



ORIGINAL RESEARCH PAPER

Architecture

COMBINATIVE ESSENCE OF BUILDING INTELLIGENCE FOR INTELLIGENT BUILDING

KEY WORDS: Office Automation, Quality, Post-occupancy Study, User Connectivity, Building Connectivity, Building Self-recognition, Spatiality, Building Kinesthetic, Building Logic, Building Automation, Indoor Air, Energy Efficiency, Business Travelling,

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ABSTRACT

This research paper is based upon what building intelligence for the purpose of creating a critic for BIF (Building Intelligence Framework). Looking into the domain of interior design, the "Intelligent Interior Design System", a prototype of a combined natural language acts as its Centre. One cannot find a universal definition as to what intelligent building concept is, but still little evidences show an idea about the concept in context to the quality of the building. The intelligent building concepts state the intelligent buildings and not the core of the intelligence of the building system. The paper tries to define building intelligence called the Building Intelligence (BI) on the fact that human innovations in the technology can implant intelligence into a nonliving structure to make it living. The IBs concept lists many elements that can be incorporated to add towards the quality of the building and the built environment. The design process applied such to adapt for the application of IBs concept elements will result in overall good intelligent working environment. Thus, to bring the existence of the IBs, the application of the IB concept factors and quality of the intelligent subsystem must be assured, for a target environment.

INTRODUCTION

The starting of intelligent building marked from the latter half of 1980s from Finland. New design ideas, new structures and spatial solutions were created in the RTD (Resistance Temperature Detector) work of the intelligent buildings where The Finnish building sector participated actively. The economic recession was a setback to the progress of intelligent building and an actual crisis of the Finnish property management business began in 1922. The Intelligent Buildings Survey (the IBs Survey) research project took place which was the first boom of IBs then. The IBs system was growing at a faster rate as compared to the intelligent building projects.

INTELLIGENT BUILDING CONCEPTS

An intelligent building is one which provides a productive and cost effective environment through the optimization of its four basic elements and systems, structure, services, management and the inter-relationship between them. The main objective of the Intelligent buildings is to help property managers, building owners and occupants realize their goals. It focuses on key areas like cost, comfort, convenience, safety, longterm flexibility, and marketability. There is no threshold past for intelligence, which a building may pass or fails. Optimal building intelligence is finding the right permutation and combination for the needs of occupants and presenting it as one solution to the whole. A structured design accommodating change in convenient and cost effective manner is the only element common to all the intelligent buildings. The European Intelligent Building Group (Anon. 2001g, Lehto 1998a) gave its definition at the end of the 90's: "An intelligent building creates an environment that allows organisations to achieve their business objectives and maximizes the effectiveness of its occupants, while at the same time allowing efficient management of resources with minimum life-time costs." The latest IB concept described by European Intelligent Building Group's is (Kell 2001) as follows: "Assessed in terms of performance not technology. Incorporates the best available concepts, materials, systems and technologies and integrates these to achieve a building which meets the performance requirements of the building's stakeholders. Stakeholders include owners, managers & users, as well as local and global community.

An intelligent building focuses to provide a comfortable and productive environment through automated control systems such as: heating, ventilation, air-conditions (HVAC): fire safety: security: and energy/lighting management to its occupants. The control systems interact with each other and are sync to work in an integrated manner. For example, in case of fire, the fire alarm communicates with the security system to unlock the doors. In turn, the security system communicates with the HVAC system to regulate the dampers to stop the fume and smoke from spreading. Intelligent building scope is expanded to telecommunications and control services also via cabling and management system that meets all the challenges and demands of the market.

The common factors of the different intelligent building concepts can be summarized as follows:

- IBs provide possibility to maximum performance of the stakeholders with an effective and productive environment.
- The stakeholders are: local and global community, real estate developers and providers, building managers, architects, building purchasers, building owners, speculators, occupants or tenants and other end-users.
- The needs of the occupants are dominant in the terms of performance of the building, which puts the emphasis on efficacy
- The performance will be gained in a cost effective manner with minimum life-time costs.
- The management of resources efficient and sustainability should be respected.
- The performance needs will be met by integrating the best available concepts, materials, systems and technologies, architecture and structures.
- The performance can be evaluated by factors like flexibility and utilization of space, movable space elements and equipment, life cycle costing, comfort, convenience, safety and security, working efficiency, image of high technology, culture, construction process and structure, long term flexibility, and marketability, information intensity, interaction, service-orientation, ability of promoting health (therapeutic), adaptability, reliability (stable and accurate), and productivity (profitability) at correctness of basic technical solutions.

THE FACTORS OF INTELLIGENT BUILDING CONCEPTS:

End-user need orientation	Ability to promote health (therapeutic)
Level of integration	Convenience
Environmental friendliness	Adaptability
Space flexibility and utilization	Safety and security
Movable space elements and equipment	Reliability (stable and accurate)
Life cycle costing	Working efficiency
Service-orientation	Productivity (profitability)
Comfort	Image of high technology
The correctness of basic technical solutions	Culture

DIFFERENCE BETWEEN THE INTELLIGENT BUILDING CONCEPTS AND BUILDING INTELLIGENCE-

The separation or identification of the intelligent building could follow from the building intelligence, which human intelligence has lent to it. The definitions of the human intelligence can be kept as models for the building intelligence. The core of the essence of the building intelligence is something different than what the IB concepts are saying about the Ibs.

Building intelligence, which is based on the human tendency of

fabrication - lending human intelligence to the building encourages deriving the essence of the IB concepts -the building intelligence ñ from the forms of human intelligence defined by Gardner with such components as:

- Building connectivity
- Building self-recognition
- Spatiality
- Building kinesthetic
- Building logic

These components forming the building intelligence are called the Building Intelligence (BI). The IBs have been built according to the IB concepts, which do not include defined explicit information of building intelligence, but the correlation between the factors of the IB concepts and the BI can be found. The forms of BI are related to the factors of the IB concepts as follows: building connectivity is related to culture and interaction; building self-recognition is related to information intensity; building kinaesthetics to space flexibility and utilisation, movable space elements and equipment to long term flexibility and adaptability; 461 building logic is related to level of integration, reliability (stable sand accurate) and correctness of basic technical solutions. The spatiality has no articulation among the IB concepts.

In other words the definition of the building intelligence can be presented mathematically as follows Equation 18. $BI = f(bi_1 \dots bi_5)$ where bi_i is the form of the BI and they are: bi_1 is building connectivity, bi_2 is building self-recognition, bi_3 is spatiality, bi_4 is building kina esthetics, and bi_5 is building logic.

CONCLUSION

So, as of now we have talked about the wisdom of the building at par to human intelligence. The mental skills of humans have started to be under growing interest in the sciences. It is clear that the next step towards a more responsive building design, R&D, and construction will emerge with the skill of not only human intelligence but the knowledge of all human mental qualifications into a building. In clear words, humans analyses their logical part of the body and lend the knowledge of that structure to the building. For example: Inter-office communication network resembles human nerve systems or, in some cases, the wireless technology could even be considered to resemble human mental bodies. The connection of inter-building services resembles the connectivity of human body parts. To the human intrapersonal intelligence belongs the human ability of spatial instinct.

The human mind senses colors, materials, scenery, interior designs, room temperature, measures etc. Afterwards, the data is processed and a person forms his/her own opinion regarding the space, about its quality and comfortability. The analysis is based on his feelings, personal experience, instinct etc. The ever developing architecture has to do with this phenomenon. It is impossible to argue anything about this, because the term spatial instinct is a word for subjective conversation without a scientific meaning. The Intelligence of a building is originated from the use of intelligence with instinct. It was also interesting to find out from the results of the IBs Survey that although the architectural paradigm includes the idea of human scale in building, still the massive and tall buildings could be more attractive to the end-users than the smaller ones in certain conditions. The BIF is the interplay between the built environment in the intelligent buildings and the human intelligence.

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