

BIM *Building Information Modeling*

SECTORS, LEVELS AND DIMENSIONS OF THE BIM.

After having learned what the acronym BIM means, what BIM is, and its basic elements, we are going to explore BIM to learn about its reach. Now we will delve into an in-depth analysis of the sectors in which BIM operates, its division in levels of evolution, and the dimensions it operates on.

Complete or Partial BIM

Understanding if the BIM we are handling is a complete BIM or a partial BIM is rather simple: the BIM is multidisciplinary by nature, which means that if we generate a model of information for a construction and this information is for the designer's exclusive use and is not shared with the engineer and/or constructor, we find ourselves with a partial BIM; if the information is shared with the engineer and constructor and with other figures involved in the construction's building process, we find ourselves with a complete BIM.

Opened or Closed (or proprietary) BIM

The Building Information Modeling (BIM) must provide interoperability and multidisciplinary collaboration. This involves a massive management of different types of information from multiple subjects involved in the project (architects, engineers, constructors, etc.). It is therefore essential to use a model that guarantees access to information. This brings about two concepts related to the creation of the BIM: Open BIM and Closed BIM (or owner BIM).

An Open BIM refers to a model in which the various participants in the project, using different BIM software platforms, can share and integrate models, files, and data between themselves by using non-proprietary formats such as IFC.

A Closed BIM instead refers to a relatively restricted design environment in which all participants use a single BIM software platform.

An open BIM environment is flexible and actively encourages multidisciplinary collaboration between different teams preferring to use different software platforms, in order to use the best one for each phase.

On the contrary, a closed BIM requires that all teams use the same software platform, limiting or preventing the collaboration with other software platforms.

For these reasons, the open BIM represents the future of the BIM.

THE BIM SECTORS

As it is clear by now, the Building Information Modeling (BIM) applies not only to buildings, but to all the processes and stages of construction. In order to better identify the sectors, a subdivision was made that also aids in understanding the BIM's extensions. The following list is by no means exhaustive, but contains only the major sectors, which are:

BIM for Architecture: design of buildings.

BIM for Structure: structural design.

BIM for Infrastructure: design of roads, highways, railways, bridges, tunnels, mines, aqueducts, sewer systems, etc.

BIM for Landscape Architecture: design of external areas and territory modeling.

BIM for Land Surveying: topography, land survey.

BIM for MEP: design of mechanical, electrical and plumbing services.

All these types of BIMs should not be considered as separate entities; a complete BIM is created by collaboration, communication, and sharing of information between the different BIM sectors.

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THE BIM DIMENSIONS

The BIM dimensions refer to the types of information that can be managed, and are the following:

3D BIM: geometrical models in 3 dimensions. Allows visualizations, interference detection, and various types of analysis.

4D BIM: adds the management of "time" to the 3D geometrical models. Allows the geometry to be linked to the time information in order to manage the phases or sequences.

5D BIM: adds the management of "cost" to the previous four dimensions. Used to connect the geometric elements and time constraints to the costs for the construction of a work.

6D BIM: adds the management of everything that relates to the sustainable development of a building, for example, energy analysis.

7D BIM: adds the management of all aspects of the work's life cycle. Generally released at the end of the construction, it contains all of the necessary information for the owner for the work's use and maintenance.

THE BIM LEVELS OF MATURITY

The BIM is divided into levels of maturity or evolution, which are:

Level 0: 2D geometric models, no CAD management, data exchange through printed documents (paper or electronic). This level is not BIM.

Level 1: use of 2D or 3D CAD with a collaborative tool, providing a common data environment with a standardized approach regarding the data's structure and format. The commercial data is managed by other financial and cost management softwares, without their integration.

Level 2: use of 3D environments with management of additional annexed "BIM" information (material, suppliers, etc.). This data will then be managed by an external software. The data is transferred through dedicated interfaces (non-standard). This level can use and integrate the management of 4D and 5D information.

Level 3: a fully integrated collaborative process, enabled for web services and compatible with standard services. This level of BIM will use 4D, 5D, and 6D information.

There is also a level 4, where the entire BIM is managed in a Cloud.

The BIM and European legislation

In the course of 2016, the use of BIM in Europe will become mandatory. But what level of BIM is required?

For the moment, also as a function of the standards available, level 2 will be required, i.e. all projects will be coordinated with software that manage information models and information will be shared, where possible, with the standard formats that are already available. Where these formats haven't been defined, they will adopt other "common" or "familiar" formats, but especially open, with the aim of sharing, collaborating, and communicating.

.... to be continued...