

Information Sheet on Lean Construction & ISO 19650

ISO 19650

What is ISO?

The International Organization for Standardization (ISO) develops and publishes standards through collaboration with its members as an independent, non-government organization. National standards bodies from member countries collaborate and contribute to the development.

Why ISO?

ISO cover a wide range of domains from technology, industry, business and services. The standards are voluntary and adopted worldwide to help organizations improve their day-to-day operations, improve customer experience, and facilitate international trade.

What is BIM?

One of the challenges is that BIM has numerous definitions and different meanings that have evolved over the years. First and foremost, it is a process. ISO 19650 defines BIM as the 'Use of a shared digital representation of an asset to facilitate design, construction, and operation processes to form a reliable basis for decisions. BIM is not about specific technology and can be applied to large and small projects regardless of the procurement route. Examples of built assets, to name a few, are buildings, roads, railways, bridges, airports, piping networks etc. It is essential to know that we are not just talking about 3D models, but ISO considers all information such as meeting records, emails, model outputs, installation certificates etc.

What is ISO 19650?

ISO 19650 series is an international standard of good practice defining information management principles and requirements over the whole life cycle of built assets (Figure 1). It is designed in a flexible way regardless of the type of project, client or asset under construction. The framework provides a structured approach to the delivery of assets, operation of assets, how we exchange information, Security and further standards still being developed for health and safety. A significant amount of work and experience has gone into the development, and it catered for an international audience rather than a specific country or region. And because of that, it has the flexibility of being regionalized, and this is achieved by developing an annex to the framework for the country or locale of origin. This has been successfully completed in the UK and Ireland.

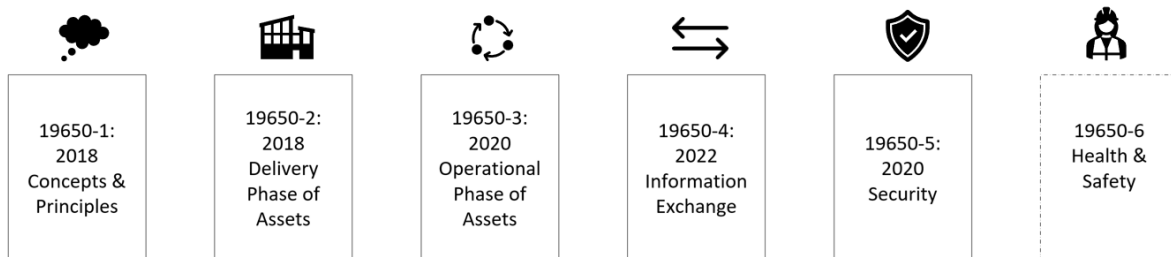


Figure 1: Current and developing ISO 19650 Frameworks.

What is information?

When we talk about information, in ISO terms, it means a reinterpretable representation of data in a formalized manner suitable for communication, interpretation or processing (ISO 2018, P3). In other words, information can be processed by human or automatic means. This is important as Clients

need to understand their 'information requirements' to make informed decisions and manage assets in operation. On projects, when asking to produce information, it needs to add value as requesting information that is not understood or provides value is wasteful.

Why ISO 19650

What has been so wrong with how we handle digital information and workflows in projects? There are numerous examples of what goes wrong when a lack of how information is transferred and managed in projects. Poor information management leads to security issues, construction delays, overspending, and miscalculations. By standardizing the approach and providing a technical framework, we can understand what needs to be delivered consistently.

Benefits of ISO 19650

Adopting ISO 19650 has numerous benefits. For example, the framework provides a standardized structured approach with a common language. This helps to drive improved collaboration and communication for all stakeholders reducing misunderstanding. As there are consistent processes, transparent information management workflows and requirements driving:

- Better coordination and collaboration
- Efficiency and productivity gains
- Enhanced quality
- Data reliability
- Reduction of errors
- Cost and time savings
- Reduction in delays
- Reduction in Health and Safety issues or risks
- Better sustainable delivery
- Supports Lean Construction Principles

Moreover, we tend to forget that information management does not end at construction; there is a vital transfer of information between project delivery and asset operation. Asset management is essential to many clients and can cost more than the design and construction to maintain over the asset's lifecycle. (Reference to the ratio for Design to Build to Operate). Figure 2, from ISO 19650-2:2018, illustrates the whole life cycle of an asset and the ongoing process of starting the delivery of projects (A), progressive development (B), and the end of delivery to operation (C). Many clients go through this iterative process with their assets through construction projects.



Figure 2: Diagram from ISO 19650-2:2018 illustrating the whole life cycle and intercept points

Challenges in Adopting Frameworks

While adopting ISO has benefits, organizations can find it challenging to apply, and we have found that clients can adopt frameworks or mandate BIM in a project without fully understanding the requirements. There is no ISO button. For clients, it requires a greater overarching engagement with stakeholders within the organization to understand how assets are constructed and managed aligned with the business functions. Every client has different information requirements, systems, and processes. Buying a template off the shelf or new technology does not make your organization ISO-ready or generate immediate benefits. Understanding how information is used and managed from procurement, finance, engineering, design, construction, and operation will drive informed decision-making and help develop how to align the framework to the business. When we ask for information, the reason needs to be clearly understood, or it is wasteful. This is where information requirements are critical and must be articulated consistently and structured to fulfil the organization's requirements.

Client silos are revealed if critical stakeholders are not engaged. This will include key consumers of handover data, which may span multiple departments and integrate through numerous systems, including Operations, IT, HR & Finance, to name a few.

The benefits are not just for clients or owner-operators. For example, contractors have tight profit margins, sometimes less than 1% in projects. Taking a lean approach and adopting ISO can assist in delivering within the project parameters and value engineering. Only 1% of unstructured asset data ever collected is used (Harvard Business Review, 2017). Putting this in perspective, are we asking for the wrong or too much data or, even worse, not fully utilizing the potential of what we have?

Owner-operators have critical roles in asset and facilities management that require reporting, targets, on-site work through PPM and reactive maintenance, tracking parts, and making sure they have access to the latest documentation to maintain buildings and infrastructure. When we consider the immense burden of an owner-operator, errors at handover are costly.

Getting started on ISO 19650

Figure 3, based on ISO 19650-2:2018, provides one of the most fundamental diagrams as an overview of the Information Requirements and Information Models.

At a high level, the Organization Information Requirements (OIR) define the high-level information required by an organization to support its portfolio. The OIR would include policies and targets on regulation, compliance, maintenance, and sustainability. Multiple stakeholders would develop the OIR in the organization, such as HR, Finance, Operations etc., which could be achieved through stakeholder engagement and should be reviewed as the business information needs change. We have found that cross-referencing the OIR with asset requirements helps drive the focus of why information is requested.

The Asset Information Requirements (AIR) – Asset level, driven by operations and asset/portfolio owners. Examples include structured asset lists with ppm tasks and associated data sheets.

Exchange Information Requirements (EIR) – Exchange requirements are project specific and specify what information is required at each information stage. The Lead appointed party (client) will also define technology and technical requirements. Setting out a clear EIR means the appointing party (client) can identify Lead Appointed Parties best to deliver and meet the project information needs. In turn, the Lead appointed parties will cascade their information requirements to appointed parties.

Project Information Requirements (PIR) – defined at a project level setting out the critical decision-making points. Information is delivered at the appropriate stages. However, key decisions need to be made. These could be related to the design, costs, security, and sustainability. Making decisions on reliable data applies a level of governance that the asset being designed and constructed fulfils client needs. The information could be presented in numerous forms, such as models, schedules, reports etc.

Asset Information Model (AIM) –The Asset Information Model contains all the information to support, maintain and manage the asset. Examples include asset registers in a CAFM system as constructed records, such as models, plans, and schematics to support assets.

Project Information Model (PIM) –The Project Information Model contributes to the Asset Information Model (AIM) throughout the project. The PIM will contain design information, construction details, costing outputs, schedule etc. The PIM is commonly mistaken as an integrated model but has all the information outputs required for the design and construction—appropriate archiving procedures, which the ISO framework addresses, need to be implemented.

The PIM and AIM should be structured so that the information is easily accessible, auditable, secure, and records changes. Specific requirements to comply with such conditions will be outlined in the EIR—for example, naming conventions, metadata and the Common Data Environment (CDE).

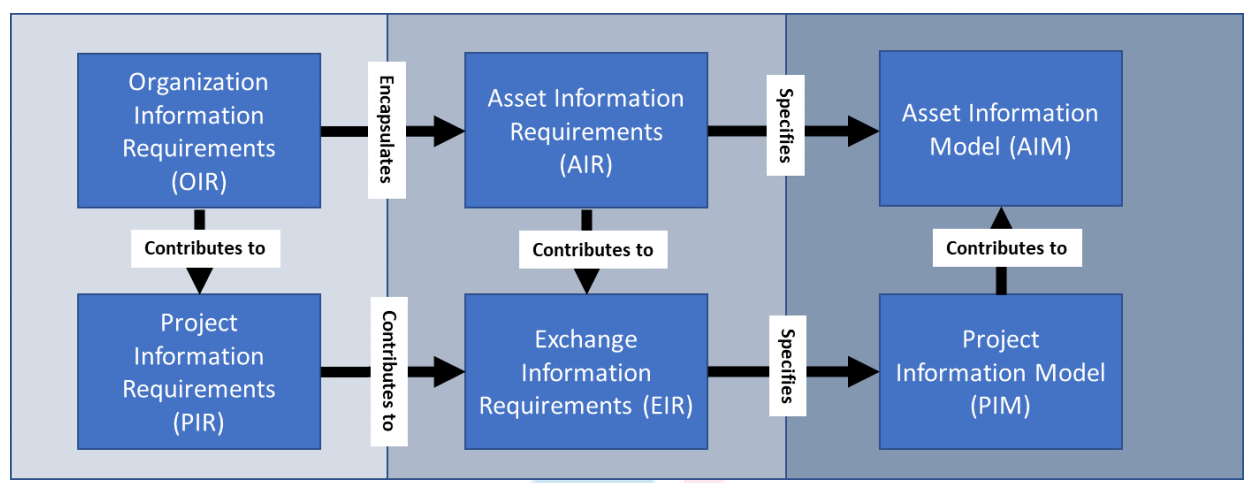


Figure 3: Information Requirements and Information Models

ISO 19650 Teams and Roles

Figure 4, based on ISO 19650-2:2018, illustrates the various parties involved in the project team and the relational interfaces regarding information management. It is essential to note the diagram is not designed to show contractual relationships.

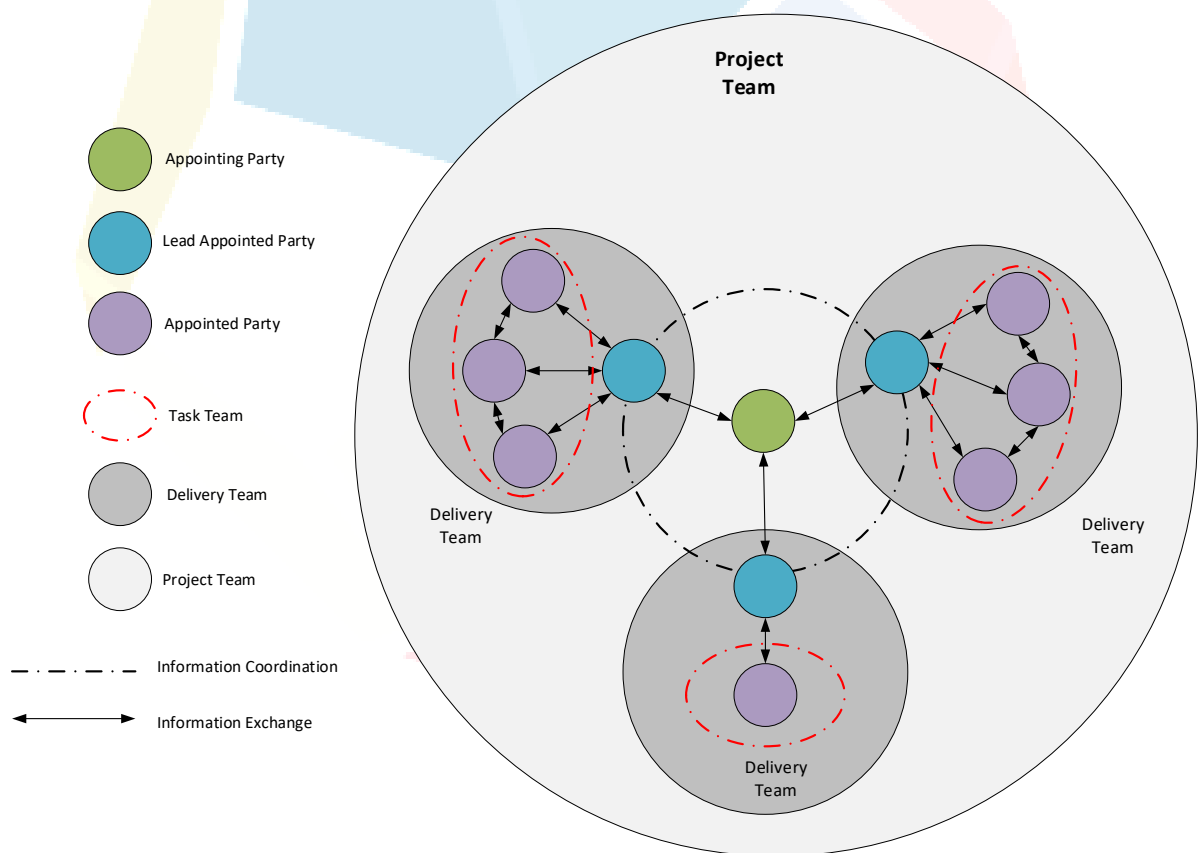


Figure 4: Diagram based on ISO 19650-2:2018 illustrating the interfaces between parties in relation to information management.

The Appointing Party typically will be the client or a party that will manage information on behalf of the client. The Appointing Party appoints a Lead appointed party, and several appointments could exist simultaneously, depending on the procurement route. For example, the Lead appointed party could typically be Architects, M&E, Structural, or a Project Management organization. Appointed parties are appointed by the Lead appointed party, who will have their information requirements.

Typical representations could be sub-consultants, specialists etc. Information is exchanged from the appointed party (Acoustic Specialist) to the Lead appointed party (Architect) to the Appointing Party (Client).

Useful Resources

The following are valuable resources for starting on lean construction and your organizations ISO 19650 journey:

Table 1: Useful ISO 19650 References

Site	Link
Standards by ISO/TC 59/SC 13 - Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM)	https://www.iso.org/committee/49180/x/catalogue/p/1/u/1/w/0/d/0
Building Smart	https://www.buildingsmart.org/
NIMA (Formerly UK BIM Alliance)	https://wearenima.im/
UK BIM Framework	https://www.ukbimframework.org/
Pentagon Solutions	https://www.pentagonsolutions.com/bim-consultancy/