Smart Buildings: 7 keys to build better cities for all

— by Manu Fernandez & Tatiane Martins Carrer

What do buildings in a smart city look like? Answering «Smart» seems an intuitive and obvious answer, but it is probably not a very precise definition. **Although smart building has been a key topic in the conversation about smart cities from the very beginning, it is often understood in a very limited way.**

Smart buildings are typically l**inked to specific technological innovations** in the design and construction process. However, in the same way the smart city concept has evolved to include more comprehensive and complex urban visions, **the ideals of smart buildings could be broader and more complex, with the potential to rethink the role of architecture design in our cities.**

There are no set recipes for good architecture; as a product of society, our understanding of it changes and evolves along with it, but **in a very broad sense, smart architecture is the one that helps improve the quality of life.** As a result of this way of thinking, we would like to provide a basic framework for how to widely address the term intelligence in building design so that it is more responsive to its intended function.

7 dimensions that any Smart Building should integrate

Here we compiled some of the layers of intelligence to be integrated in the design process to widen the spectrum of what smart buildings in smart cities may be.

1 | Technology: the quest for automation

Technological innovations have been the **primary driver of the growing interest in smart buildings,** as the ability to embed automation processes into architectural structures provides efficiency, personalization, comfort, and adaptability gains. The components of what smart implies in smart buildings have been **automated control of ventilation, air conditioning, lighting, or security**, among others, solidifying a consistent set of means to design and build material infrastructures seizing digital transformation solutions. All of these innovations, from new materials to information modeling, are intended to **promote the efficient functioning and performance of buildings**, with the goal of ensuring **better resource management,** savings, and user convenience.

2 | Function and program: it's the function, stupid!

In terms of improving quality of life, it seems obvious that **buildings must be thought of in relation to the city and society.**

Therefore, **the function of the building in the territory and the program it will embrace must be addressed to the community**: people need shelter, but they also need a store to buy food, schools to take children, drugstores, hospitals, etc.

Good neighborhoods to live in are the ones that offer sufficient services for people's daily life necessities, therefore questioning what kind of structure the community needs in a determined place in order to address diversity to the building program at the very beginning could give a lot of smart and surprising answers.

3 | Context: the right piece of the city's puzzle

Can you imagine the Eiffel Tower separated from the Gardens of Trocadero? This simple example makes clear the intrinsic relationship between buildings and the city's landscape and proves that a city is not a screen in the background and the limits of the building are not where the construction ends!

Smart buildings must have the intelligence to identify themselves with the landscape they are part of, being the perfect and unique piece that composes the most harmonious picture that everybody wants to photograph. The contextual and landscape dimension, especially related to the building's volume, voids and material should consider its role in the improvement of the quality of the urban landscape and the city.

4 | Interspace: even private buildings have a public life

There is a limit point that separates what happens outside the building, in the streets, and what happens inside it – yes, we are talking about the façades. Windows, gardens, verandas and voids, for instance, make the gradations between the exterior and the interior, but also between the public and the private, the collective and the individual spheres. Smart buildings should contribute to the urban environment by improving the quality of façades, making them more livable and permeable spaces.

Do you like to walk on streets that have only blind walls? It is so boring and anguishing! Active and permeable façades not only enrich and diversify the landscape, but also collaborate, among other things, with the construction of the affective memory and the security of the public space, creating for instance, the possibility to have "eyes on the street".

5 | Sustainability: making more with less

Above all, smart cities should be a collective commitment to more sustainable urban environments, and smart buildings should consider how they will contribute to this in terms of environmental performance.
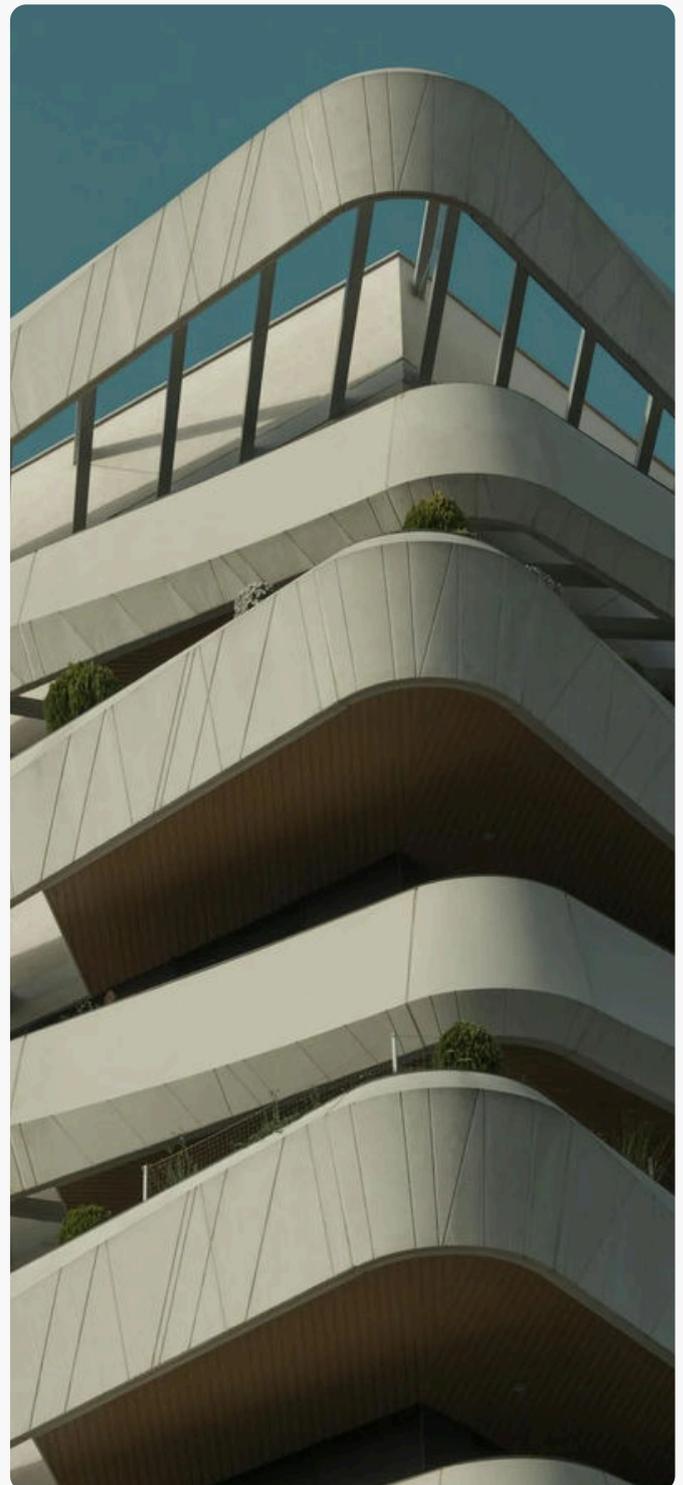

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Assuming principles of **passivehaus and circular economy solutions** as well as following sustainability standards and certifications during the design process could provide some answers to this topic. For instance, it is mandatory for **smart buildings to optimize natural resources such as sunlight, water, and natural ventilation,** as well as the materials to be used. In terms of circular economy and the role of the building to the city, new projects must also consider the existing condition of the place, being at the same time, flexible enough to easily **adapt to society's changing needs** of the future in order to give the structure a longer life span.

On the other hand, consider the life cycle of all used material, including, for example, the responsibility upon the social processes behind the manufacturing of them could contribute to complete the three fundamental pillars of sustainability principles.

## 6 | Social: yes, we are talking about equality again

There is no news in the message that **buildings must provide safe and easy accessibility to every person, to all spaces from outside to inside,** no matter his or her physical and mental conditions. Ok, everybody got it, but, the social dimension is also about supplying spaces that **facilitates daily life and actions required to activities related to production (work) and reproduction (family),** assuring equality and diversity-awareness in the quality of spaces, and especially talking about housing buildings, minimizing hierarchies of spaces to different members of the family.

In terms of **architecture of gender,** smart buildings should also provide spaces that help the taking care of others, especially thinking about all activities that unfortunately until now a day relies most of all on women.

7 | Flexibility: design for the unexpected

Single-use buildings are not only boring, but also a waste of urban land. **Smart cities have to embrace diversity of uses because we know what too much specialization of urban functions brings.**

Buildings also deserve **complexity and flexibility.** Even the most specific typologies of buildings (hospitals, residential care homes, public administration facilities...) admit certain **complementary functions that will benefit the primary purpose of the building** and create a sort of positive externalities. There are a lot of smart combinations that could provide both amazing mixed solutions and benefits services to the whole city.
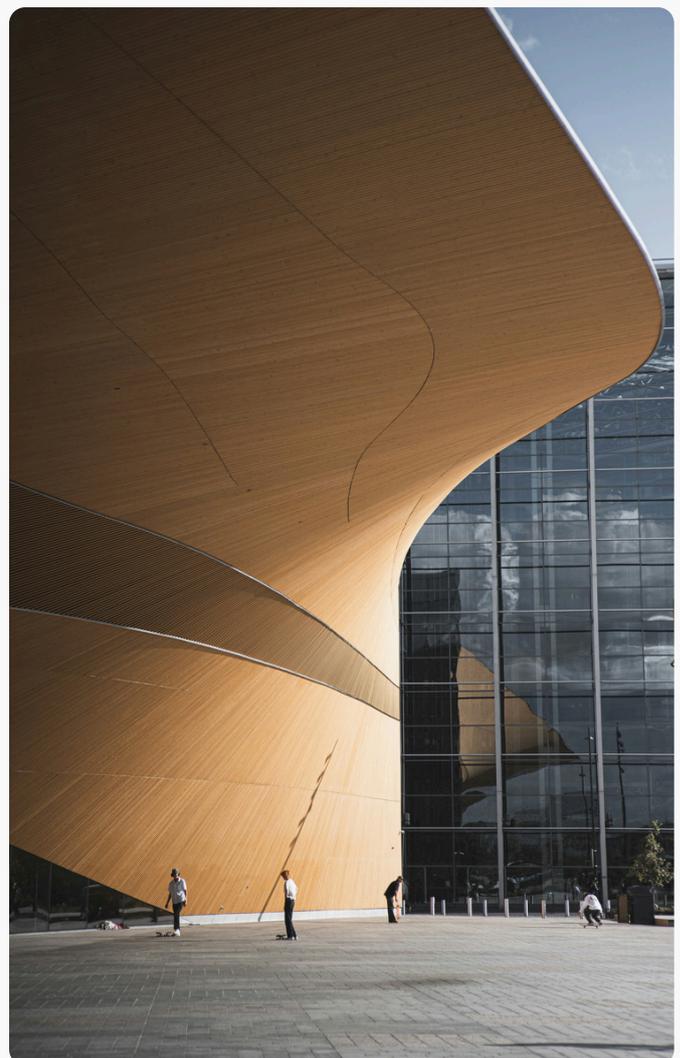
The smart buildings our cities need

The preceding framework is not an objection to what has traditionally been referred to as smart buildings, but rather **an invitation to broaden the scope of the buildings that aspire to make sense in our cities.**

In the coming years, we can expect an increasing number of buildings to be designed using various strategies that include materials and systems to make them technologically sophisticated in some way. This will result in **more efficient public and private building operations and performances,** as well as retrofitting old buildings to extend their life, seizing new digital processes and solutions.

That will be a good starting point, but this quest for smarter buildings begs the question: **how can we build a better building?**

That is most likely the best question to begin with when designing buildings—or doing whatever! And, in order to find the best answer to that question, **we propose expanding the aspirations that should be brought to the table, looking beyond the catalog of digitally-enabled solutions and new generation materials, thus enlarging the ambition of these smart buildings**.

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