Digitising CDM – A Client's Guide to improving Information Management in Construction Projects
A Bridge between PAS 1192-6 and ISO 19650

BIM 4 Health and Safety Working Group

Note produced by the BIM 4 Health and Safety Working Group

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Introduction

Clients need to think about their information management systems, and how information in a digital form can be used to support their business. If they have predominantly spreadsheet and text dominated systems, they may want to learn how information models can be integrated with their asset and health & safety management information. The approach in this note sets out how to use information requirements, at organisational, asset, project and appointment levels, to achieve the integration of geometrical models, text, alphanumeric codes and spreadsheet information.

As Clients embrace digital transformation, all their information requirements and related deliverables can be created, shared, and issued in digital formats as part of an information model and shared via a Common Data Environment (CDE). This note has been written to help Clients work within a paper based or digital system but hopefully inspire them to see the benefits of embracing a move to a fully connected digital system.

NOTE: This guidance document has been produced by the BIM 4 Health & Safety working Group which is a cross industry working group including Clients, Health & Safety specialists, BIM specialists, designers and contractors. Adopting all the guidance in this document will take you beyond legal minimum compliance for Health & Safety. This document forms part of the UK BIM Framework resources. Access to the other resources which constitute the UK BIM Framework can be found here: www.UKBIMFramework.org. Guidance D on Information Requirements contains some specific health & safety examples which can be read in conjunction with this guidance.

Purpose of this note

This note is to help all Clients, ("*The Appointing Party*") to improve information management in a construction project to better manage health and safety risks as well as improve project outcomes. Ten plain language questions are set out in this note that will help Clients prioritise key Health & Safety (H&S) issues. The focus of these questions is on managing risks, from project inception to design and construction, and on into operational use. The questions have an associated maturity matrix**,** to help Clients fully understand the questions and prompt actions they might consider or be required to perform.

This note is intended to help bridge the gap between the application of Publicly Available Specification (PAS) 1192-6:2018 "Specification for collaborative sharing and use of structured Health & Safety information using BIM", for Health & Safety, which remains an extant standard, and the International Organization for Standardization (ISO) 19650 series of standards now widely adopted in the UK.

Health & Safety Information is required by Law and enabled by ISO 19650

The Construction Design and Management Regulations 2015 (CDM) place duties on Clients, Designers, Principal Designers, Principal Contractors and Contractors to identify, share and use H&S information to prevent accidents and ill health occurring as a result of construction work. Better information management processes provide effective ways of meeting these duties. For example, clash detection can identify significant H&S issues and risks in early design, opening up new possibilities for monitoring and measuring risk management, including better learning opportunities. Four key benefits include;

1. Geometric models of structures in the early design phases provide visual pictures and animations, which enhance the foreseeability of any significant risks. (duties on designers in CDM Regs. 8 &11);
2. Simulations and animations, which show construction over time, enable designs to be tested, rehearsed and checked, where stages of work take place successively and simultaneously (CDM Reg 11);
3. The establishment and use of an effective CDE enables coordination for the purpose of planning, managing monitoring and coordination of critical health and safety information on a project (CDM Regs. 11 and 13);
4. The handover of a reliable and trustworthy H&S file is enabled by good information management. (CDM Reg 4).

The Client has the duty in CDM to make arrangements to manage a project to ensure compliance with and provide H&S information. Information Requirements PIR specify the information needed by the Client to provide evidence that the core requirements of CDM for Design and Planning are being met.

The Client needs to establish the Project Information Requirements

PAS 1192-6:2018 sets out the process and data requirements to integrate H&S information into information models and simulations to deliver the desired outcome. The mechanism for ensuring these processes and requirements are met is through the establishment of Project Information Requirements (PIR) and ultimately the Exchange Information Requirements (EIR). To establish health and safety related project information requirements, the Client may arrange a meeting at the initiation of a project, with their CDM Principal Designer, and individuals responsible for information management. Topics for discussion at this meeting need to consider a range of issues as laid out in Figure 1.

Figure 1: Information Requirement through an asset life cycle - a range of issues to consider

Once the information requirements to support these issues has been identified, they then need to be configured into PIR. To support Clients in doing so, the BIM 4 Health & Safety Working Group has derived a suite of PIR, high-level information requirements relating to a project, which can be used as a prompt list by Clients – see Appendix A.

These PIR span the range of Pre-Construction and Construction phase activities covered by CDM, including the need to handover vital H&S information to the asset or building owner/end user on completion of the construction project. These PIR set out, at a high level, and at the beginning of the Pre-Construction Phase, a framework for managing risk information throughout the Project, right up to completion and handover of the H&S File. The Maturity Matrix shown at the end of this note will help Clients think through which PIR may be relevant to their project.

While the BIM 4 Health & Safety Working Group PIR can help, not every PIR will be needed on every project, and in some cases, Clients may need to supplement the provided list with specific PIR of their own. Adopting these PIR will take you beyond minimum legal compliance, towards achieving “taking the lead” in H&S practices. These can be supplemented by PIR relating to specific hazard risk topics, the working group has created sample PIR for topics that include Asbestos, Fire Safety, Temporary Works, Structural Safety and Lifting Operations. Others may be added to this list as they are produced. These, in turn, are then used to establish the EIR that form lead appointed party contract documentation.

Sharing Information - The Right Information to the Right People at the Right Time

Due consideration of what the H&S information requirements to support the operational phase, will pay dividends during the planning stages of the project - illustrated in figure 1. Decisions made in design and planning need to consider eliminate hazards and reduce H&S risks in construction, operation, maintenance, use and repurposing of the asset or building. The CDM Regulations require the production of an H&S file, which will contain information to be handed over to the owner/end user. The compilation of the H&S File will be supported by setting up a CDE at the outset of a project as a mechanism for developing, approving, and sharing H&S File contents. The project benefits will accrue through improved H&S management of the asset or building as shown within Figure 2. This diagram shows how positive benefits will accumulate and losses reduce through access to relevant information, including inefficiency, waste and the need to re-work. In a CDE, an audit trail of design decisions should be preserved, so re-investigation of issues and risks can be done with confidence. The required information should be logged and recorded for any suppliers (consultants and/or contractors) to re-use according to the project needs and requirements.

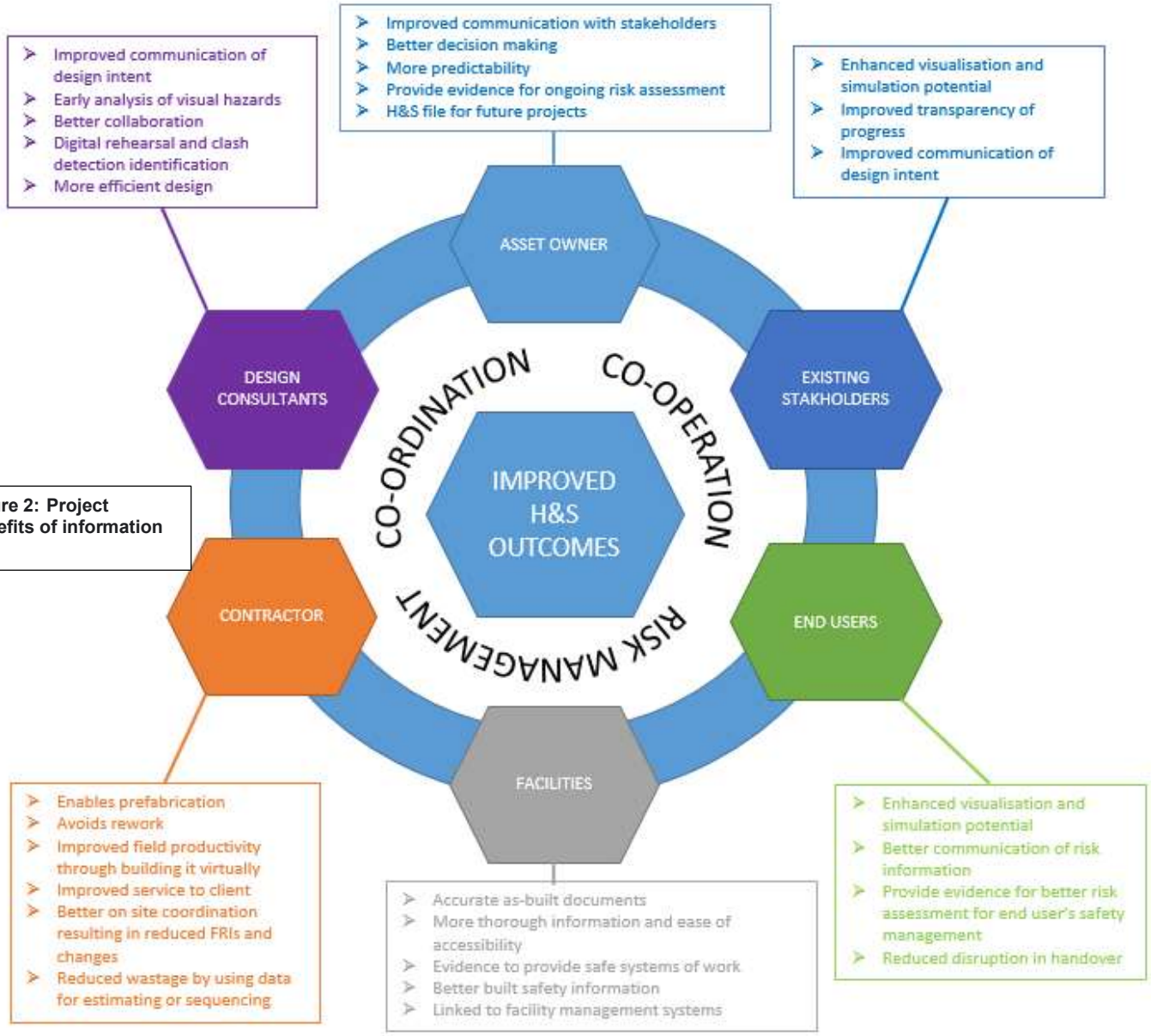

Figure 2: Project Benefits of information

A risk of using digital ways of working is that vast amounts of digital information can be generated. Project procedures need to consider what information is important, required, needs to be kept, immediately accessible, what can be filed, and what can be archived. In this way PIR can be focused on prompting what is the right information to be provided to the right person(s), at the right point in the project, in the right format. The benefits of doing so (activities and products) for various project stakeholders are shown in Figure 2. The information can be generated and collected by a range of appointed parties on a project to share and issue to others to meet H&S requirements.

What is needed

The Client requires structured health and safety (H&S) information to be identified, shared and used in a collaborative manner throughout the life cycle of a project to fulfil the provisions within PAS 1192-6:2018. To support this, the Client may share relevant information. This includes the Pre-Construction Information (PCI), for any supplier (appointed party) to inform the development of the Project Information Model (PIM). To support the Client with their legal duties under the CDM regulations, it is vital to appoint a CDM Principal Designer, as early as possible in the project. This early appointment of a Principal Designer will help a Client meet their legal duties from the outset of a project.

All H&S information needs to be structured and formatted to facilitate proactive engagement, collaboration and compliance. All Appointed Parties should use the provided H&S information to allow them to fulfil their duties and obligations under the CDM regulations and related H&S legislation throughout the project. On completion of the project, H&S information must be incorporated into a CDM Health & Safety File by the Principal Designer or Principal Contractor and shared with the Client, preferably via the CDE. This will enable those responsible for the asset to comply with their legal H&S duties.

The requirements of the CDM regulations can be well described at a high level by using the PIR. PIR are a set of high-level information requirements defining the project needs, described in ISO 19650-2. Further information on PIR and their relationship to other information requirements is described within UK BIM Framework Guidance D.

Suggested things to consider while creating the PIR include the;

- Project scope;
- Intended purpose for which the information will be used by the Client;
- Project plan of works;
- Intended procurement route;
- The number of key decision points throughout the project; and
- Decisions that the Client needs to make.

This information, once established within the EIR, enables the Client to monitor and ensure ongoing compliance to satisfy these information requirements. Once specified, H&S PIR determine the content of design risk information which is managed within in a Project Information Model (PIM). Figure 3 shows how information requirements contributes to the establishment of a Project Information Model (PIM) and how it feeds into asset management. Only the information relevant to that appointment may be required through each exchange information requirements (EIR).

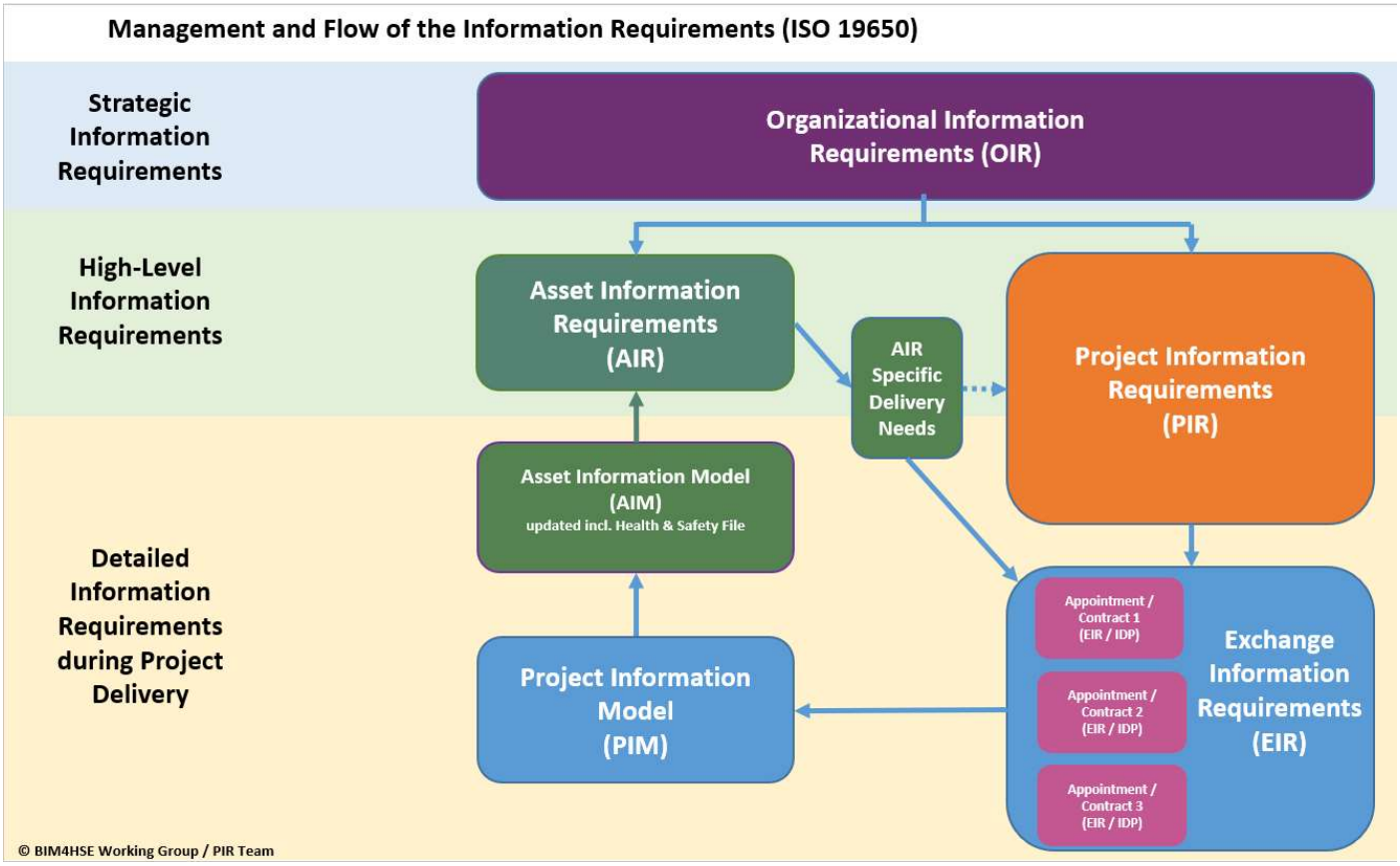

Figure 3: Management and Flow of the Information Requirements for a Construction Project

In ISO 19650 terms, *each Appointed Party* – Suppliers (consultant and/or contractor), needs to refer to the EIR and other appointment documents issued by the Client, to understand the detail of what information the Client requires, and the detail of how and when that critical information will be delivered. For a project, each designer appointed directly by the Client, Principal Designer, or a Principal Contractor will receive an EIR specific to their appointment.

Shown below are the BIM4H&S working group plain language questions (PLQs). PLQs are a useful mechanism to establish information requirements. By considering what information is needed to answer these questions, a schedule of information requirements can be developed without technical know-how. As shown in the table below, these PLQs could prompt the following information requirements depending on your level of digital competence.

For the purposes of this paper, digital competence of a client has been categorised as:

First steps	The minimum to achieve compliance with PAS1192-6.
Keeping up with the Pack	This is the standard considered for the industry.
Taking the lead	This for the standard for those high performing teams. Organisational leadership inspired for information management.

10 Plain Language Questions for Clients – Helping you to think about what Health and Safety Project Information Requirements to specify?
This list summarises the questions in the Maturity Matrix below

1. What information does the Client already have or need to obtain at the initiation of a project? (*Note: suggested focus is on, early project decisions that will have health and safety implications for the operation and end use of the asset, Pre-Construction Information that has been assembled and used to guide the procurement strategy and key areas of risk identified for further study.)*
2. What systems does the Client have in place to monitor information requirements and how will this information be managed effectively to deliver the required outcome safely? (*For example: A CDM Compliance strategy.)*
3. What information has the Client specified and what is required for the Common Data Environment (CDE) for this project? (*Note: focus needs to be on - how will this contribute and improve communication of Health & Safety information including elevated risks.)*
4. What risk studies and reviews have been specified at key stages to solve H&S issues, enable collaborative working and provide information to ensure that risks are where possible, eliminated, or otherwise reduced and treated?
5. What are the design risk objectives to eliminate and reduce risks in the project? These objectives need to be set by the Client to guide the design team.
6. Has a design plan been requested, from the Principal Designer, which maximises the opportunities for collaboration in design risk management? (*Note: This needs to consider how design risk objectives will be met and how the different design disciplines will work together including how design risk data will be shared*)
7. Are models produced by different design disciplines capable of effective federation and has Health & Safety Information been integrated and conserved for re-use?
8. What are the arrangements that will be put in place at the outset to ensure testing and commissioning is carried out effectively? (*Note: These arrangements will include the need to assure the client that what was specified has actually been built, and how to feed forward vital operational health and safety information.*)
9. What are the arrangements that will be put in place at the outset to ensure that information in a Health & Safety File is valid, verified and made available to the end user?
10. How will you be able to ensure that lessons are learned from this project experience, in relation to health and safety? (*Note: PAS 1192-6:2018 requires lessons learned in relation to innovation, good practice and sharing of knowledge to be generalised and shared for re-use by the industry.*)

THE CLIENT'S HEALTH AND SAFETY INFORMATION REQUIREMENTS MATURITY MATRIX

Question	PIR's To Consider	First steps	Keeping up with the pack	Taking the lead
1. What information does the Client already have or need to obtain at the initiation of a project? (*Note: suggested focus is on, early project decisions that will have health and safety implications for the operation and end use of the asset, Pre-Construction Information that has been assembled and used to guide the procurement strategy and key areas of risk identified for further study.*) **Key clause(s): PAS1192:6 Section 6.1 & 6.2**	1,2,3,5,6,7	1) Client carries out an initial Preliminary Hazard Analysis & Safety Review (PHASR) to identify hazards and risks, including for operational use. 2) Information on key early decisions is recorded for others to use. 3) Client identifies where support is needed (high uncertainty, significant hazards identified).	1) PHASR results recorded on CDE. 2) PHASR outputs embedded into contract documents and informs focus areas for tender returns. 3) Output of PHASR feeds into project life cycle design risk management requirements (HAZOP / HAZCON, site layout study etc.)	1) Comprehensive PHASR with independent chair carried out early with multi-discipline designer/contractor involvement. 2) Time bound actions monitored to check outcomes in ongoing design reviews, recorded on CDE, with audit trail. 3) Formal early risk study for operations and maintenance carried out alongside PHASR.
2. What systems does the Client have in place to monitor Information requirements and how will this information be managed effectively to deliver the required outcome safely? (For example: A CDM Compliance strategy.) **Key clause(s): PAS1192:6 Section 5**	1,2,3,4,5,6, 12,13,14	1) Client identifies knowledge he/she has to share, sets up meeting with design team to identify gaps and puts a plan in place to mitigate the gaps. 2) Client sets up checks to ensure that that information is understood, valid and reliable. 3) Client sets design risk objectives and a method of monitoring to ensure that they are met.	1) Client identifies age and confidence in data as part of knowledge share, highlighting potential surveys required. 2) CDM Principal Designer and design team involved in validating and seeking gaps in PCI. 3) Client monitors progress in fulfilment of the Project Information Requirements.	1) Client captures feedback on gap analysis and progressively closes gap to improve asset and H&S data. 2) Client monitors risk studies, design risk objectives and progress with Design Plan. 3) Client regularly checks the supply chain has received, understood and acted on H&S information provided by designers.
3. What information has the Client specified and what is required for the Common Data Environment (CDE) for this project? (*Note: Focus needs to be on - how will this contribute and improve communication of Health & Safety information including elevated risks.)* **Key clause(s): PAS1192:6 Section 6.2.1-6.2.8**	1,6.8	1) Client specifies use of appropriate and accessible IT tools to share information. 2) Client specifies who will have access to information using a Responsibility matrix. 3) Client specifies format and structure of H&S File – specifies as built models as required.	1) A project information manager is appointed to manage the CDE. 2) Periodic reviews of H&S File quality, accessibility and content undertaken. 3) Progressively developing and sharing H&S information within the CDE, with a dual focus on 1) what is required to handover on practical completion, 2) what is required to manage construction work safely?	1) A CDE is established early, and controlled access is granted to all project participants. 2) Seamless integration of risk information from inception (PCI) to construction phase to handover (H&S File); and operational use within the CDE. 3) Tools are specified to enable H&S federation and sharing of models
4. What risk studies and reviews have been specified at key stages to solve H&S issues, enable collaborative working and provide information to ensure that risks are where possible, eliminated, or otherwise reduced and treated? **Key clause(s): PAS1192:6 Section 6.3**	6,8,9,11,12 , 13,14	1) Client specifies reviews at key stages- Minimum terms of reference developed for reviews. 2) Reviews include key participants (including early contractor involvement and experts where required). 3) Reviews are led/managed by Principal Designer / Principal Contractor.	1) Design review actions generated and assigned owner and time bound actions to resolve. Risk treatments are recorded. 2) Residual actions from each project stage are formally passed forward to next stage. 3) Design review and risk study requirements are revalidated and reset at each project stage.	1) Design reviews are regular, comprehensive and include model federation and clash detection / avoidance. 2) A constructability review/ construction phase rehearsal informs Temporary Works register & Design risk log/register/tracker/schedule. 3) Design decisions and assumptions recorded on CDE and linked to formal risk management systems.
5. What are the design risk objectives to eliminate and reduce risks in the project? These objectives need to be set t by the Client to guide the design team. **Key clause(s): PAS1192:6 Section 6.2.11**	6,11,12,	1) Client states those hazards or risks they want eliminated by design, including occupational health risks. 2) Client sets out what H&S risks he/she wants information on, and where risk studies will be needed. 3) Designers explain how information management methods will be used to aid H&S in design through their tender responses.	1) Client/design team agree which risks will be eliminated, reduced or controlled by the design - early design options are scoped out/modelled. 2) Objective set on how to use models, symbols, animations, simulations, to share risk information via the project team, including in construction. 3) Active monitoring by Client and Principal Designer of design risk objectives.	1) Client design risk objectives and outcomes are cascaded through the project and supply chain. 2) Client requires best mix of geometrical model and simulation/sequencing in models for project, operations and stakeholder engagement. 3) Client specifies H&S health reporting / dashboard reporting from Principal Designer and Principal Contractor via CDE, to reflect stress in workforce caused by programming of work.
6. Has a design plan been requested, from the Principal Designer, which maximises the opportunities for collaboration in design risk management? (*Note: This needs to consider how design risk objectives will be met and how the different design disciplines will work together including how design risk data will be shared*). **Key clause(s): PAS1192:6 Section 6.3.4**	3,6,9,	1) Client specifies strategy for collaboration in the design in order to improve design risk management. Where appointed, Principal Designer to lead on creating and managing the plan. 2) All design participants identified and co-ordinated in the design plan. 3) Design plan includes design risk objectives and track elevated risks.	1) Pre-contract design plan forms part of the tender return. 2) Design plan includes design assurance activities, which monitor risk treatment through design. 3) Design plan incorporates constructability and temporary works requirements.	1) Design plan is comprehensive and shows in detail how objectives will be met and how elevated risks will be closed out. 2) Plan shows how design of temporary works will be enabled by design team. 3) Plan shows how risk burden will be measured and minimised throughout design, construction and in use.
7. Are models produced by different design disciplines capable of effective federation and has Health & Safety Information been integrated and conserved for re-use? **Key clause(s): PAS1192:6 Section 7**	6,7,9,10,1	1) The tender responses include a Federation strategy to identify how models shall be federated and combined to support H&S and integrate risk information. 2) Principal Designer and design team decide how risk information is to be shared and recorded through the CDE. 3) H&S information is made available through CDE for re-use.	1) Temporary works information is included in the CDE and shared within the design team. 2) Soft clash (temporary works) detection / avoidance includes consideration to workers, the public and end users. 3) Reviews regularly see opportunities for improving risk management as clashes are identified and shared.	1) Soft and hard clash detection / avoidance is continuous and includes consideration of worker activities 2) A range of information is combined with models and used in reviews and designers are informed of pending changes and revisions. 3) Models enable automated rule checking to reduce risk, ensure efficient co-ordination of effort during the design stage, and ensure feed forward to the construction teams.
8. What are the arrangements that will be put in place at the outset to ensure testing and commissioning is carried out effectively? (*Note: These arrangements will include the need to assure the client that what was specified has actually been built, and how to feed forward vital operational health and safety information.*) **Key clause(s): PAS1192:6 Section 6.5**	9,10,11,12, 13,14	1) Client specifies who will be responsible for commissioning. 2) Client identifies early what commissioning tasks are needed and how these will be recorded. 3) Commissioning, test and validation results integrated with H&S File and available in the CDE.	1) Commissioning reviews (including temporary works) completed through visualisation. 2) Model and visualisation used in commissioning to be supplied to the end user for continual / reuse. 3) As built models and information that has been verified is identified in the CDE.	1) Incorporate the commissioning plan into soft landing scope. 2) Model information is used to populate asset management system. 3) An index to all H&S information required for asset operation, maintenance and end use is recorded in the CDE.
9. What are the arrangements that will be put in place at the outset to ensure that information in a Health & Safety File is valid, verified and made available to the end user? **Key clause(s): PAS1192:6 Section 6.5**	1,2,9,14.	1) Client sets out an Information Requirement to ensure that the H&S File is delivered contractually 2) Client specifies H&S File content as a level of need for delivery through Exchange information Requirements. 3) H&S File is pre-structured in the CDE, for access by all participants	1) Client provides the PCI to reflect H&S File handover. 2) End user reviews are carried out progressively through the project life cycle on H&S File content and structure for usability. 3) All handover info on CDE tested and exchanged with the end user.	1) All H&S File info is indexed on CDE and incorporated into soft landing strategy. 2) H&S File is in a format to enable ready access to end users and next project manager. 3) As-built(s) validated through laser scanning / point clouds for construction tolerances.
10. How will you be able to ensure that lessons are learned from this project experience, in relation to health and safety? (*Note: PAS 1192-6:2018 requires lessons learned in relation to innovation, good practice and sharing of knowledge to be generalised and shared for re-use by the industry.*) **Key clause(s): PAS1192:6 Section 5.5**	2,4	1) At inception, Client requests from all Duty Holders to provide appropriate best practices and lessons learned from previous projects. 2) Action plan and process in place to capture new lessons learnt from appointed all Duty Holders. 3) Client considers Key Performance Indicators from the lessons learnt from appointed all Duty Holders.	1) Best practices and lessons learnt reviewed by Client and all appointed Duty Holders and where appropriate, issued in timely fashion within industry 2) KPI utilised for measuring the quantity and type of H&S lessons learnt, forms part of project reporting to Client. 3) Identification of new lessons learnt in relation to BIM / PAS1192:6.	1) Client reviews action plan and recognises positive outcomes at regular intervals. 2) Lessons learned and best practices fed back by all Duty Holders to all relevant design disciplines and supply chain in project. 3) Client shares generalisation of learning and best practices across industries for open learning.

Appendix A: The PIR's That Concisely Capture Requirements of PAS 1192-6:2018

The table below lists fourteen Project Information Requirements (PIR) written to help you understand the minimum level of information to satisfy PAS 1192-6:2018. These PIR demonstrate how ISO 19650 standard can be used to improve H&S outcomes. These are a guide and teams may supplement these according the level of complexity and risk on their project.

Set of 14 PIR's Derived from PAS 1192-6:2018 The Information Requirement	Insights relating to these Information Requirements
1. Provide and maintain digital Pre-Construction Information for appropriate use by participants and service providers.	Pre-construction H&S information provided by the client shall be structured into a digital format for appropriate use by participants and service providers to support their legal duties and contractual obligations throughout the project life cycle. As well as this reference information, the client shall set out specific EIR supported by an information standard and information production methods and procedures.
2. Identify, capture and record information for the Appointing Party to monitor and assure compliance with information requirements.	Information needed to monitor compliance with CDM 2015 inc SKET of project team, Confirmation of timely appointments, Completed F10 Form where relevant, KPI's associated with each PIR. In addition, monitoring, Design Risk Objectives, Construction Risk Objectives, Project outcomes, Costs, Time Over runs, Quality issues, H&S audit outcomes, incidents.
3. Establish a digital H&S Information RACI (Responsibility, Accountability, Consultation, Information) Matrix and ensure all project users have access.	The matrix needs to consider from the beginning of the project who will take responsibility for key roles and functions in the project. The matrix may also detail those who are accountable, those who should be consulted and those who should be informed in relation to any functions included. As responsibilities and tasks are identified in the project these should be added to the matrix, where there will be a benefit from the information being made available to the wider team.
4. A digital catalogue of lessons learned shall be established that enables learning points for future use to be entered and catalogued for generalisation and open sharing.	All participants on the project should be required to notify the Principal Designer or / Principal Contractor when ever an issue arises where useful knowledge can be shared and lessons learned.
5. To establish and maintain a digital Skills and Training Matrix that is specific to the project.	The Matrix shall detail any special skills, knowledge or training requirements that will be required by the project and link to an appropriate system of tracking capabilities of consultants and contractors engaged on the project. The Matrix shall be formatted to allow periodic compliance monitoring using appropriate metrics.
6. To require the project information model (PIM) to contain current elevated risk information complete with an audit trail, in a way that integrates structured and unstructured information with geometrical models.	The structured data outputs relating to elevated risks shall be established to allow filtering, use-of, analysis and proactive risk management through various metrics. The record needs to consider an audit trail of key risk treatment decisions, and of residual risks which remain after treatment. There may be associated treatment plans for selected risk scenarios of evident concern. All attributes for shared information and risk information to be included as set out in PAS 1192-6:2018 Annex A. The PIM shall enable sharing and collaboration in risk management in order to optimise risk treatment in the project.
7. Maintain a schedule of risk studies completed for the project with their findings and recommendations.	A Risk Study Schedule of all required risk studies, workshops and reviews shall be established and maintained for tracking compliance and effectiveness in the identification, treatment and acceptance of risk. The findings of Reviews and Risk Studies (including the identified hazards, proposed risk treatments and agreed actions) shall be structured into a digital format that enables resolution and compliance to be routinely monitored, and available for reference by those affected.
8. Maintain a table of H&S information shortfalls and gaps.	Project participants and service providers shall develop a tabulated list of H&S information shortfalls and gaps relating to their scope to enable informed resolution and effective risk management.
9. Prepare a project specific design which includes the plan for design risk management, a list of surveys and investigations required, and a list of geometrical models and simulations required for the project.	A project specific Design Plan that includes the approach to DRM (design Risk Management), shall be established and available to all participants in the design team. A tabulated list of DRO's (Design Risk Objectives) and CRO's (Construction Risk Objectives) for Health & Safety shall be established and available for routine status and compliance monitoring; the tabulated list shall also be embedded in the Design Plan. Project participants and service providers shall develop a tabulated list of the surveys and investigations required to develop, complete or verify the design or construction solution, enabling effective risk management and H&S management of the survey / investigation activities. The surveys required to prepare digital rehearsals shall also be listed. Based on the identified elevated risks and outcome of the Construction Hazard Review, a tabulated list of the 3D visualisations required to assist in planning the control of construction risks and communicating on-site dangers shall be established and maintained.
10. Maintain safety critical digital design risk information for sharing and use.	A structured digital information format shall be established that enables the following H&S information to be accessed, filtered and used by other participants in planning, managing and controlling H&S risks:- "key design decisions; design assumptions; sequences mandated by design; construction techniques mandated by design; safety critical factors or features; elevated risks; risk treatment that must be verified; safety provisions designed-in; elevated/significant safety risks designed-out; complex lifting operations; Category II & III temporary works; key aspects where quality is essential; design visualisations developed.
11. Establish a project specific Construction Plan for all participants and service providers undertaking construction work (may be an integral part of the CDM required Construction Phase Plan.	A project specific Construction Plan, that includes the approach to CRM and sets out the provisions for emergency events, shall be established and available to all participants and service providers undertaking construction work (may be an integral part of the CDM required Construction Phase Plan). A tabulated list of CRO's shall be established and available for routine

Set of 14 PIR's Derived from PAS 1192-6:2018 The Information Requirement	Insights relating to these Information Requirements
	status and compliance monitoring; the tabulated list shall also be embedded in the Construction Plan.
12. Maintain a validation and verification information schedule, including as built records.	Design team participants shall collaboratively develop and make available a Validation and Verification Information Schedule that is to be made available and maintained to support the validation of the built asset and verify functional performance in compliance with the design intent. A schedule of as-built records shall be included that tracks the progressive validation of the asset. It shall be sufficiently detailed to allow compliance monitoring, design validation and verification, and preparation of the CDM 2015 Health & Safety File.
13. Capture and maintain details of all services of and their relationship to, safety critical services, systems and equipment.	Schedule of contact details and service details of all organizations delivering project services under the appointment for safety critical services, systems and equipment. Capture and maintain details of all services providers (such as consultants, contractors and suppliers) of and their relationship to, safety critical services, systems and equipment to enable significant asset maintenance, repair or replacement projects.
14. A Health and Safety File containing all of the information that is appropriate to the characteristics of the project shall be prepared, reviewed, revised and updated.	The Health and Safety File shall be progressively developed as follows: 1. Established with key headings 2. Populated with relevant design risk information 3. Checked and validated as-built information 4. Populated with additional relevant information for risk management of the asset in use. It shall contain a level of detail proportionate to the risks that have not been eliminated through the design or construction processes.

Should you have any feedback on this document, please e-mail either gordon.crick@hse.gov.uk or andrew.rouse@environment-agency.gov.uk using the reference in the title of **Digitising CDM – A Client's Guide Feedback.**