Intelligent infrastructure& its reflection in interior spaces creativity

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Research Summary:
Changes in technology, behavior, and expectations are converging in the built environment, creating opportunity, demanding new architecture, and challenging us to figure out how to provide it. In the era of the intelligent infrastructure, the new creative ideas for the interior design are needed. So it will allow to create the new digital society and preserve the resources for the future generations.

Aim of the research:
We would like to find the way, in which the intelligent infrastructure of the future is connected the creativity. It is vital, it is to make the relations between these two parallels and predict the future co-operation.

Search Results:
New technologies can resolve the conflict between the freedom and interactivity of the design process and the static environments the process generates. It is becoming possible for buildings to change more efficiently and gracefully. Materials are becoming less rigid. Infrastructures are becoming more modular, consequently more suited for change. And control has the potential to be distributed in ways that allow design processes to become a part of the use and operation of a building.

Find recommendations:
The development and application of this technology requires innovation in all aspects of building design, construction, operation, and use. We believe this innovation in programmability is the pathway to sustainability in the built environment. The programmable environment recognizes the generative potential of digital technology to create both form and compelling experiences. Digital technology must become an intrinsic component of the built environment, permeating the building and transforming its architecture from a design result into a design medium.

INTRODUCTION:

"We shape our buildings, and afterwards our buildings shape us."
Winston Churchill, 1943[17]

The environment and the design of the buildings have undergone dramatic changes during the last number of decades as society makes the transition from an industrial age to an information age. In the wake of this new work styles, locations and pattern are underpinning the changes being experienced in the design of intelligent buildings today, giving rise to a better connected, more competitive and increasingly complex of environment. Some features of this era are the emerging trend of knowledge and creativity; the changing demand for the sustainable and energy preserving buildings; and the increased number of mobile users.

Technology is the most important factor influencing and enabling the scale of change within our life. Today's buildings serve their purposes through complex combinations of the passive capabilities of structure and skin, the dynamic capabilities of mechanical and electrical systems and appliances, and the sensing, processing, and control capabilities of computational devices and networks. The addition of electronic intelligence generally enhances the versatility of interiors, allows them to adapt more effectively to changes in occupant requirements and exterior conditions, and makes them more efficient consumers of resources. As the necessary technologies continue to develop, and as designers learn to make effective use of them, intelligent systems will become an increasingly crucial concern of interior design, a more and more dominant cost element in construction and fit-out, and a fundamental determinant of client and user satisfaction.

1. The evolution of the term "creativity". The meaning of the creativity. The word "creativity" has become a modern mantra and is seen by many as a panacea for a wide range of problems. Interpretations of what creativity is range from the power of god to create matter and life, through the inspired artist or scientist such as Bach or Einstein to an individual's craft skill or ability to reorganize an interior layout. As a concept, "creativity" may have become so broad as to be completely devalued [13].Yet creativity involving the manifestation of new ideas, concepts, processes, artefacts or new understanding is important to individuals, communities and our society as a whole. In many ways, it is indefinable yet with describable attributes. However, what is it fundamentally and why do we as humans value it so much? Arnheim argued that from psychologist's point of view one needed to decide if creativity is more of "an instinct or a reflex". If instinctive, creativity, is essentially a gift of the gods which causes the creative person to feel, impelled to search the world for subjects about which to be inventive, formative, scientific or poetical.' If a reflex, creativity is a possible form of reaction for people who are 'born into the world full of invitations to act' where there are 'mysteries and problems, challenges, threats and opportunities'. In such a world, he sees that we are 'driven' by 'our own interest to explore, understand' the potential around us [1]. As we are social creatures, some forms of creativity are seen as having more value than others have, but these value judgments are dependent on both the context and the dominant values of the society or section of society that is making those judgments. Negus and [2, 13] see originality as being a key element of creativity,

something that is still prized in our society. However, not all creative endeavors are successful and it is perhaps a willingness to risk failure that is a key feature of the creative process. As such, this poses a severe problem for its inclusion in our increasingly 'risk averse' society

Bohm sees the creative process as arising from a creative state of mind which is,"…one whose interest in what is being done is wholehearted and total, like that of a young child. With this spirit it is always open to learning what is new, to perceiving new differences and new similarities, leading to new orders and structures, rather than tending to impose familiar orders and structures in the field of what is seen" [2]. Perception is at the heart of this process but this is not the day-to-day recognition process of the mind judging against its known patterns. It is a form of seeing through what artists would call the 'veils of perception' so one is capable of seeing afresh, which Bohm and Krishnamurti [2, 7], say requires one to be attentive, alert, sensitive and aware. To engage in creative inquiry, one must therefore put oneself in a creative state of mind that is open to new possibilities. This can only be achieved if one is aware of the ways in which the mind creates, what many psychologists and philosophers call the 'veils of perception'. These 'spectacles of memory' [9] filter new experiences and ideas through our existing knowledge, values, beliefs and one needs to become aware of, and learn to suspend such judgmental thought processes in order to be open to new possibilities.

Above all, the rationale of creativity is to make new meaning manifest either in the form of transforming one's own or others understanding or creating a new object, idea or process. This may require a sort of mental balancing act between the openness to the new and the employment of disciplinary skills with which to capture and develop the new meaning. For example, for an artist who develops her ideas of something seen and felt, there is a dialogue through the medium with the object/image being created. There are skills needed in the use of materials and judgments about line, tone, form, composition etc., and how the emerging work successfully captures the idea, but these have to be suborned to serve the process and allow the new to emerge and not stifle it.

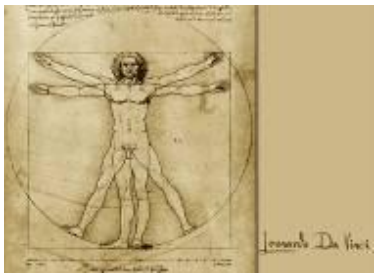
The models of creativity expressed above are similar to the observations of the physicist [2] who sees creativity as dependent on perception and being able to recognize something new, which requires a state of mind which is 'attentive, alert, aware and sensitive' and which does not impose existing preconceptions. This is also very similar to the state which the educationalist Mezirow [10] says is necessary for transformational learning to take place in which a person may have to abandon or modify their values and beliefs in order to accommodate their new experience and to create a new meaning.

Bohm sees creativity as potentially opening the way to transform the individual, saying that, "the being of ourselves is meaning; the being of society is meaning [therefore] a change of meaning is a change of being" [2, 15]. Both Bohm and Mezirow speak of the transformational process of making new meaning, the core human activity of change and development, which is ultimately what the creative process facilitates in the creation of new forms, knowledge, understanding and processes. There is no one, right, regarding the definition of creativity but it is important that we understand the different meanings inherent in the use of the term creativity, the variety of ways its use can be encouraged and engaged in the learning process and the moral and ethical issues refatting in its uses. The process of change, creation and re-creation is the natural order of the universe.

In the figure 1, we have represented the evolution of the creativity, from being as an "act of God" to "the mankind creation"

In western civilization the idea of creativity starts as a literal 'act of god' and is aligned with the power of bringing the universe into being, the ultimate act of creation - 'let there be light'!

As early as 1490, Leonardo Da Vinci's famous drawing of a man in a circle and square illustrating human proportions, placed mankind at the center of circle , and fitting those pure geometric and mathematical forms.



The rise of the importance of the 'individual' in society developed during the renaissance alongside a rapid expansion of knowledge and what could be termed creative acts in the arts and sciences. Creativity was explained as god inspired acts of man. Michelangelo painted the giving of life by God to man in the Sistine Chapel

By the end of the 19th century the transition of creativity from god to man was complete when Nietzsche (1969ed) wrote in 'Thus Spoke Zarathustra' that 'God is Dead' and man/woman is the centre of their own universe and can therefore, by inference, all be creative.

Work by Kepler, Galileo and Newton began to transform the way our world was understood and with this developed the technology and the philosophies which supported the taming of nature to mankind's ends.

As, during the 20th century, women, through the suffragette and feminist movements have struggled for and claimed equity in society with men, so they challenged the romantic notion of the 'male genius creator'. Definitions of creativity became more inclusive, accepting community as well as individual activity. However, the century has also seen the trivialization of creativity as mere novelty. This and the sublimation of the individual as a consumer in the global economy have arguably led to the devaluation of creativity as a mere tool for economic ends.

Western civilization — **The end of 15th century** — **The end of 19th century** — **Beginning of 19th**

Figure 1: The evolution of the term "creativity" and how human kind view it. Source: [adapted by the author from 1, 2].

2. What is the "Intelligent Infrastructure"? "Intelligent infrastructure" or "smart infrastructure" is the application of technology to deliver a more effective and efficient infrastructure service. It uses a layer of technologies, which can be embedded in the design of new infrastructure or applied to existing infrastructure [4].

While the ability to apply technology to infrastructure assets has existed for some time, rapid advancements in sensor, communications and analytical technologies mean that intelligent infrastructure is a relatively new phenomenon. Research, development and deployment of smart technologies are ongoing in a wide range of infrastructures. Across the world policymakers, infrastructure providers, researchers and enterprises are working to develop solutions that use advanced technologies to address infrastructure challenges in more efficient ways. It is not surprising, however, that infrastructure solutions usually emerge in response to a particular issue or deficit faced by a country or region. Mostly, the successful intelligence infrastructure consist from the following actions:

- Improve Public Finances;

- Ø Improve the Competitiveness;
- Ø Improve business productivity and create new business opportunities [14].

A range of factors are driving interest and enterprise opportunities in intelligent infrastructure both domestically and internationally:

- Technological change: Developments in technology such as new computer models, algorithms and improved sensor technologies have increased the potential and reduced the costs of intelligent applications for infrastructure;
- Environmental considerations: Environmental pressures domestically and internationally are increasing the need to use technology to reduce water and energy usage, improve water quality, increase the use of renewable energies and develop less carbon-intensive transport systems;
- Population pressures: Globally, rising populations and increasing urbanization are placing increased pressure on infrastructure systems (such as electricity grids) and resources (such as water) which are driving global enterprise opportunities;
- International and domestic policies: A range of international and domestic policies are increasingly incorporating intelligent solutions. For example, intelligent infrastructure has a role to play in delivering on the EU 2020 Strategy priorities of "smart, sustainable and inclusive growth". Domestically, the Government's should focus on identifying opportunities for sustainable economic growth and job creation ,the need to improve national competitiveness through reducing business costs and improving productivity are also acting as policy drivers [3];

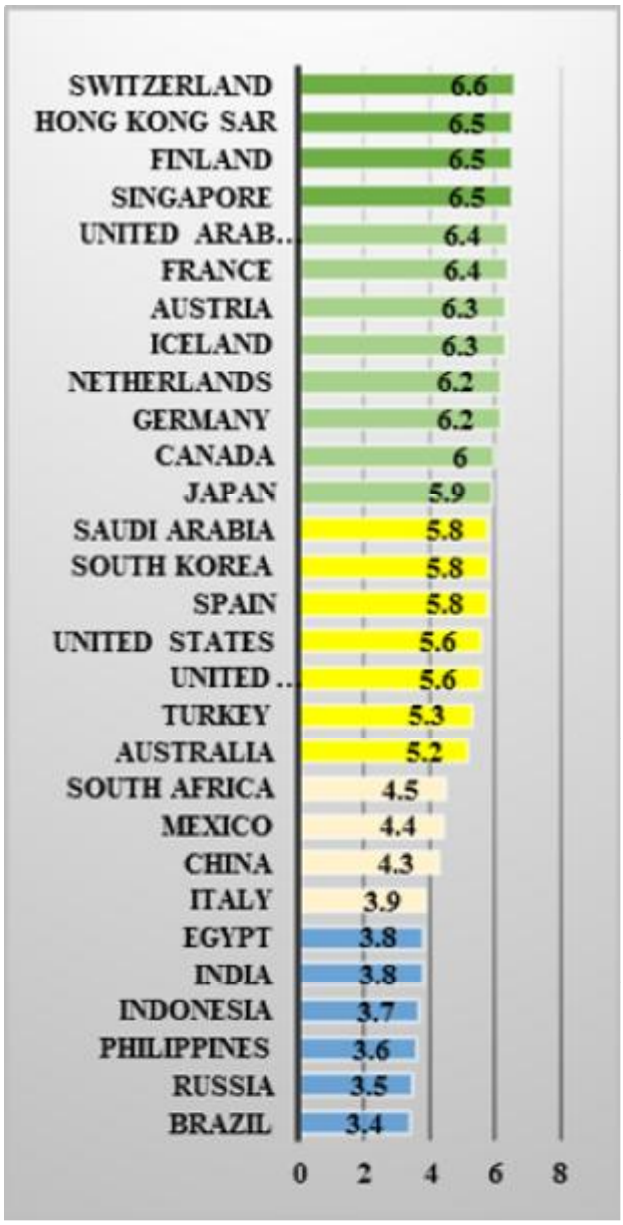


Figure 2: Business Executives Rate. The Quality of Infrastructure. Assessment of the quality of transport, telecommunications, and energy infrastructure on a scale of 1 to 7. Source: [adapted by author from 4, 25].

- Customer expectations and preferences: As shown by the growth in the use of smart phones, consumers are increasingly demanding new smart technologies and solutions [6].

All these factors influence the way the design of the buildings are changing, according to the environment tendency, new waves in the technology and human needs and desires.

We are about 10 years into a process through which the global economy is moving inexorably towards a multi-dimensional digital economy. As shown in Figure 3, this shift seems to be associated with the kinds of increases in productivity historically associated with other great infrastructural innovations. However, there are also signs that we have reached a critical level of usage and complexity, indicating that, as in the past, there will be a need for significant innovation in intelligent infrastructure[4]. We have seen usage of both the telecommunications and Internet networks increase at least a hundredfold in just the past few years, resulting in a dramatic and often unforeseen impact on society and the economy. These trends have been accompanied by a massive increase in complexity, driven by:

- An increased, global demand requiring increases in scale
- The use of digital infrastructures for increasingly critical economic applications
- The convergence of predecessor infrastructures
- A host of new security and regulatory concerns

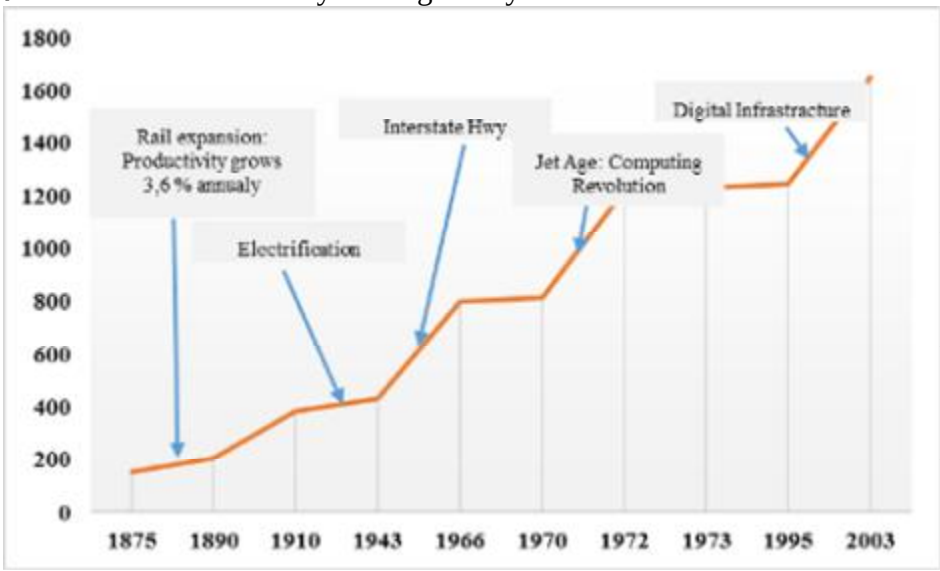


Figure 3: U.S. Labor productivity: 1870 – 2003. Source: [12]

If the past is any guide, for commerce and communications to reach their full potential, we must continuously strive to mitigate complexity through intelligent infrastructures. These infrastructures should support and enhance technology so it can enable people to find, connect, secure, and transact across today's complex global networks

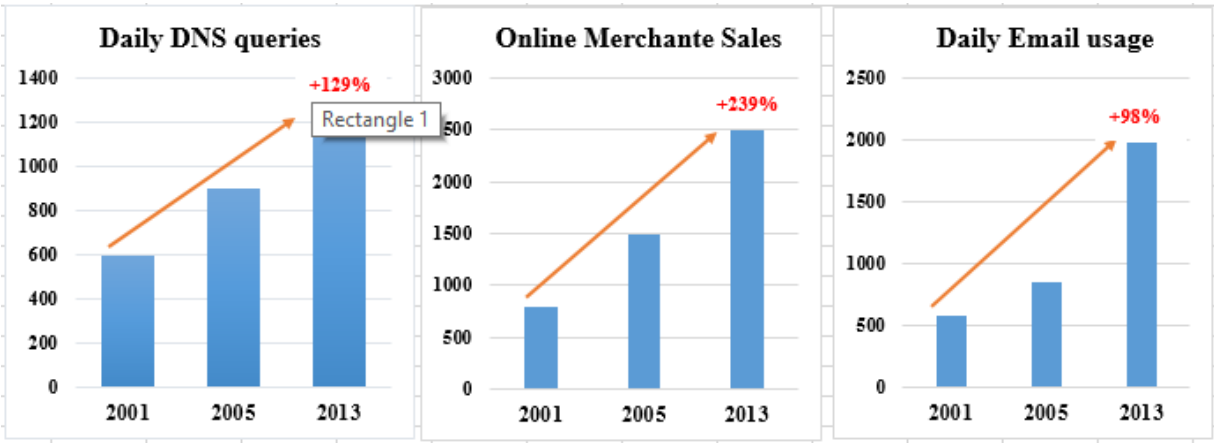


Figure 4: The growth of the online commerce and online communication due to the development of technologies. Source: [25]

We are at that inflection point- we can even say, in that "critical time" - where without some intelligence, infrastructures that have been built and deployed, such as the Internet, cellular networks, or cable networks, are at risk of being swamped. While demand and adoption of technology grow at a blistering pace, security threats, inadequate capacity, and regulatory uncertainty stand as obstacles in the way of innovation. Now is the time for the technology industry to find its implementation in the interior and intelligent buildings, to use the heritage from the centuries and the development in order to preserve the infrastructure If history is any guide, this new intelligent infrastructure will not just mitigate cost, compliance, and complexity, but provide an impetus for untold economic and societal progress that will far eclipse the growth that we have seen thus far. However, to build the new society, to make the creative space and environment the resources and the wise usage of the capital is needed. In the next section, we will present the short review of the successful usage of the capitals available.

3. The review of the main tools needed to build the intelligent infrastructure.

The society needs new perspectives of cities, their dreams, knowledge, creativity, and motivation in order to find new ways to develop strategic city management. Therefore the dialogue should be conducted with leaders in cities as a tool for strategic development and knowledge sharing, resulting in added value for people in cities, organizations or companies

In order to develop and in some cases transform the capabilities of the city in line with the dynamic global environment in which they operate, there is a number of challenges that should be overcome. The most important one is internally managing three capitals in particular [16]:

- People;
- Property;
- Processes.

- People Without the services of motivated, skilled and well-managed people,the city will flounder regardless of the quality of their vision and ambitions. Good practice in people management falls into three key categories:
- Investment: People require careful management and significant investment in training and development. Cities need to ensure that employees have the right skills to manage new programs and new ways of delivering services. Without these, people employed by the city become a "wasting asset", with dire consequences for city services.
- Efficiency: Human resource (HR) processes need to be efficient, both in terms of costs and responsiveness. Line managers need to take direct responsibility for people management, with central HR providing a strategic and advisory role. Cities have to be responsive to change, and this means that they must have swift and efficient recruitment processes and they also need to have the right redeployment / redundancy processes. Four possible approaches to people management are presented in figure 5 below:

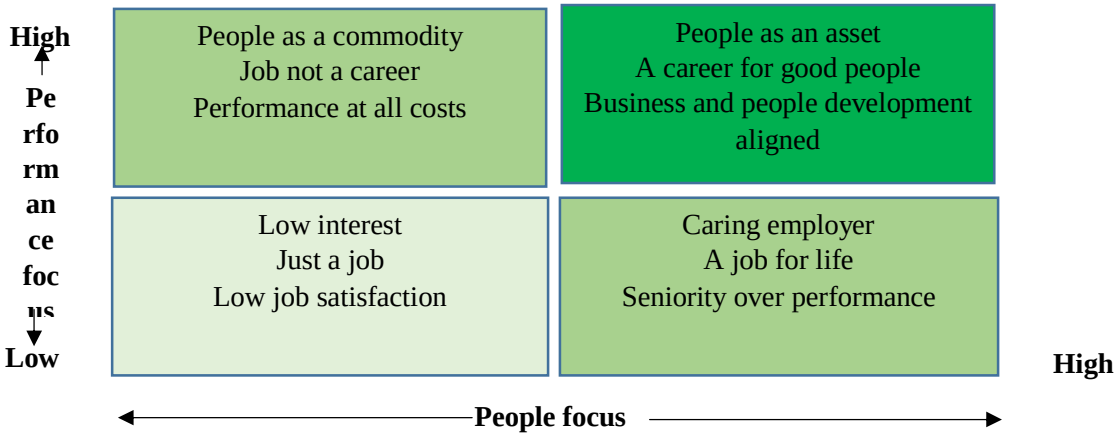


Figure 5: four possible approaches to people management. Source: [16]

A city's intellectual capital is a combination of its human and organizational capitals. In the knowledge economy, human capital represents one of the most important sources of value. It provides knowledge, creativity and the ability to innovate. Organizational capital refers to all nonhuman stocks of knowledge embedded in hardware, software, databases and the concepts and values, organizational structures and guiding principles of organizations or companies that support people's everyday work [4].

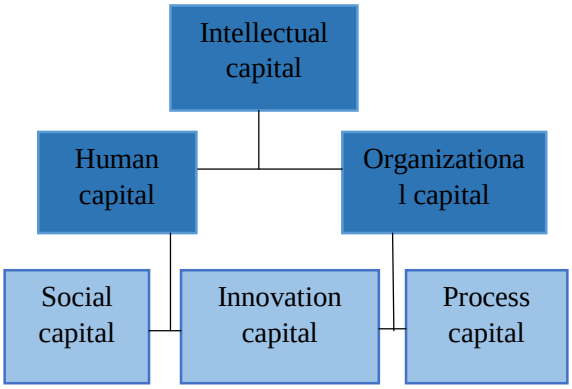


Figure 6: The combination of the capitals needed to create the intelligent society. Source: [4].

The concentration of activity within cities places an enormous burden on the local environment. Governments face competing demands to provide:

- Easy access to the workplace – a high quality infrastructure network for both public and private transport;
- A clean, green, safe and attractive living environment;
- High quality recreational space including parks, sports and shopping facilities as well as a vibrant cultural scene.

City governments must ensure that they balance the needs of citizens with the need to grow the local economy.

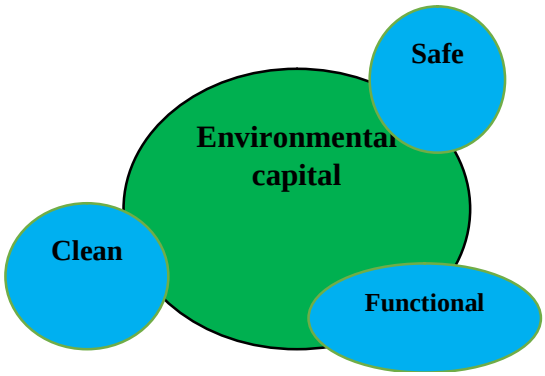


Figure 7: the elements needed for the growth of local economy. Source: [4]

Design, in the end, is about creating better things for people. Along the way, it can generate better profits as well. In the next section, we will review the practical point of the creation of the interior space for the intelligent building. Most important by the way, which the intelligent infrastructure influences on the new tendency in the interior space design. In addition, we will try to make the short summary of the exterior design intelligent architecture, as it directly influences the interior design.

4. Intelligent Interior design. The focus of interior design has shifted, over the centuries, as successive waves of technological innovation have taken effect. In the preindustrial era buildings consisted essentially of supporting skeletons and enclosing skins; interior design was mostly a matter of structure and spatial organization. With the Industrial Revolution, buildings acquired sophisticated mechanical and electrical systems—in effect, artificial physiologies; interior designers were increasingly concerned with selecting and procuring specialized equipment and with configuring machine-powered systems to support

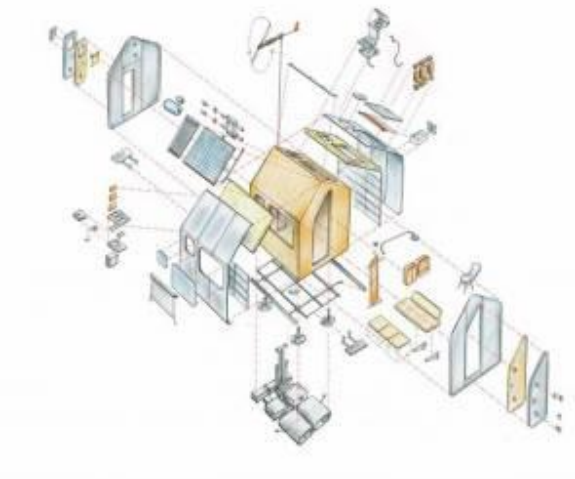


Figure 8: The scheme of Le Corbusier house, who believed a house was a 'machine for living', constructed the cabin for his own use in the 1950s in Cap Martin in the Côte d'Azur. Based on human proportions – the walls are 2.26m high, the height of a six-foot man with one arm above his head – it is for me the ultimate summerhouse. Source: [18]

specific activities. The early modernist architect Le Corbusier summarized this new condition, and the attitude he took to it, by describing a house polemically as a "machine for living in" [1]. Now, in the twenty-first century, inexpensive microelectronics, software, and increasingly pervasive digital networks are ushering in the age of intelligent interiors.

Twenty-first-century buildings are acquiring artificial nervous systems. Electronics and software are becoming important elements of interior design solutions. Moreover, designers can now think of rooms as "robots for interacting with."

4.1. To put the emerging capabilities of intelligent interiors in perspective, we will begin from a typical preindustrial building—the elementary habitation of an agricultural worker shown, in its now ruined and abandoned state, in Figure 9. It consists of a single rectangular space with doors at either end and windows on opposite sides. Its basic function was, simply, shelter. The stone walls and the corrugated iron roof provided protection from the wind and the rain, and relief from the heat of the sun. The walls mitigated extremes of heat and cold by supplying insulation, and through their thermal mass, they would heat up in the warmth of the day, then reradiate thermal energy to the interior in the cool evenings. When these passive strategies did not suffice, a fireplace produced additional heat. In addition, when it got really cold, there were blankets to huddle under. The door and window openings provided connection to the exterior, together with mechanisms for controlling the character of that connection. They could be opened and closed manually to vary the flow of air. And, through filtering mechanisms such as screens, shutters, blinds, and drapes (probably minimal in this particular case), they provided straightforward ways to manipulate qualities of interior light, view, privacy, and protection from bugs and dust.

Figure 9: The Skeleton and Skin of a Simple Building. Source: [24]

The interior was not subdivided, like a modern home, into specialized rooms. Instead, the space was adapted for different purposes at different times, through use of very simple, mostly portable furniture and equipment. There was a bed for sleeping, table and chairs for eating and reading, and a water basin for washing. The fireplace served as an elementary cooking device, and the great outdoors as a private [8].

4.2. The most obvious difference is that the more modern interior is subdivided into numerous specialized rooms for particular purposes— typically several bedrooms for different family members, living room, dining room, kitchen, bathrooms, laundry, and garage. The designer's most fundamental task is to configure these rooms in response to a program—that is, to get their sizes, proportions, interrelationships, and orientations right. Each of these rooms requires specialized furniture and machinery to support the associated

functions. So a second crucial design task is to select, specify, and procure the necessary items. Natural light from the windows is augmented by a variety of different electric light fixtures—with the specifications of these varying according to location and purpose. And there are heating and mechanical ventilation fixtures to provide active means of climate control. To keep all these specialized devices running, the house is elaborately networked with supply and removal systems. There are hot and cold water supplies and sewer connections to the kitchen, bathroom, and laundry; the plumbing plan is an important part of the design. There may be gas supply, as well. There are air supply and return ducts to all the rooms; this requires another sheet of construction drawings, and introduces another trade. And there is electrical wiring everywhere—yet another drawing and trade. All these systems require control devices, so the designer is required to select, specify, and conveniently locate these. They consist mostly of faucets and valves for the plumbing, and switches and dimmers for the electrical system. Perhaps there are some rudimentary automatic controls—thermostats for the air conditioning and timers for the lights [6].

Figure 10, 11: technological style appeared at the 20th, and became very popular until the end of century. Implementing all the features of the machine dominance. Source: [19].

Finally, the internal networks of the house are connected to large-scale utility networks. There are metered connections to water, gas, and electrical supply networks. Municipal sewer and garbage disposal systems remove waste.

Other modern building types—offices, manufacturing facilities, warehouses, retail facilities, schools, hospitals, laboratories, and so on—can be analyzed in similar ways. All consist of differentiated and specialized interior spaces, with furniture and equipment adapted specifically to the particular functions of those spaces. These spaces are tied together by internal mechanical and electrical networks, and these networks are linked to large-scale utilities. Throughout the nineteenth and twentieth centuries, as the mechanical and electrical systems of buildings became increasingly elaborate and sophisticated, they demanded growing shares of design attention (Figure 12). They also accounted for increasing proportions of construction documents, and they began to dominate construction and operating costs [5].

Figure 12: Mechanical and electrical networks have become increasingly elaborate and sophisticated in modern buildings. Source: [8].

4.3. Digitally networked Interiors. Since the late 1960s, digital networks have emerged as an increasingly important new type of interior system. Their development began with

the implementation of elementary computer networks in major business, research, and educational facilities. In their physical characteristics and space requirements, these networks are highly varied. Optical fiber may be used for the highest-speed links; this is bulky, cannot be bent around sharp corners, and—though fairly easily accommodated in special chases and trays in new construction—can be very difficult to retrofit gracefully into existing interiors. Coaxial and twisted-pair copper wiring serves for lower-speed links; this is less demanding in its requirements than fiber, but the sheer number of cables may add up to a significant space demand. Wireless networks reduce the need to run cables everywhere, but they have other limitations: they still require transceivers at closely spaced intervals, they are generally slower than the wired alternatives, and they are subject to interference problems.

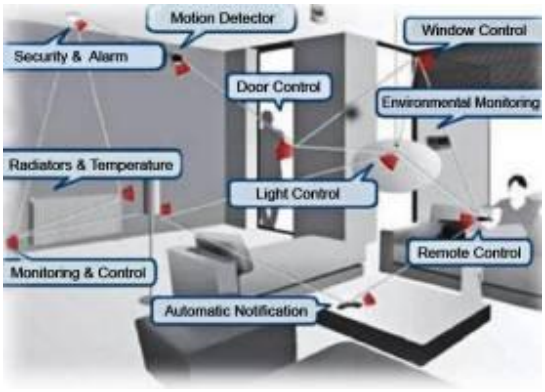


Figure 13: An example of a home with a wireless sensor network. A number of sensor nodes are installed in the house and connected via one source. Source: [25].

4.4. Intelligent Interiors. The activity that converts a merely networked building into an intelligent building is the integration of electronic sensors, robotic effectors, and control intelligence into the network so that the building can respond more effectively to changing interior requirements and external conditions. This is becoming increasingly feasible as the cost of microelectronics drops, as electronic intelligence is embedded in a widening array of devices, and as these devices are networked. Electronic sensors correspond to the eyes, ears, and other sensory organs of living organisms. Computer-connected microphones and digital cameras (particularly in the form of increasingly ubiquitous Webcams) are the most obvious. Pressure sensors not only make keyboards possible, they can also be embedded in flooring and furniture to track locations of furniture and inhabitants. Position sensors range from the mechanical and optical sensors of the PC mouse to ultrasonic and electromagnetic sensors that precisely track coordinates of objects in three-dimensional space, to Global Positioning System (GPS)-based sensors that track automobiles, boats, and airplanes. Motion sensors tell whether there is activity within a space. Electronic and optical tags and badges, together with special readers, allow objects to be identified. Climatic sensors can keep track of temperature, humidity, and air movement. Specialized chemical sensors exist in vast variety. And medical sensors—implants, bedside devices, and noninvasive sensors in the surrounding environment—can monitor your bodily

Figure 14, 15: the intelligent interior design with the home control features. Source: [25].

condition. Robotic effectors are machines that have been networked and brought under computer control; they correspond to the hands, feet, and other organisms that living organisms employ to accomplish their goals. Computer-controlled displays, printers, and audio output devices have, of course, become very familiar. Less obviously, any household device may now be thought of as a potential robotic effector. Lighting, heating and ventilating, water and sewage, cleaning, and security and safety systems of buildings may also be integrated with networks. So may actuators that operate doors, windows, and blinds or other privacy and sun-control devices. And there are innumerable specialized devices such as computer-aided design and manufacturing (CAD/CAM) production machines and surgical robots.

Control software relates the input from electronic sensors to the output from robotic effectors. In its simplest and most familiar form it specifies a fixed sequence of operations—the cycle of a dishwasher or microwave oven, for example. More advanced control software applies decision rules in order to determine appropriate responses to current conditions. Thus an air-conditioning system may respond to temperature variations by varying its cooling output, a houseplant irrigation system may respond to soil moisture content by increasing or decreasing water supply, a clothes washer may respond to the particular fabric and cleaning problem by adjusting its chemical mix and cycle, and so on. The most sophisticated control software has the capacity to observe and learn. For example, an advanced climate-control system might observe patterns of variation in external climatic conditions and internal user behavior, develop predictive models based on these observations, and thus anticipate needs. Instead of merely reacting to a drop in temperature, as a simple thermostat-controlled system would, it might anticipate the drop and prepare for it efficiently by adjusting heat production. Even more ambitiously, advanced control software might coordinate the actions of multiple devices and systems; on a snowy winter morning it might wake up a household by turning up the heat at the usual time, making wake-up calls at appropriate moments, switching on the lights, setting appliances to work to prepare breakfast, piping in personalized versions of the day's news, and starting the car. Control software need not be fixed for the life of a device. Software controlled devices may be reprogrammed as necessary—thus providing far greater flexibility than was possible with the hard-wired devices

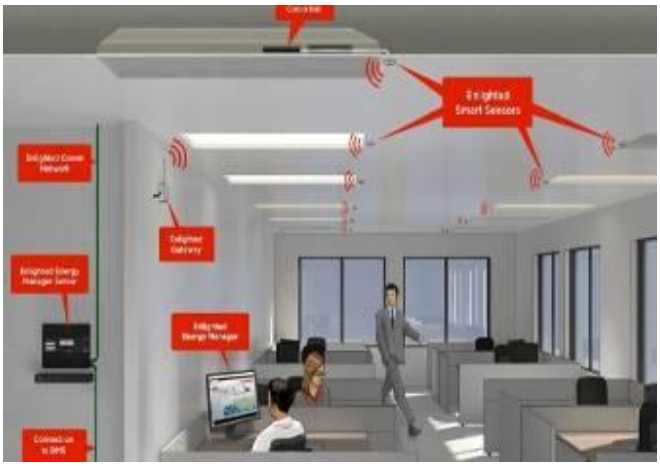


Figure 16, 17: the motion launch control system implemented an office. And Genesis Technology Group's Mirrored Dhaka Office Source: [20, 25].

common in the past. And, where a device is networked, reprogramming may be accomplished by downloading the new software from the Internet. These new capabilities fundamentally change the way in which buildings respond to the requirements of their inhabitants. Preindustrial buildings, as we have seen, relied mostly on passive strategies for responding to environmental variation and meeting user needs. Buildings of the industrial era made much more use of active, electrical and mechanical devices to perform these tasks, but depended on manual and simple automatic control systems. The intelligent interiors of the twenty-first century will increasingly integrate diverse electronic sensors, robotic effectors, embedded intelligence, networking, and control software to create distributed systems that respond in far more sophisticated and efficient fashion (Figure 16) [5, 6, 11].

5. The creativity is the main stimulus for development and growth. In order to summarize all the previous material, we can put in the beginning the one word "creativity". The extraordinary thoughts allow to the people to see the future tendencies, to compare incomparable things, to create the comfort on the limited space and to feel ourselves safety and secure.

According to the present factors: the global warming, the transition of the society towards a healthy lifestyle, the uniqueness with the nature, - the people prefer sustainable materials. In addition, the technologies including wireless control system, motion launch sensors and the remote control systems. Can

Now, we will present few examples of intelligent design. Using a series of amazing space-saving strategies and mobile architectural elements, even a small flat can be converted his simple apartment-turned-condominium into a vast and varied place filled with twenty-one distinct, unique, useful and luxurious spaces (figure 18, 19, 20).

Figure 18, 19, 20: This fascinating experiment with transforming interior spaces includes a steam room, home cinema and many other high-end amenities not found in most living spaces of comparable seize Source: [23]

A series of sliding walls contain spaces within them but also hide drawers, shelves and other useful storage places for DVDs, CDs and other objects that normally displace interior space. In short: they do not only define space as walls but also as doors and dividers. As far as we have seen, however the room is completed in the minimalism style; it has all the necessary elements for the daily secure and comfortable life; at the same time it economizes the space in the building.

One more example of the interior design creativity and the space economizing techniques is the BBC's new creative hub. The interior design is visually striking with "meeting pods" lining the atrium. Narrow spaces at the edge are transformed into intimate pods. The activity-driven design make efficient use of space, allowing flexible and creative balance.

Figure 21, 22, 23: The BBC's new creative hub in the Greater Manchester area in North England is a vibrant modern workplace, which offers more choice in less space. Source: [21].

In addition, we would like to demonstrate the creative technologies that are comfortable and at the same time friendly for the environment.

Figure 24: Intelligent Building design, with sensors incorporated throughout. Source: [22].

Building owners have a number of ways to creatively address rising costs and environmental concerns. One option is to conduct an energy audit to find ways to increase efficiency. In the auditing process, energy meters collect energy usage data for a period of time, typically 30 to 90 days. After this collection period, the data is analyzed and used to identify sources of energy waste. Building owners can use this information to adapt to more efficient usage patterns. Additionally, usage data can be compared to time-of-use costing data from the local utility provider. Utilities charge more for power at peak usage times. Building owners can choose to modify their practices to reduce their electricity usage at these peak times. After a formal energy audit, many building owners choose to have energy meters permanently installed in their facility to routinely monitor and adapt their power usage practices. Here we can follow the smart house, in interior design of what, there are located the sensor remote controls.

Measures taken to reduce energy use and improve the environment can be done simply and effectively by taking a holistic approach to planning. More importantly the owners and the architects should create the design with the desire and care about the future generation.

CONCLUSION:

Technology is increasingly applied nowadays to the provision of infrastructure services to make them more effective and efficient.

There is a need for financial institutions to develop expertise in investing in this high potential sector as a priority. Where this expertise is not available, financial institutions should develop networks of international experts, which they can readily access for investment advice.

Design should do the same thing in everyday life that art does when encountered, amaze us, scare us or delight us, but certainly open us to new worlds within our daily existence.

Architects and interior designers face unprecedented challenges when creating the contemporary interior design. At the same time it should be inspiring and comfortable for living, but the brief must now allow for environmental requirements, constraints on resources and changes in our daily routine and the modern intelligent tendencies.

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