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## **Sustainable, Intelligent, Arcologic – A Futurist’s Vision of Future Buildings**

Future buildings are shaped by social, economic and technological forces that are at least partially already in existence. To mention a few: The need for energy efficiency and, more generally, for overall environmental efficiency during the whole life cycle of a building; the rising demands and convenience requirements of occupants; more frequent changes of use with reconstructions, renovations and refurbishments; and rather continuous integration of new information and communication technologies.

Visions of future buildings – like solar architecture, intelligent and bionic buildings, nanoarchitecture and arcology – reflect in different ways these forces and challenges. Some-times, these visions work as guiding images. They inspire imagination and foster discussion about goals and aims, tools and future directions of architecture, construction, and building operations. As a point in case, the vision of intelligent buildings comprises all applications of ICT. Today, in the age of networked ICT, the concept of a central computer that controls all systems of the building is obsolete. Intelligent means “pervasive” ICT, using advanced sensors, monitors, controls, and communication technologies to improve resource efficiency, comfort, affordability, adaptability, durability, and environmental harmony.

Bionic buildings follow models taken from nature. Lightweight structures imitating e. g. diatom skeletons or water-repellent functional surfaces are already rather conventional. But one can also imagine ventilation systems like in a termites’ nest, supply structures like in leaves of plants, form-adaptive systems with folding structures like fins or the use of self-healing materials or materials that react to environmental conditions like temperature or humidity.

Nanoarchitecture builds on bio- and nanotechnologies, e. g. new smart, functional materials. Visionaries see the building as a living organism: It “grows” from “nano-seeds” into the desired shape, it expands and shrinks as necessary, and its “green bricks” on roof and envelope are capable of photosynthesis supplying all the building with chemical energy. Still one step further, one can regard the whole building as an ecosystem, an “arcology” (architecture combined with ecology). Such concepts may seem today very far-fetched. But they indicate that we experience a paradigm shift in how to see a building – no longer as something mechanical, but as an organic being.

In fifty years, buildings are surely intelligent, but very probably more than that: empathic. They are not only eco-efficient, but bionic. And they are not just (automatically) constructed but “grown” in nanotechnological, organic ways.