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Technologies and the home

“It will be possible to send anywhere or to recreate anywhere a system of sensations, or more precisely a system of stimuli, provoked by some object or event in any given place. Works of art will acquire a kind of ubiquity. (..) Just as water, gas and electricity are brought into our homes from far off to satisfy our needs in response to a minimal effort, so we shall be supplied with visual or auditory images, whitewall appear and disappear at a simple movement of the hand, hardly more than a sign.”
Paul Valery, *the Conquest of Ubiquity*, 1927

“Architecture is the art of reconciliation between ourselves and the world, and this mediation takes place through the senses”¹.
Juhani Pallasmaa

In 1950 cybernetics scientist Norbert Wiener, hoping that people would be released by machines and could thus achieve more creative pursuits, after realizing the dangers of de-humanization and displacement, came to the conclusion that *“We are the slaves of our technical improvement. (..) We have modified our environment so radically that we must now modify ourselves in order to exist in this new environment”².*

¹Pallasmaa, J. (2005). *The Eyes of the Skin: Architecture and the Senses*. Academy Press.

²Wiener, N. (1950). *Cybernetics and Society* (p. 199). Da Capo. (p.46)

This statement should have been a clear warning then as well as continuously over the following years, also given the fact that a variety of thinkers/philosophers have questioned the upcoming technological developments and still continue to do.

Thirty years later, in 1980, Jacques Ellul argued that *“He (i.e., man, mp.) now is situated in a new, artificial environment. He no longer lives in touch with the realities of the earth and the water, but with the realities of the instruments and objects forming the totality of his environment”*³.

Another 16 years later when the digital options arose, in 1996, Mark Weiser and John Seely Brown wrote their – now famous – article: *“The Coming Age of Calm Computing”* in which they suggested: *“tie them (i.e., microprocessors, mp) to the internet, and now you have connected together millions of information sources with hundreds of information delivery systems in your house”*⁴. Today, over 25 years later, it remains questionable whether they could have envisioned the full implications of their proposal, in particular, where it concerns the parallel questions of ethics and privacy that are so deeply rooted and connected with our – future – homes.

In 1998, the term “Internet of Things” (IoT) was coined by Kevin Ashton; and although a final adequate definition is still lacking – which makes an ethical discussion complicated, if not near impossible – it is vital to address its ontology since the lack of understanding, let alone full acceptance and implementation is still absent. While formerly addressed as *“ubicom”* or *“pervasive computing”* (and simplifying the argument that the IoT is the connection of objects to the Internet) we do not do justice to its inherent complexity when it comes to possibilities and technology. Next to that, there is ample reason to address people as well, assuming we rethink the object–subject issue: hence an “Internet of People.” As Gerald Santucci already anticipated almost a decade ago: *“(..) by acquiring an identity as well as self-management, self-healing, and self-configuration capabilities, future interconnected and uniquely addressable objects will take the properties of subjects”*⁵.

³Ellul, J. (1980). *the Technological System*. Continuum. (p.38-39)

⁴Weiser, M., & Brown, J. S. (1996). *The Coming Age of Calm Technology*. Xerox PARC Retrieved July, 8(July), 2007. <http://doi.org/10.1145/633292.633457>

⁵Santucci, G. (2011). *The Internet of Things; A Window to our Future*.

Internet of Things platform Postscapes⁶ has gathered a wide variety of definitions; I will provide two definitions that, given the subject of this book, serve as the most relevant. The first one is by CERP-IOT:

“The Internet of Things links the objects of the real world with the virtual world, thus enabling anytime, any place connectivity for anything and not only for anyone. It refers to a world where physical objects and beings, as well as virtual data and environments, all interact with each other in the same space and time.”

The second one is by IERC⁷:

“A dynamic global network infrastructure with self-configuring capabilities based on standard and interoperable communication protocols where physical and virtual “things” have identities, physical attributes, and virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network.”

Ultimately, its most important topic is and will remain the ownership and control over (the exchange of) data; so, often linked to time, space, and place.

If we take a look at its actual development and future implications, we could note the following numbers and statistics: in 2020, about 30 billion objects will be connected to the Internet, increasing to about 75 billion in 2050⁸ (e.g., Vodafone currently connects over 85 million devices around the world that are *not* mobile phones (as of October 2019))⁹. According to “the Economist,” while referring to an eternal report: “One forecast is that by 2035 the world will have a trillion connected computers, built into everything from food packaging to bridges and clothes”¹⁰. In comparison, the current world population is around 7.7 billion people. The implication is that our (built) environment gradually turns into an information system, an interface; the threat of this consequence is that, so far, it remains unclear what our role,

⁶<https://www.postscapes.com/internet-of-things-definition/>

⁷http://www.internet-of-things-research.eu/about_iot.htm

⁸<https://www.statista.com/statistics/471264/iot-number-of-connected-devices-worldwide/>

⁹<https://www.vodafone.com/business/news-and-insights/blog/gigabit-thinking/iot-will-propel-small-and-medium-businesses-to-the-top-of-the-digital-economy-here-is-how>

¹⁰<https://www.economist.com/leaders/2019/09/12/how-the-world-will-change-as-computers-spread-into-everyday-objects>

our position, and, above all, our agency/influence is. Also, where and how we live in/interact with an (built) environment that is no longer inert but “active,” i.e., responsive, informative, and possibly determining, still is not clear. In the words of William Mitchell, back in 1996: “*Rooms and buildings will be seen as sites where bits meet the body – where digital information is translated into visual, auditory, tactile, or otherwise perceptible form, and, conversely, where bodily actions are sensed and converted into digital information*”¹¹.

Essential in this is the (assumed) synthesis of digital and analog, of real and virtual, and of physical and non-physical. Accustomed and familiar as we are to (built) environments that seem to be “passive/non-responsive,” we experience a change in what constitutes a traditional sphere. It is the false distinction between elements that are – and will increasingly become – fully integrated within our (built) environment, providing an intuitive, tactile sphere. After all, in its original envisioning, it was intended to be “pervasive computing” or “ambient intelligence” in the first place. While, within current parameters, there still is no such thing as the “digital home,” it is the transformation of the environment into an interface, a structured “system of systems,” that requires another approach or another attitude. The unavoidable question here is whether we should rethink the current dichotomy of private space vs. public space, of a space that is physically accessible but, in addition, appropriate to facilitate and protect our privacy without its current physical translation. Rephrased: can we think and experience – a sense of – dwelling without its traditional (built) connotation? Can we (re)define principles of spatial privacy – and therefore home – without having to realize a building in its current physical shape or form?

A contemporary, modern building already consists of an increasing amalgam of various technologies; besides the (often complicated) built structure in itself, it incorporates the systems to control/monitor the structure and provide information on climate-control systems, security, media, etc. So far, these (digital) systems are incorporated within a fixed/inert physical structure, while, at the same time, they increasingly – seem to – merge; the entire building seems to develop into an “intelligent” building, providing the question whether we end up with a fully digitally/artificially controlled environment. Technologies, including the IoT – assuming we stop framing it as a technology in favor of a concept – can bring us closer to experience, to our environment, to all elements that frame, determine, and influence our “place in the world.” In the phrasing of Marcos Novak: “*We already inhabit an invisible world of shapes, an architecture of latent information that is modulated by our every breath and transmission. The shapes*

¹¹Mitchell, W. J. (1996). *City of Bits: Space, Place, and the Infobahn (On Architecture)*. The MIT Press. (p.105)

are definite, and with the right tools of sampling and visualization, can be seen, captured, and, if so desired, manufactured."

In the previous chapters, I have argued that the current, traditional way of providing the framework for housing over, in particular, the last 50 years was and still is inadequate: it is inflexible, unsustainable, as well as a completed product created by third parties without the active involvement and/or participation of the inhabitant, be it the first or the last. Technological developments and innovative solutions provide us for years now with abundant opportunities to adapt and change the building system and its products, assuming the entire building chain acknowledges and accepts the fact that a fundamental shift is inescapable, not for the sake of change as such but for the sake of the interest of the entire chain, including the inhabitant and therefore the well-being of the community as a whole. In 2013, Tomasz Jaskiewicz anticipated: *"What all possible scenarios of interactive architectural future have in common, is the increased role of inhabitants in formation and transformation of architectural habitats. Beyond doubt, the future of architecture is participatory, focused on enabling people to form and improve the spaces in which they live their lives"*¹².

As illustrated (in Chapter 4), it is practically impossible to create only individual housing for individual people. We have surpassed the moment that we can all acquire a single (one-family) house with a front and back garden and a carport, assuming this ever was a realistic and well-considered aspiration. The sheer number of people living in cities will – so far – only increase, and the surface alone required to provide everyone with even a "tiny house" is simply not enough. Even if there would occur an envisioned returning to the countryside (see, e.g., Rem Koolhaas' recent "Countryside" research), we cannot answer for the wish that everybody – in particular in the western world and/or other densely populated areas – will be housed individually, together with his/her own self-supportive piece of land.

Answering the housing issue implies answering its unavoidable accompanying issues, i.e., urban structure, built infrastructure, energy, and sustainability. A "simple" example illustrates this situation: to answer the upcoming reduction in energy usage and the output of CO₂, the Dutch Government has decided in its Climate Agreement that by 2050, the entire housing-stock has to be preserved and gas is expelled from

¹²Jaskiewicz, T. (2013). Towards a methodology for complex adaptive interactive architecture (2013th ed.). Technical University Delft.

our housing, meaning that by 2020, no newly built house will have a gas connection and starting in 2030, adaptation is realized to shift from low-calorie gas to high-calorie gas. This concerns individual housing where it would be far more economically achievable/realizable – and most probably cheaper – to apply and integrate these changes on a larger scale, i.e., adapt a system providing the option for a series of options for varied housing instead of each house individually. Each year, around 20.000 houses need to be replaced; large quantities of houses need to be adapted to address the new energy transition. It seems almost impossible to realize this within acceptable amounts of costs for owners as well as tenants.

When, in 2010, the French architect Philippe Rahm argued: *“When we feel that we are too cold or too warm, we typically find external causes, such as the climate (at an atmospheric level), and we respond with attempts to correct them. From an anthropological point of view, this could be considered the origin and the mission of architecture. (...) Architects should no longer merely build spaces, but rather create temperatures and atmospheres”*¹³. Translated for the larger scale: creating the prerequisites – e.g., Grosz’ frame – for multiple housing, keeping in mind that issues like sustainability, adaptability, flexibility, and climatic conditions should prevail, extensive open structures will be preferable instead of individually constructed housing.

Systems and open systems

“Whole Earth Catalogue” writer Steward Brand once described the framework of housing as the “6-S” systems, i.e., from the outside inwards: *“site, structure, skin, service, space-plan, stuff”*¹⁴. The more inwards we define, the shorter its lifetime and the more flexible we become. Separating the individual from the collective creates the possibilities to separate common structure from individual infill; i.e., the collective is the framework that remains intact over time, the individual part is what is flexible, adaptive, and personalized. It also provides the opportunity to address the circular principles of a sustainable built environment, to address the lifecycle of materials, and to provide an architecture – a system of systems – that facilitates flexible reuse. I repeat: this is by no means a new paradigm; back to John Habraken and his, by now about 50-years-“old,” Introduction¹⁵ on Open Building:

¹³Hauptmann, D. (2011). *Cognitive Architecture. From Bio-politics To Noo-politics*. 010 Publishers.(p.387,391)

¹⁴Brand, S. (1994). *How Buildings Learn; What Happens After They’re Built*. Viking.

¹⁵<https://www.habraken.com/html/introduction.htm>

Open Building is the term used to indicate a number of different, but related ideas about the making of environment.

For instance:

- ⊙ The idea of distinct levels of intervention in the built environment, such as those represented by “‘support’ support” and “‘infill’,” or by urban design and architecture.
- ⊙ The idea that users / inhabitants may make decisions as well.
- ⊙ The idea that, more generally, designing is a process with multiple participants and also different kinds of professionals.
- ⊙ The idea that the interface between technical systems allows the replacement of one system with another performing the same function. (As with different fit-out systems applied in a same building.)
- ⊙ The idea that built environment is in constant translation and change must be recognized and understood.

The website of the Dutch organization of building companies “Bouwend Nederland” seems to recognize the problem at hand, but transforming theory into real practice seems to remain a challenge: “From their role in the chain, primary construction companies can further reduce the use of raw materials. This by designing buildings with: lighter structures, usable for multiple functions and easily demountable after demolition. Separate and minimize construction and demolition waste. In addition, material that is as sustainable as possible can be used” (transl.mp).

Today’s ways of building housing, however, still does not imply – i.e., on a larger scale – the use of “lighter structures,” does not incorporate “multiple functions,” and is hardly “demountable.” Much has to do with the initial design and ways/means of building; e.g., where we were used to hardware (physical) infrastructural systems, we move toward the less visible digital systems. If we recall Open Building’s last item: “The idea that built environment is the product of an ongoing, never ending, design process in which environment transforms part by part,” we also need to be aware that a transforming environment will – for decades to come – be structured along a built (physical) entity that provides the preconditions for this “never ending process”; one that will be(come) a hybrid of the real and the virtual and the digital and the analog. Ellul’s “totality of the environment,” together with certain indeterminacy, will continuously remind

us to be aware that we are part of a sensory environment – a frame – that lacks a *genius loci*. It is, in a sense, open, unarticulated, and random but provides its inhabitants the means to add that *genius* in such a way that it enhances atmosphere, experience, and quality as well as agency: connectedness when needed or desired. As thoughtfully phrased by Elizabeth Grosz: “(..) *the construction of territory is the fabrication of the space in which sensations may emerge, from which a rhythm, a tone, coloring, weight, texture may be extracted and moved elsewhere, may function for its own sake, may resonate for the sake of intensity alone*”¹⁶.

Where early projects originated in too often premature innovations, anticipated technology, or a desired focus on flexibility/adaptability, these topics now can join forces; technological developments today and tomorrow facilitate what decades ago was only anticipated or envisioned. This is not “limited” to digital developments; e.g., more precise tools in close combination with improved machinery facilitate larger numbers of standardized/modular elements, thus decreasing prices. At the same time, many materials – be it for building or for infrastructure – are tagged, i.e., recognizable and traceable¹⁷. Summarized: where we so far considered a series/area of houses as the sum-total of individual buildings with all limits of their own infrastructure and technologies, we now can think of an up-scaled overall structure that is functioning as a protective and sustainable entity as well as providing individual freedom, i.e., the true prerequisites for open building. In Carlo Ratti’s words (on open-source architecture software): “*A tipping point is approaching that posits architecture as information and brings empowerment through fabrication*”¹⁸.

The sensory environment – the interface – is enhanced, made possible, and accessible by “technology”; it is the extension of our environment now shared with a variety of objects connected digitally and individually. As Floridi noted: we now live in an “infosphere”; we are – and will increasingly become – an active, participating element in a continuously changing environment. It forces us to think the consequences, not only for us as inhabitants but also those concerning sustainability and circularity; the focus of the next chapter.

¹⁶Grosz, E. (2008). *Chaos, Territory, Art*. Columbia University Press.(p.12)

¹⁷See, e.g., <https://www.oogstkaart.nl/about/>

¹⁸Ratti, C. (2015). *Open Source Architecture*. Thames & Hudson.