BIM Collaboration

Siva Koppula – Autodesk

AB3111 This class will show you how to assess the existing collaborative methods in a Building Information Modeling (BIM) project (Building or Infrastructure) using the Bew-Richards BIM Maturity Model and BS1192 as a reference standard. We will then explain how to identify the potential gaps that could lead to delays and cost inefficiencies and how to eliminate the gaps using workflows and software technology. Typically BIM projects involve multiple disciplines and multiple organizations. To collaborate efficiently and effectively among different disciplines and across different organizations, it is essential to have standard methods and procedures and a common data environment with clearly defined roles and

Learning Objectives

At the end of this class, you will be able to:

- Explain What is BIM Collaboration

- Assess BIM Collaboration

- Understand BS 1192:2007 standard

- Develop BIM Collaboration solution

About the Speaker

Siva is currently working as BIM Technical Consultant at Autodesk. Siva has wide-ranging experience as Solution Architect and Technical Consultant. He is involved in developing technical solutions, conducting business process assessments, risk analysis, requirement analysis and other consultancy services. He has over 16 years of experience in IT consulting and development industry. He is TOGAF 9.0 certified Enterprise Architect and has MBA from Manchester Business School.

Siva.koppula@autodesk.com

What is BIM Collaboration?

BIM as a concept has surpassed the original significance of its name. From its origins as a technology-focused improvement to building design, we now see BIM as an approach to radically transforming and improving the overall business performance of organizations working in all sectors of the built environment. To say this is not to detract from the importance of its original component terms: "building", "information" and "modelling". However, the broader BIM concept - this bigger far-reaching idea applied across all relevant industries - is an even more radical and significant improvement over traditional approaches than considered possible when BIM was conceived. What is BIM? BIM is still evolving and as such, the definitions resulting

from a review of current published literature vary. In general, what is considered BIM ranges from very limited in scope, focusing exclusively on the technology aspect, to very broad, encompassing other organizational and operational aspects such as governance, processes, standards, and people. What is common to all definitions is the model-centric aspect of BIM; just as the benefits of BIM are derived from this model-centric approach, so to the implementation of BIM must address it.

While using the correct software is an important aspect of it, BIM is more than that. It has the following implementation areas:
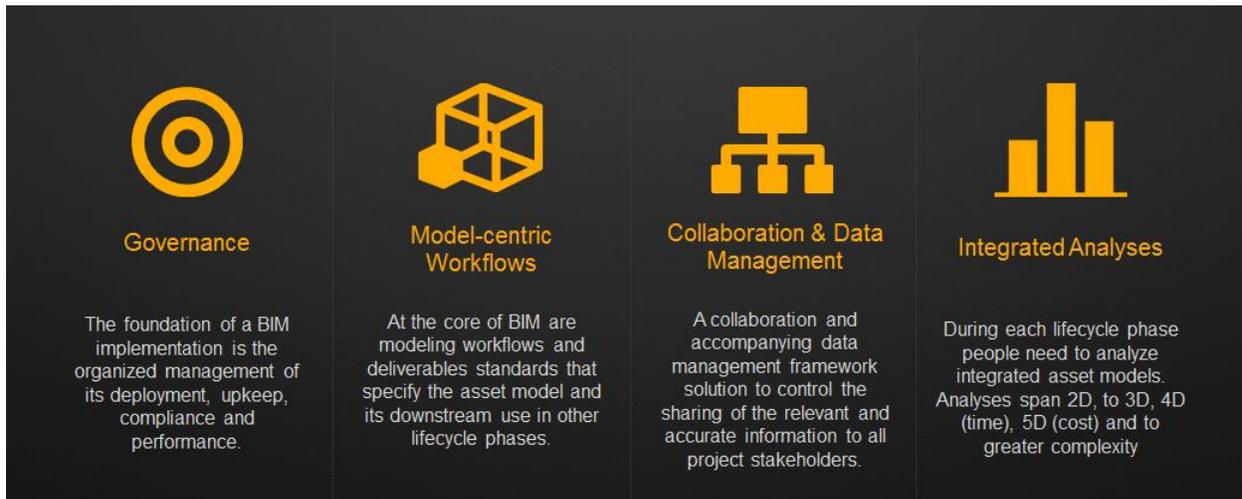

Figure 1: BIM Implementation areas

Governance – deals with setting up the right organisational framework, including BIM vision, BIM organisation structure etc

Modelling & Deliverables – Using the right software, defining the correct workflows, adopting best practise guidelines etc

Collaboration & Data Management – relates to data organisation and sharing, developing collaborative etc.

Analysis & Integration – deals with Model integration and analysis such as clash detection, sequencing etc

BIM Collaboration
BIM Collaboration is the process of identification of different BIM phases for a given project and defining the process of data and information sharing between these different phases. In this case 'data' refers to the data generated by different software used in the different phases of the BIM project and 'information' refers to the process of notifying users in the different phases of

the BIM project. The data and users could be located in the same or different offices (geographical locations).

BIM Collaboration process can appear complex with so many things to think about – data creating, software tools to use, data management solutions, information sharing, permissions, data replications etc

Hence it makes sense to break down BIM collaboration into different components as shown in the figure below:
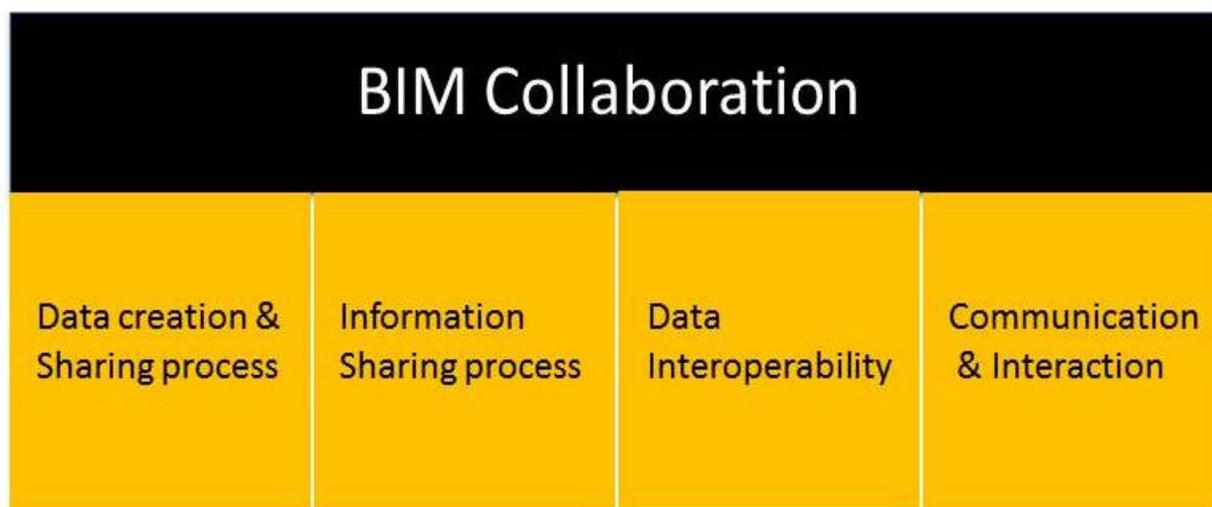

Figure 2: BIM Collaboration components

Data Creation & sharing process relates to defining and organising data, developing data management solution and defining workflows to share the data

Information sharing – involves defining the different stages when information is shared within the same design discipline and with the other design disciplines, the permissions levels status and version information of the data shared etc.

Data Interoperability – deals with the different data formats involved in the project and defining workflows for bringing them together, including any data migration that might be required

Communication & Interaction – relates to the notification and communication process through which users are aware of the latest status of project and design data artefacts. These could include dash boards, email notifications, use of social media tools for instant two-way collaboration etc.

How to assess BIM Collaboration?

One quick way to assess Collaboration issues in an organisation would be to ask if they experiences any of the issues listed below:

- Lack of structured workflow

- Delay in releasing the information

- Lack of trust in the shared data

- Lack of information about the shared data

- Lack of consistency

- Lack of standard methods & procedures

- Lack of quick access to the project team

f the answer is no to all these issues i.e. they have resolved all these issues then they have a perfect Collaboration solution! And they need not spend any further efforts on BIM Collaboration. On the other hand if any of these issues exists, then it is an indication that there is a need for a proper collaboration solution. If a solution already exists, then it probably needs improvements.

The assessment process is broadly based on the BIM Collaboration components. The objective is to try to establish the current as-is scenario by assessing the following:

- As–Is scenario assessment

- Data flow process assessment

- Data creation and sharing process assessment

- Information sharing process assessment

- Data interoperability issues

- Communication and interaction

It is recommended to develop detailed questions on each of these topics. Typically try to follow the 5Ws approach – (Who what when where why) when trying to develop data flow process maps.

Following figures provide some examples of Collaboration assessment. The figure below shows process assessment that involves various components such as tasks, transfer/messaging, storage/catalogue, decision/review & delay. In an efficient process the red line should be towards left with minimum number of delays and decision points.

Figure 3: Process review example

Sno	Task	■	→	▼	♦	⏱
	Review Existing data	☐	⇨	▽	◇	⏱
	Additional data required?	☐	⇨	▽	◇	⏱
	Request additional data	☐	⇨	▽	◇	⏱
	Wait for the data to arrive	☐	⇨	▽	◇	⏱
	Create base map as dwg file	☐	⇨	▽	◇	⏱
	Convert/Translate data	☐	⇨	▽	◇	⏱
	Create/store data in correct layers	☐	⇨	▽	◇	⏱
	Stylise data	☐	⇨	▽	◇	⏱
	Send basemap for review	☐	⇨	▽	◇	⏱
	Review basemap	☐	⇨	▽	◇	⏱
	Wait for the feedback	☐	⇨	▽	◇	⏱
	Update base map	☐	⇨	▽	◇	⏱
	Send base map for cataloguing	☐	⇨	▽	◇	⏱
	Store base map dwg in the project folder	☐	⇨	▽	◇	⏱
		7	3	2	1	1

■ Task

→ Transfer

▼ Storage/Catalogue

♦ Decision/Review

⏱ Wait/Delay

The figure below shows an example of assessing as-is collaboration solution. It uses the familiar red, green, yellow traffic light signals colors to various collaboration activities and according to the status of their implementation.

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Figure 4: As-Is BIM Collaboration Assessment

Data creation & Sharing	Item	Rating
	Common data environment exists?	🟡
	Standards for file naming, CAD layers, use of templates	🟢
	Roles & responsibilities defined	🟡
	Use Collaboration software	
	Data Management	🟡
Information Sharing	Standard collaboration process defined?	🟡
	Automated notification process for data status and version exists?	🔴
	Process (eg. COBie) to collect information on assets exits?	🔴
	Electronic document management system exists for managing reports etc?	🟢
	Electronic document management system exists for managing design and model data?	⚪
Data Interoperability		
	Data formats agreed at start of project?	🟢
	Process defined to aggregate data/models from different sources?	🟡
Communication & Interactions	Use Social Media tools for communication?	⚪
	Use Project dash boards to communicate status on different activities	🔴
	Minutes of the meeting recorded and catalogued?	🟢

Status	Score
Excellent to Very Good – Requires little if any improvement	🟢
Average – Requires some improvements	🟡
Unknown – At this time the data did not supply enough information to rate	⚪
Red Flag – Indicates an issue with an item, a closer look needs to be taken.	🔴

What is BS 1192:2007?

- It is the code of practice for Collaborative production of architectural, engineering and construction information
- It defines the process for both 2D and 3D data/models sharing between different design disciplines

- It has been implemented on a number of projects of various value and the savings of 10% have been sustained on all projects. (CPIC)

- It provides definitive guidance on how to implement collaborative work

- BS1192 emphasises the importance of effective collaboration between the participants in construction projects on order to enable data to be reused accurately and knowledgeably so that the full benefits can be achieved.

- The new standard provides guidance to firms in order to effectively share data and enhance the productivity of the whole project team, while also reducing costs.

- The standard establishes the methodology for managing the production, distribution and quality of construction information, including that generated by CAD systems, using a disciplined process for collaboration and a specified naming policy.

- The standard is applicable to all parties involved in the preparation and use of such information throughout the design, construction, operation and deconstruction of projects and throughout the supply chain.
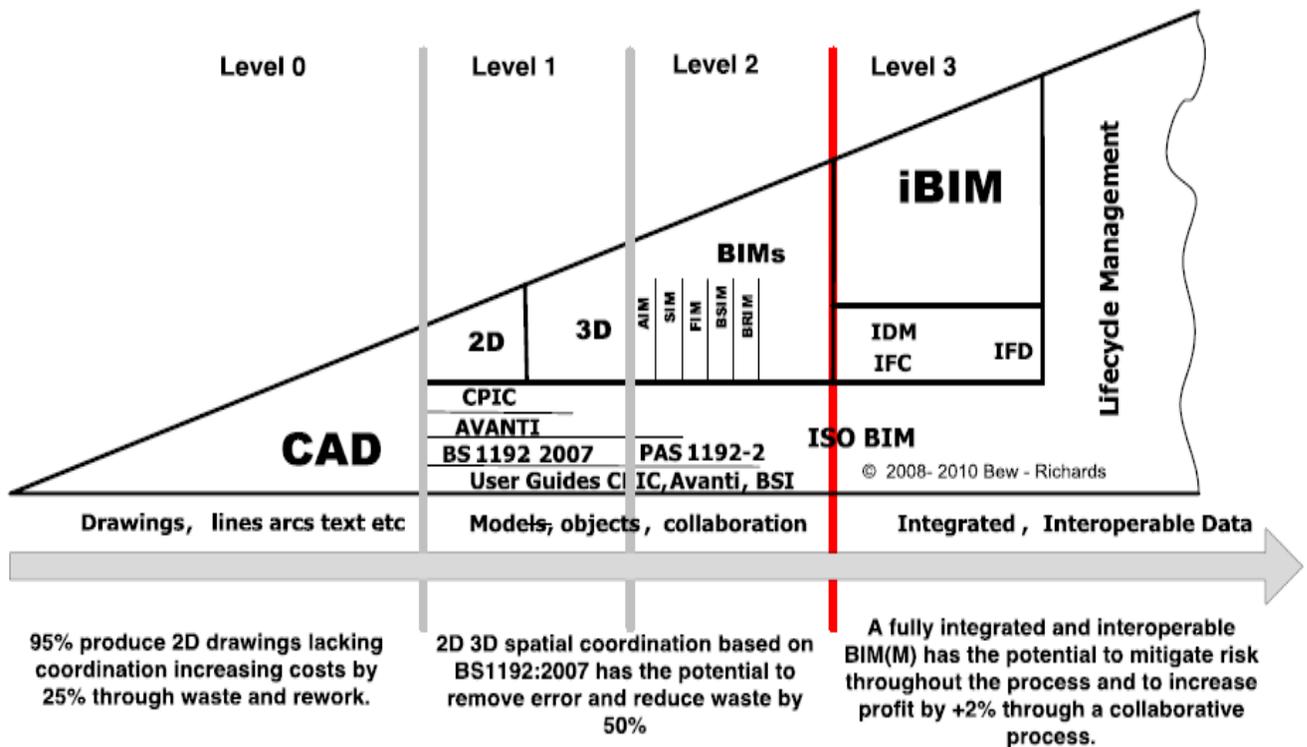
Figure 5: UK BIM Maturity Model

- UK BIM maturity model shown above, suggests implementing BS1192 as the process for 2D/3D coordination to remove errors and reduce waste.

BS 1192:2007 main components
Following are the main components of BS 1192:2007.

Common Data Environment
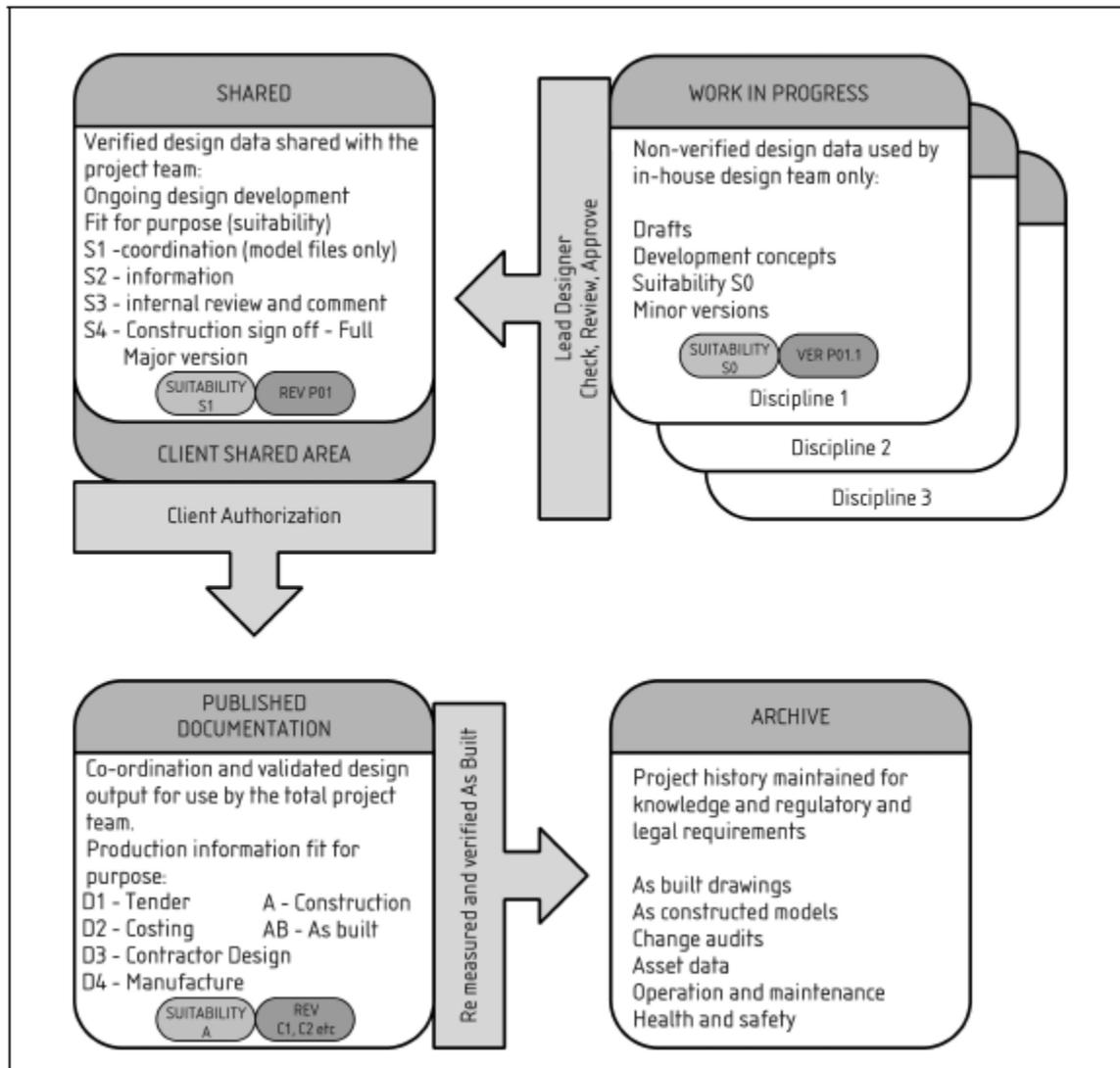There are four phases of common data environment as shown in the figure below:

Figure 6: Four phases of Common Data Environment

Following are advantages of adopting such a CDE:

- Ownership of information remains with the originator, although it is shared and reused;

- Shared information reduces the time and cost in producing coordinated information; and

- Any number of documents can be generated from diff erent combinations of model fi les.

- If the procedures for sharing information are consistently used by the design teams,

- Spatial coordination is a by- product of using the CDE processes, and will deliver production

- Information is right first time.

- Information can subsequently be used for construction planning, estimating, cost planning,

- Facilities management and other downstream activities.

Standard Method Procedures

All projects should follow a common set of generic processes at the highest level, which are fine-tuned on a project-by-project basis. The procedures outlined apply to all approaches to project design production, including:

- co-ordination of the project model files (2D and 3D) as they develop;
- production of 2D drawings from 2D and 3D models; and
- production of of 2D drawings using 2D CAD draughting software.

The areas covered by this section include file naming standards, CAD standards, templates, annotation, symbol libraries, using standard co-ordinate system etc.

Roles & Responsibilities

At the start of a project, it is important to identify the roles and responsibilities of the design team, and of specialist subcontractors who have design content in their work packages. It is also necessary to defi ne the roles and responsibilities of individual team members as well as the schedule of responsibilities for deliverables of the overall team. The titles of the managers may diff er, but the important factors are the ownership, responsibility and authority.

The figure below shows the typical examples of the team member roles required within a large project.
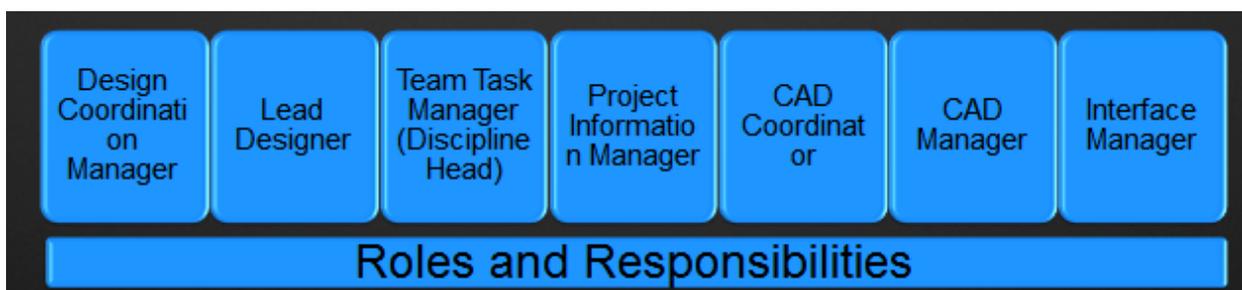

Figure 7: Typical example of Roles and Responsibilities

Developing BIM Collaboration Solution

Following are the typical steps involved in developing collaboration solution:

- As – IS Assessment
- BIM Collaboration Requirements assessments
- Gap Analysis: As-Is situation vs collaboration requirements
- Gap Analysis: As-is situation vs BS 1192 requirements
- Develop options and solutions for bridging the above gaps
- Develop or adopt collaboration framework
- Modify existing collaboration framework
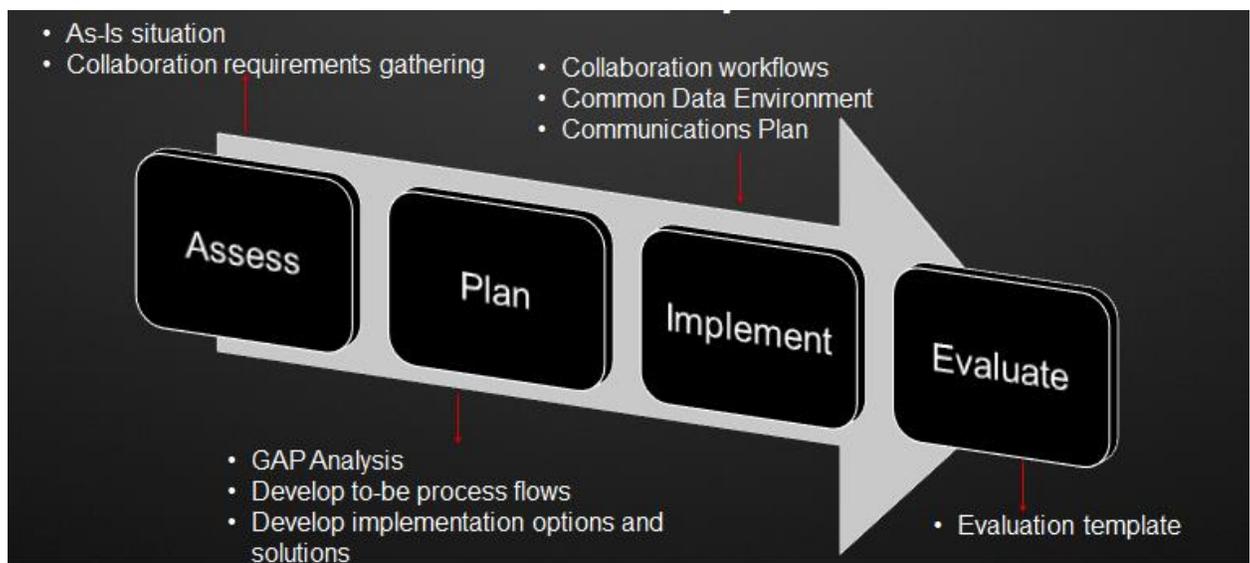- Develop and implement technical solution
- Review and assessment

Figure 8: Developing BIM Collaboration Solution

When developing BIM Collaboration solution, it is important to consider the following scenarios:

- Single design discipline & single office

- Multiple design disciplines & single office

- Multiple design disciplines & multiple offices

- Multiple design disciplines & multiple offices & multiple organisations

A standard or simple BIM Collaboration solution can be deployed using Vault with following features:

- Workflows, CDE, Standards Method Procedures etc., based on BS 1992:2007

- Single site Vault installation

A more complex BIM Collaboration solution would involve the following:

- Customised solution based on customers' existing workflow

- Single or multi-site Vault installation

- Integration with Buzzsaw

- Integration with Revit Server

- Integration with non-Autodesk technologies