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Time to move beyond the architecture of the oil age

We must discard the architectural baggage of the 20th century to solve 21st century problems – argues our new columnist Marc Ó Riain – and relearn some lessons from before the advent of oil.

We once knew how to design and build buildings properly. But in the oil age we forgot or decided that other concerns, like aesthetics or cheap construction were more important than durability and functionality. As we lobby for adequate standards to address the environmental crisis, we need to understand why we don't seem to care, what drives political decision making and why many in our industry are so resistant to change.

We once knew but we forgot.

Greek architecture informed Roman architecture. Vitruvius recorded the techniques, skills and design strategies in *De Architectura*, the ten books of architecture which set out engineering technologies for drinking water, sanitation and building heating systems, materials, building orientation,

“Stonemasons and early architects built upon a classical understanding of orientation, room scale, material and function.”

proportion, light and climate. Wotton's (1624) translation of such texts enabled stonemasons to learn from the amassed knowledge of the field. Indeed, masons well understood the impact of climate on buildings, as they preferred locating houses in valleys over hilltops, where “the stormy blasts of winter, should breed them (occupants) greater annoyance” (Harrison 1587). Stonemasons and early architects built upon a classical understanding of orientation, room scale, material and function. Great estate houses of the Romanesque Revival (1840) depended on natural light and heating by open fires. It was perhaps a shame that the hypocaust underfloor heating systems found in the early British roman villas (like the one excavated at St Albans), had not been revived at the same time. The architect's role began to be distinguished from the master mason in the seventeenth century (Neveu 2008). The Palladian buildings that arose after these translations demonstrated a clear correlation between size of rooms and sizes of openings, daylight and heat loss. Large windows allowed natural light in and rooms were limited by the size of windows and quantity of light. Stone walls absorbed the heat of the fires, releasing the heat slowly at night. Indeed, Hawkes argued that Hardwick

Hall (1597) was oriented to store heat from the sun in a trombe wall effect.

The architect was seen as having an appreciation and knowledge of aesthetics, rather than construction (Perrault). Architects did not start out well according to Banham (1969), who recorded that they were indifferent “to the environmental performance of their buildings”. That said the styles of the Palladian villas began to inform the urban houses and terraces of the cities. Recent research by Scottish Heritage showed that timber shutters performed better than double-glazed windows at retaining heat in a building. The high point of building design would come around 1900. Arts & Crafts movement buildings like the Broad Leys House, Voysey (1898) embraced optimal orientation, creating double height bay windows for light, a cantilevered balcony creating a ground floor veranda to the south for shelter and

shade, placing service areas in the east of the house and having window sizes environmentally appropriate to room function and orientation. By the turn of the twentieth century, this would demonstrate a steady advancement in the understanding of building physics and how a building's design relates to its environment, climate and location.

However, all would be about to change with a paradigm shift towards modernism, which still casts a long shadow that dominates much of architectural practice and education today. Modernism was a reaction to ornamentation, as Loos (1908) condemned ornament as crime. An Italian Architect, Sant Elia, created the manifesto for modernism and brutalism “With the use of concrete, steel and glass...to be ugly in its mechanical simplicity”.

This revolution would see seminal architects like Gropius, Meyer and Le Corbusier look toward industrial buildings and a ‘plastic’ or flat aesthetic with large gridded windows and thin concrete walls. Buildings like the Fagus Werks building (1913) began to define an aesthetic approach to buildings that lacked the environmental performances of the amassed knowledge that had preceded it. Modernism rejected all that had gone before

seeking to create a ‘Tabula Rasa’, a clean slate. The Fagus Werks building suffered from overheating with awning later retrofitted to ameliorate the issues with the strip banded glazing. According to Feuerstein (2002) the Dessau Bauhaus building (1924) suffered from “undersized and inefficient heating, huge heat gain and heat loss from the expansive, unprotected and non-insulated glass façades, poorly maintained roofs, which led to leakage...”. City of Refuge (1933) by Le Corbusier, another seminal leader in the modernist movement, was a functional failure. His experiments with active double skin façades (murs neutralisants), mechanical ventilation heat recovery (respiration exacte) and airtightness would be almost 60 years ahead of passive house, but led to insufferable living conditions for the homeless occupants.

These buildings and their architects created a movement that has dominated European and American architecture for over a century. The ‘plastic’ aesthetic has transmuted today into the characterless glass boxes that purge our cities, decimating diversity, personality and urban grain. But why has the paradigm of modernism been so dominant and why have architects not shifted toward a more environmentally enlightened practice? The design of buildings within the modernist paradigm is not simply informed by aesthetic priorities but also by budget limitations and building standards. The first zero energy building was constructed in Copenhagen in 1975. We should start to question the reasons for the lack of progress and the lack of aspirational building standards today. In truth the reasons are tridential; a modernist architectural bias to the plastic form, inadequate minimum building standards (especially in the commercial context) and capital centric investment models that ignore the benefits of lower operational costs/healthier indoor air qualities.

In the next issue we will explore the impact of cheap oil and government policies on renewable technologies and building standards.

Marc Ó Riain is the president emeritus of the Institute of Designers in Ireland, a founding editor of Iterations design research journal and practice review, a former director of Irish Design 2015, a board member of the new Design Enterprise Skillsnet and has completed a PhD in low energy building retrofit, realising Ireland's first commercial nZEB retrofit in 2013.