each stake holder, architect (RIBA), structural (ACE) civil (ICE) and MEP (BSRIA) engineers against the RIBA Plan of Work Stages, embodied in the Digital Plan of Work (please see www.bimtaskgroup.org). For the infrastructure works we will include the railway (GRIP) stages.

Guide 3 Level 3

As maturity level 3 becomes a reality and technologies develop into web services and distribution of interoperable data sets a Level 3 Guide will be developed.

Level 3 BIM Deliverables

The Government is currently defining Level 3 requirements, and this Roadmap will be updated to demonstrate the desired deliverables to meet these, including a standardisation programme which may include national and international standards.

Other BSI BIM Publications:

BS ISO 16739:2013 Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries

BS ISO 15686-4:2014 Building Construction — Service Life Planning — Part 4: Service Life Planning using Building Information Modelling

All British Standards and other BSI documents are available from the BSI shop: http://shop.bsigroup.com/