Certification Systems for Green Buildings in Romania – LEED, BREEAM, Green Homes & the importance of BIM interdisciplinary collaboration in order to achieve energy-efficient projects

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Abstract. The presentation at this conference will focus on the description of mandatory and optional criteria for obtaining LEED and BREEAM international certifications for green buildings. At the same time, recent research will be presented in the field of green building evaluation and market trends, the benefits of these certifications for the beneficiary, investor and developer, occupancy rates, land value for green buildings and the costs and risks of including a building within sustainable initiatives. A breakdown of legislative requirements and incentives for sustainable construction by the Government will be presented. Subsequently, relevant case studies from Romania in the residential and office buildings that are certified or under certification will be detailed in order to present the constructive details used to obtain this recognition on the market.

We are living in a world of fast technological advances that create a dichotomy of effects. On one hand, they enhance the quality of life through innovation, performance and effectiveness and at the same time their significant impact alters the natural surrounding we live in through a high demand of energy consumption. Over the years, several studies have been developed by scholars and professionals who thought of transforming the urban conglomerates into self-sustainable low emission green hubs that intend to benefit the planet on the long term, as well as to protect the natural resources and the way people conduct their daily lives.

Sustainability defines a way of life and work, not just a mere concept of energy efficient architectural features. We need to think of new ways of adapting to the new and emerging ways of working both collectively and from more of an individualistic approach through the use of technology. The visions for the emerging utopian cities of the future must address sustainability. These design strategies will manage to mitigate the toxic by-products of our consumption habits, while maximizing our use of sustainable energy sources. Meeting these challenges means more deeply integrating green technologies like wind and solar power, natural climate controls and space-age materials into the building processes.

Past and current and most up-to-date technologies and strategies are meant to improve the way people design spaces in order to be more eco-friendly, to ultimately improve the users' quality of life, as well as the natural habitats. The research can be extended in order to provide further solutions which could be incorporated into all types of construction, at no high costs.

Integrative approach of design is one aspect of sustainability that has the possibility of diluting the boundaries between clear delineations of professions within the construction world and creating a common language which ultimately has the scope of altering and improving the human condition and the quality of life. These aspects are interconnected and it is up to us to create the bounding vocabulary.

The digital technology is adapting to the permanently diversification and specialization, characteristics of the present environment, and it is not hard to understand that the specialist knows "more and more about less and less". Multidisciplinary approach comes with subspecialties, and may conduct to fragmentation effects or overlap and duplication of information. There is a limitation of information that can be assimilated and constructively processed in traditional informatics systems in design. How could it be checked and controlled such an information system? The current encounters are the efficient and effective coordination, correlation and synergy between the different fields of all multidisciplinary factors involved, integrating categories and methods taken from different disciplines such as: engineering of constructions, installations, legislation, urbanism, related standards, etc.

A hubbub of the information may lead to disruption effects and requires an integrative approach for counteract. Building Information Modelling (BIM)

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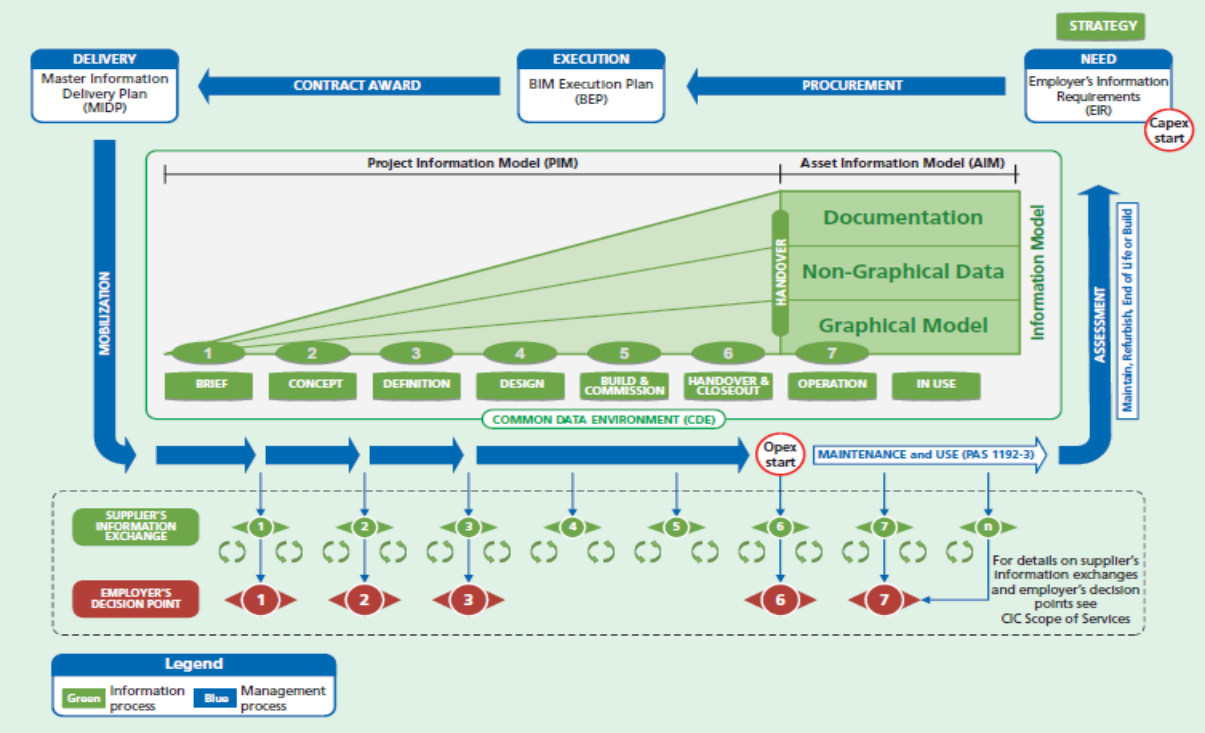
technology may represent the turning point on the path to digitization.

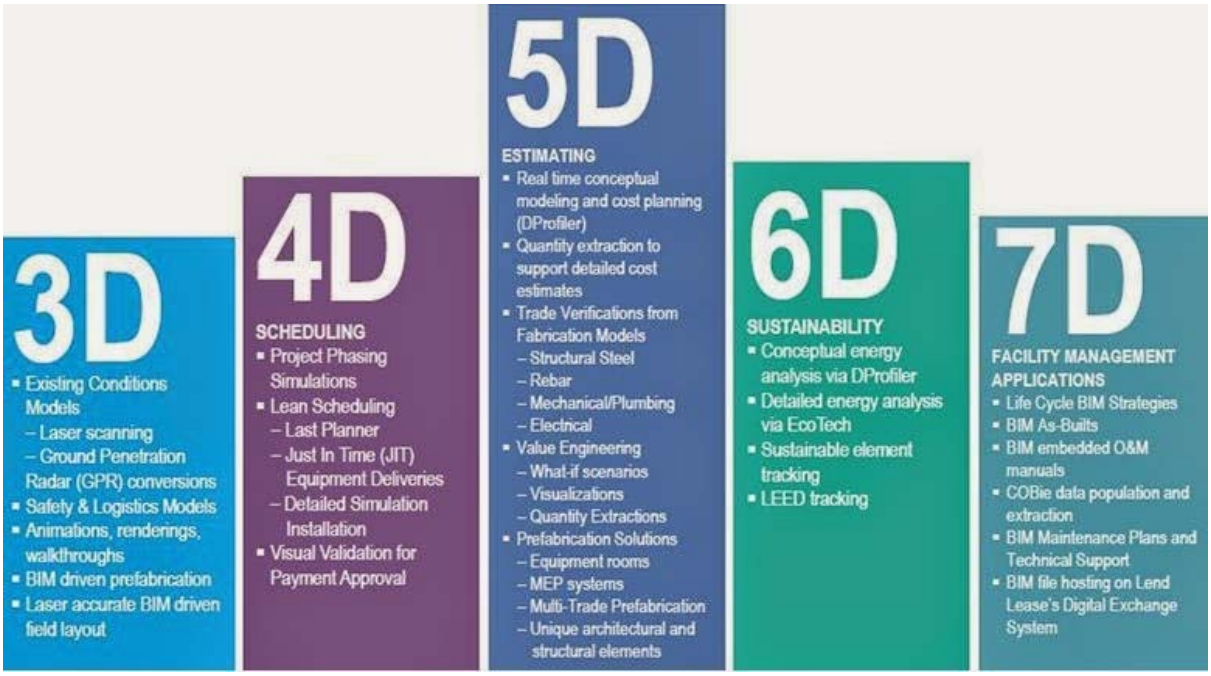
The control comes with the effective multi-D management. Assessing BIM's potential, from the

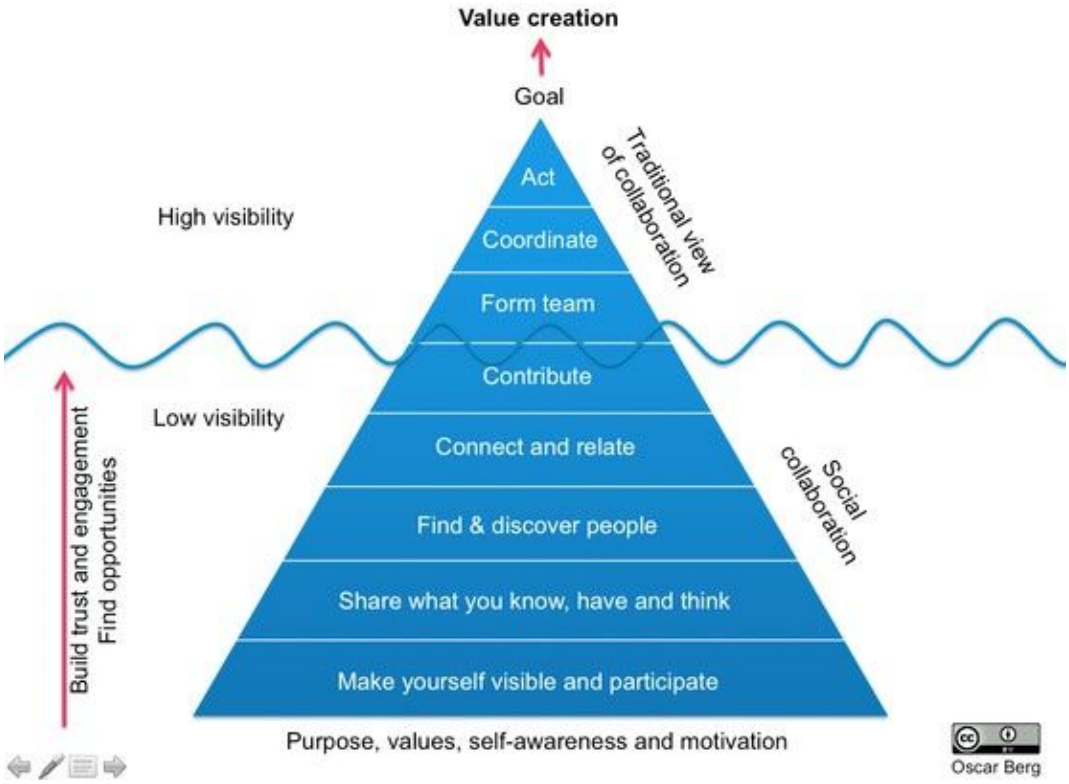


It's important to remark that BIM offers a greater freedom in the manipulation of the content than its predecessor, CAD, computer-aided design, used since the early 1960s. With BIM, users can generate 3D views instantly, create digital representations of physical places and objects and share those designs for collaboration. The project information is accessible throughout the entire construction lifecycle to more effectively plan and build physical infrastructure and more control of it.

perspective of impact on building materials, contractors, building operations and facility management is dealing with BIM adoption and furthermore the different levels of adoption with great impact on people and training needs, on standards and standard object dictionary. Roland Berger believes BIM could be the most disruptive digital instrument in the industry.

Some countries have already announced or plan to announce government mandates for obligatory use of BIM in the public sector. How Romania prepares for this





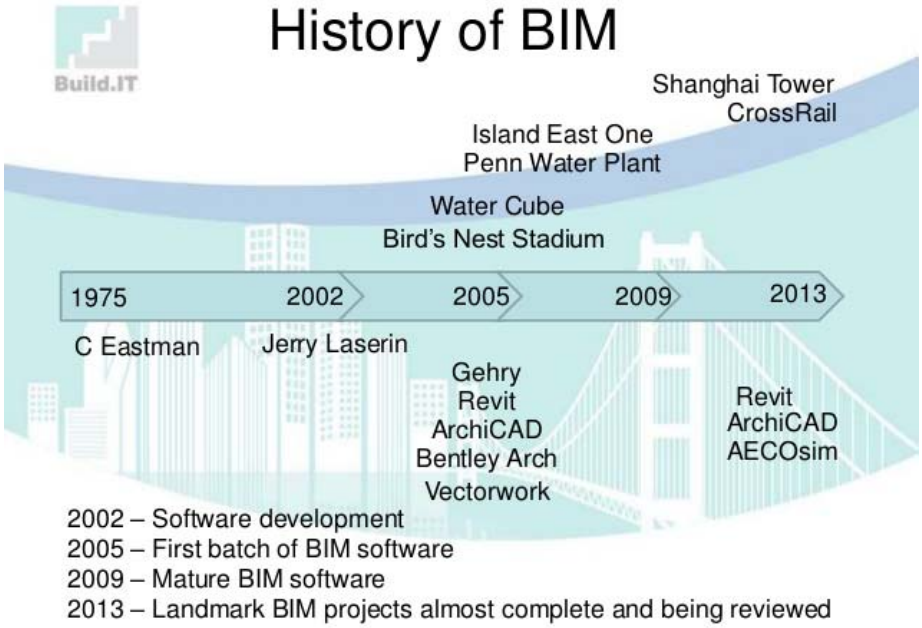
change is a topical issue in debate.

Because the times lead us here, being aware of the context of digitized technologies and diversification.

And since this goal would have been reached, the information held could be further used by operators, customers, and valued. A plus of value that can generate opportunities by use.

The concept of BIM has existed since the 1970s. (September 1974). An Outline of the Building Derscription System. Institute of Physical Planning, Carnegie-Mellon University).

The term 'building model' (in the sense of BIM as used today) was first used in papers in the mid-1980s: in a 1985 paper by Simon Ruffle eventually published in 1986 (Ruffle S. (1986) "Architectural design exposed:



(Eastman, Charles; Fisher, David; Lafue, Gilles; Lividini, Joseph; Stoker, Douglas; Yessios, Christos

from computer-aided-drawing to computer-aided-design" Environments and Planning B: Planning and

Design 1986 March 7 pp 385-389) and later in a 1986 paper by Robert Aish (Aish, R. (1986) "Building Modelling: The Key to Integrated Construction CAD" CIB 5th International Symposium on the Use of Computers for Environmental Engineering related to Building, 7–9 July) - then at GMW Computers LTD, developer of RUCAPS software - referring to the software's use at London's Heathrow Airport (cited by Laiserin, Jerry (2008), Foreword to Eastman, C., et al (2008), op cit, p.xii), (Really Universal Computer Aided Production System was a CAD system for architects, first developed during the 1970s and 1980s, and today credited as a forerunner of BIM. It ran on minicomputers. The term 'Building Information Model' first appeared in a 1992 paper by G.A. van Nederveen and F. P. Tolman (Van Nederveen, G.A.; Tolman, F.P. (1992). "Modelling multiple views on buildings". Automation in Construction. 1 (3): 215–24.)
10 years later it became popularly. In 2002, Autodesk released a white paper entitled "Building Information Modeling," (Autodesk (2002). Building Information Modeling. San Rafael, CA, Autodesk, Inc.) and other software vendors also started to assert their involvement in the field. Bentley Systems and Graphisoft, industry observers, Jerry Laiserin helped popularize and standardize the term as a common name for the digital representation of the building process (Laiserin, J. (2003) "The BIM Page", The Laiserin Letter.). Facilitating exchange and interoperability of information in digital format had previously been offered under differing terminology by Graphisoft as "Virtual Building", Bentley Systems as "Integrated Project Models", and by Autodesk or Vectorworks as "Building Information Modeling".
Laiserin and UK's Royal Academy of Engineering recognize RUCAPS, Sonata and Reflex as pioneers among applications.
As Graphisoft had been developing such solutions for longer than its competitors, Laiserin regarded its ArchiCAD as then "one of the most mature BIM solutions on the market. (Laiserin, J. (2003) "Graphisoft on BIM", The Laiserin Letter, January 20, 2003)" Following its launch in 1987, ArchiCAD became regarded by some as the first implementation of as it was the first CAD product on a personal computer able to create both 2D and 3D geometry, as well as the first commercial BIM product for personal computers.
ArchiCAD has made substantial gains in user base from 2007-2011.
Meantime, by 2000's, "Revit" was written in C++ and utilizing a parametric change engine by Charles River

Software in Cambridge, MA, purchased by Autodesk in 2002.
Revit revolutionized the world of BIM, allowing a 'fourth-dimension' of time to be associated with the building model.
Making a leap in time, there is not hard to notice the tide competition between the developers of softwares for creating BIM platforms, towards a collaborative architecture, influenced by sustainable design, trends in human computer interaction, augmented reality, cloud computing, parametric and generative design, virtual design and construction.

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