The Common Data Environment to BIM processes support
New operating methodologies for the construction’s industry growth

From Big Data to CDE, BIM, and LEAN Construction Delivery

“Big Data” has been discussed a lot, however, data must be in easily understood, common terms, definitions, and formats, in order to be assessed and leveraged for the benefit of an organization.

In today’s world, the issue not the lack of volume of data, but the lack of current actionable information that will drive higher productivity.

However, in order to be correctly interpreted and to offer the expected benefits, the data must also necessarily be easily and immediately accessible, comprehensible and organized in common formats.

The Common Data Environment is therefore necessary and essential to be able to efficiently and essential to carry out more effectively the activities of repair, renovation, maintenance and new construction with significant improvements in quality, project delivery time, and cost.

BIM is the efficient life cycle management of the built environment supported by digital technology. It is able to provide huge benefits to all interested stakeholders.

The interrelation of tools such as BIM, LEAN Construction, and the Common Data Environment can allow, if properly managed, the maximum return on investment and better outcomes for real property owners, building users, services providers, and oversight groups.
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Introduction

Very soon the following motto will prevail: No Data – No business.

The BIM (Building Information Modeling) is now commonly regarded as changing more than anything else, the way we work at every stage of the building process: planning, design, construction and management. The CDE allows you to distribute data and create value for the whole chain of users involved in the process.

With the advent of BIM, data, even for our industry, can be considered the economic foundation on which to build a new way of doing business: Those who are able to manage and exploit this new state will find themselves at the heart of the production of wealth, the others out.

To generate wealth and value, data originating from the planning and project phases must be channeled as quickly as possible, without interruption further along the process, where it can be aggregated, distributed and updated.

The introduction of BIM also brings with it the ability to precisely map and manage precisely data exchange among team members, tracing each individual’s activities over time, monitoring accordingly time, cost and the quality of production.

Also in this case if CDE if properly used, it is able to ensure in real-time a higher level of efficiency and control of the activity and even offer accurate feedback on the state of completion of works.

The adoption of a CDE finally overcomes geographical barriers and allows, the creation of an extended team, also from different countries or continents.

The possibility offered by CDE to collaborate remotely using a shared information technology platform offers the opportunities to create new business opportunities reducing administrative costs and delays.
CDE’s basic concepts

What is a Common Data Environment?
The Common Data Environment (CDE) is a central repository where construction project information is housed. The contents of the CDE are not limited to assets created in a 'BIM environment' and it will therefore include documentation, graphical model and non-graphical assets. A data architecture, complete with a robust set of terms, definitions, and standardized organization is extremely important to both information sharing and ongoing data maintenance. In using a single source of information collaboration between project members should be enhanced.

CDE & Who Needs It?
A Common Data Environment will impact all participants and stakeholder within the construction value chain:

Owner
Owners are becoming increasingly aware of the waste and low productivity associated with traditional methods, and are demanding change. Early and ongoing collaborative sharing of standardized information is now recognized as required for success.

Designer
A high level of pressure will be put on architects and designers because owners/clients currently see 3D visualization as the answer to saving resources and ensuring that budgets are not over run.

Contractor
Constructors should be active part of the process, from the earliest planning stages, in order to take advantage of their field experience and knowledge. All stakeholders must offer their contributions and experience as early as possible in order to more efficiently meet objectives for quality, time, and cost.

Facility Manager
The Facility Manager as well as the Energy Manager, and related colleagues, can depend upon a CDE to assure available access to historical, current, and planned operations and maintenance management activities, costs, and impacts. Within the CDE, a wide range of standardized information is stored and immediately accessed: BIM models, locations, buildings, horizontal infrastructure, movable assets (equipment, furniture), major building systems, major equipment, and people (internal, and external).

The CDE – Common Data Environment – Can be defined as an information architecture and application, generally available in the cloud, accessible from any device (PC, tablet or smartphone) from which it is possible to manage projects in a consistent, structured yet adaptive way, promoting collaboration between users.

The CDE allows all users involved in the construction and facilities management process to share in a single database in real-time. Information is always available and up to date; It facilitates collaboration between team members by avoiding the duplication of information and minimizing the possible occurrence of errors at every stage of work life-cycle.

The Common Data Environment (CDE); an online place for collecting, managing and sharing information amongst a team working on a project.

A CDE could take many forms, depending on the size or type of project you are working on. It could be a project server, an extranet or a cloud-based system.

"An online place for collecting, managing and sharing information"

PAS 1192-2 provides specific guidance for the information management requirements associated with projects delivered using BIM.

Not all information on a project will be originated, exchanged or managed in a BIM format. This information will also need to be managed in a consistent and structured way to enable efficient and accurate information exchange.

BS 1192:2007 provides details of the standards and processes that should be adopted to deliver these outcomes. Only information exchanges specific to BIM are described in PAS 1192-2.

Effective use of a CDE will build an accurate and well-structured data set – a ‘Project Information Model’ (PIM) – as the stages progress.

Once verified, this published documentation and data is used in the asset management phase and known as an Asset Information Model (AIM).

You can learn more about Common Data Environments in PAS 1192-2, which is available as a free download from the British Standards Institution here:
https://www.designingbuildings.co.uk/wiki/PAS_1192-2
Building a successful Common Data Environment

**NUMBER 1**
Choose the right team

Choose team members with the management and technical skills necessary to work collaboratively to achieve desired project outcomes.

A motivated, competent team is key to success.

**NUMBER 2**
Define roles and responsibilities

Roles, responsibilities, deliverables, and schedules must be clearly defined, ensuring that each team member is assigned proper access to the Common Data Environment.

Spending time up front to set up a CDE assures efficient and transparent access to information shortens overall project delivery times.

“A proper setting up of the Common Data Environment allows all team members to work in an environment optimized for their needs.

Do not skimp on the time it takes to set up the Common Data Environment correctly.”

**NUMBER 3**
Define approval workflow

Clearly decide who can do what, for example, who can access certain type of information or documents.

Define with which rules documents and the team’s activities should be approved.
Building a successful Common Data Environment

**NUMBER 4**
Common language and data availability

Define a common glossary of terms, definition, and data architectures, including file formats and use of non-proprietary, open formats whenever possible.

Assure data is available anywhere, anytime, including mobile devices.

**NUMBER 5**
Data security First

The CDE must meet data safety and service level requirements, including encryption and data recovery.

Include multiple levels of access based upon user and information types.

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"Some changes are so slow that you don’t notice, others are so fast that they don’t notice you“.

The digitization of the construction industry is gradually transforming how we do business on a day-to-day basis.

**NUMBER 6**
BIM – Building Information Management

A Common Data Environment, in combination with life-cycle centric Building Information Management enables significant cost savings as well as on-time, on-budget, project delivery and improved levels of satisfaction for all participants and stakeholders.

Common data in relationship to BIM, display of federated BIM models is key.
Setting up the CDE

ON a typical construction project, a lot of information is produced. The trouble is that information is often unstructured, poorly coordinated and difficult to find.

The resultant inefficiency is estimated to add an extra 20-25% onto the cost of delivering our built environment. If we take more care and have more integrity around how we structure project data, we can help to eradicate this waste from the process, delivering clear time and cost savings.

The key to well-structured data is a Common Data Environment (CDE).

A CDE could take many forms, depending on the size or type of project you are working on. It could be a project server, an extranet or a cloud-based system.

The important thing is that this space is digital, that everybody in your team has open and unhindered access to it, and that it can be easily sub-divided into areas for categorising information. In simple terms, it needs to be a collaborative and well-managed space for sharing work.

With a single shared area established, the process of data flow in a CDE starts with the Client’s authorised Employer’s Information Requirements (EIRs). This document states the information that the Client will need from the project team in order to make decisions at key points in the project lifecycle, including during its operation and use.

Design teams and other project contributors are able to work in their own ‘Work in Progress’ areas, developing and honing their graphical and non-graphical information. Once checked, that information is approved and moved to the ‘Shared’ area for other parties in access and use in the creation and development of their contributions.

At key project stages and decision points – such as at the end of work stages, Planning approval or Construction Issue – the Employer or Employer’s Agent approves and signs-off information before moving it to the ‘Published’ area. It is very important to check here that the information provided aligns with the Client’s stated requirements in their EIRs.

As each project milestone is met, published information is moved to the ‘Archive’ area for future reference and use.
CDE Management

Construction, design, and facilities management teams are under pressure from a flattening economic and digital world to more rapidly organize data and leverage mobile tools to enable access to, and the management of, actionable information... anytime and anywhere.

Streamlining, simplifying, standardizing, and automating Construction Document Management processes is an essential step towards improving productivity, quality, and overall value for all stakeholders.

The process creates a competitive advantage for innovative construction companies.

The role of BIM (through its key players: architects, engineers, surveyors, builders, managers, owners) is to support the communication, cooperation, and overall optimal outcomes project throughout its full life-cycle.

BIM, common data environments (CDE), and supporting cloud-based technology profoundly change:

• the way we work
• how we are measured and compensated
• the tools we use
• overall demand for products and services
• relationships between clients, vendors, and stakeholders.

13% Time spent looking for the right information accounts for approximately 13%* of an employee's time each and every week.

30% In the construction industry the situation if far worse. It’s not usually for project managers to spend 30%* of their time searching for the information needed to carry out their activities within e-mail, paper documents/paper binders, and digital files.

* IDC Source
Construction Document management

Only those that are successful this effort will achieve increased business productivity and efficiency, while reducing operating costs.

Operating separately, isolated from the value chain, is rapidly becoming unsustainable.

Where to start?

Here are a few essential points to consider when planning a collaborative documents delivery strategy.

- Cloud Access
- Efficient and varied search tools
- Document versions and revision management
- User access permissions and privileges management
- Viewers for common files used
- Collaboration among team members
- Management and tracking of requests for changes/issues found in documents
- Common industry standard terms and definitions – Common Data Environment, CDE
- Consideration of Life-cycle Management of the Built Environment and Asset Total Cost of Ownership
BIM collaboration between all the stakeholder value chain is changing the way to make business also in the construction industry. Cloud technology and BIM collaboration, is enabling teams to become more connected, and have access to information from anywhere and anytime.

PROJECT DELIVERY IS BECOMING MORE COLLABORATIVE
As a result, design firms in AEC are facing requirements for joint venture arrangements, the need to co-locate, version control, and centralized feedback systems. This sort of collaborative project delivery in the design phase requires architecture and engineering firms to communicate and share data easily to support efficient decision making. Examples of proven LEAN collaborative construction delivery methods include; Integrated Project Delivery, IPD, for major new construction, and Job Order Contracting, JOC, for repair, renovation, maintenance, and minor new construction.

CLOUD-BASED BIM COLLABORATION TOOLS IS INCREASINGLY ENABLING BIM PROCESSES
New LEAN collaborative project delivery models need to work in a shared space in real-time, so that decisions, updates and communications are simultaneously and instantly applied, flagged, and tracked. A solution which takes communication beyond email and creates a unified space and record can optimize BIM’s collaboration capabilities. Using the right cloud solution means workflows are integrated across the project lifecycle of planning, design, construction and operation, and barriers to communication are removed so project collaboration can occur in real-time. Cloud-based collaboration tools can help minimize design downtime and rework.
The Cloud and Data Protection

The safety of your cloud information system must be your first concern.
Be sure that your CDE relies on a solid and affordable cloud infrastructure.

Data Center
Cloud servers must have a SLA (Service Level Agreement) of 99.95%. Infrastructure must be redundant and scalable, physically located in different locations, this assures that your data is always safe and available.

Encryption
Network traffic containing sensitive information, such as credentials, is transmitted securely over the Internet to the perimeter of our environment. For example SSL certificates released by Alpha SSL that provides 256 bit encryption with RSA key generation.

Backup
Any time you upload a new version of a document Building in Cloud preserves the old version, these are available to be recovered, until they are deleted. Multiple backups of your documents and data on secure, different servers, occur daily.

CDE Access
Access to the system is granted through a triple level authentication; company alias, username and password. Optionally passwords can be configured to expire after a predefined amount of time has passed. User have access to the information based on the permission level that is granted them by the administrators.
Conclusions

The use of a tool such as CDE, combined with the use of BIM, and the use of LEAN collaborative construction delivery methods, enables significant gains in productivity, quality, and cost savings, and more efficient facilities life-cycle management.

To generate wealth and value it is necessary that the information, starting from planning and design, be transparently shared as quickly as possible among all participants and stakeholders, and without interruptions of the process.

BiC-CDE is the new module for Building in Cloud for the management of Common Data Environment fully compatible with PAS 1192 and UNI 11337 standards.

Do you need more information on BiC-CDE?

Request information  Watch the video  More information