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SUSTAINABILITY BEYOND TECHNOLOGY AND THE WORKS OF ARCHITECT RICHARD LE PLASTRIER

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Summary

Given the enormous variety of climates in which humans dwell, it is clear that the design of buildings for energy conservation will inevitably result in the development and implementation of a broad range of technical solutions. Modern society's obsession with technology has increased our demand upon unsustainable energy sources; and it seems somewhat contradictory that our intention to reduce human impact through energy conservation is, in many cases, lead by the application of additional technologies.

This paper discusses a number of approaches to the design of sustainable buildings employed over recent decades, ranging from the indigenous to the technological. It does this with the view to developing a proposition for an architectural design approach which recognises buildings as places of human habitation at a certain location in time, rather than as a framework for the support of technological devices. This proposed design approach intends to offer a global framework for the representation of the principles and decisions underpinning sustainable design and the relationship between these, the occupant, the occupant's lifestyle, and the broader environment/location.

The built works of award winning Australian architect Richard LePlastrier are then used to represent the methods by which the previously established approach to design can be manifested in a given location. LePlastrier has had considerable impact upon Australian design over his long career, with buildings spread through a variety of Australian climates. His smaller scale works are examined with regard to their material use, construction, and detailing techniques which ensure buildings not only house their current occupants, but also preserve the location and building resources for future users.

The work of LePlastrier offers a reminder of architectures anthropological beginnings and also illustrates the potential of building design to encourage occupants to challenge their current perception of conventional dwelling, taking sustainable design beyond the remedial application of technology.

Introduction

The need for human activity to take into consideration its high level of impact upon the global environment is frequently discussed and generally accepted within global society. Numerous efforts have been made at various levels of society to curb the ever-increasing impact of humanity and achieve a ‘sustainable’ future. As the built environment accounts for a significant proportion of the world’s energy consumption it is appropriate that many of these efforts relate to the planning, implementation and habitation of the built environment.

Although the support for a sustainable approach to the built environment is clearly strengthening over time, the level of action on behalf of governments and individuals continues to be relatively ineffective at reducing the overall impact of the built environment. “In a dutiful way, most people approve of the changes prescribed by environmental reform… as long as the changes do not change anything…. Given this prevailing attitude and its delusory state of inaction green architecture has remained a curiosity in the corner, instead of a force in the mainstream.” (Wines 2000) During the past few decades a diverse range of aesthetic approaches have been employed by designers to express sustainable design intentions; ranging from the highly technical to the highly organic. The development of a sustainable design aesthetic which encourages both an awareness of and alteration to existing consumption patterns may well assist in increasing the effectiveness of sustainable design in reducing the impact of human habitation as well as moving this approach further toward the mainstream.

This paper aims to briefly discuss various aesthetic tools employed in sustainable building practice and lead to a proposition for an aesthetic appropriate to building development in a global context. The works of prominent Australian architect Richard Le Plastrier are discussed as a tool to communicate such an aesthetic.

Numerous terms have been used to refer to sustainable building practices over the past decades. Just as it is necessary to propose a method of design representation easily communicated to and understood by the end users of buildings it is also necessary to employ a term of reference which is clear and evocative. For the purposes of this paper the term 'green architecture' is used as it carries implications and suggestions, which are frequently encountered by building users, at least on an ideological level.

PART ONE: Exploring the aesthetic

1.1 Technological expression

Modern society's obsession with technology has increased our demand upon unsustainable energy sources; and it seems somewhat contradictory that our intention to reduce human impact through energy conservation is, in many cases, lead by the application of additional technologies. Our reliance upon technologies and gadgets to solve all problems has lead to an architectural aesthetic that attempts to signify its sustainability through the application and expression of technological artefacts.

The expression of various technologies used to service and condition a buildings environment is not a new concept to architecture. One well-known example is the Pompidou Centre in Paris; a steel and glass box with highly visible transportation, ventilation, communication and hydraulic services that enable the habitation of the spaces within. The Pompidou Centre represents through its aesthetic expression the degree of environmental modification, and relative level of energy consumption, employed by many modern buildings. A similar trend can be observed in buildings employing the expression of technologies to represent the degree of environmental consideration or 'greenness' incorporated into their design and servicing. Such technologies are often applied as a secondary layer to conventional buildings and therefore are perceived as an added extra, an expensive luxury available to the wealthy. Such layering of technology is regarded by James Wines as 'techno-remedial solutions.' He Believes "There is an unbalanced amount of effort currently being spent to create a sanctimonious mythology around what is basically a collection of admirable engineering innovations." This imbalance in favour of technology often leads to 'green architecture' being limited to a checklist of technologies and failing to include an aesthetic representation of the principles and decisions underpinning the design.

For the built environment to accommodate the changes that have been accepted as necessary to achieve a sustainable future for humanity its inhabitants need to begin to accept that alterations to the current rate of energy consumption and therefore current way of life are required. 'Green Architecture' needs to be aimed at society as a whole and to play a leading role in the development of a generalist approach to energy reduction, rather than an expression of current artefacts which rapidly become dated.

Fig. 1.1: Solar Cell Plant Germany. Architect: HoHaus Hinz &Seifert

Fig. 1.2a: School of Environment and Information Services. Charles Sturt University Thurgoona Campus. http://www.csu.edu.au

Fig 1.2b: Charles Sturt University Thurgoona Campus. http://www.csu.edu.au

1.2 Philosophical expression

In discussing the design of the Charles Sturt University Thurgoona Campus architect Webster-Manison states that "(p)art of the challenge I set myself was to make the philosophy highly visible, and that was deliberate because one of the objectives of sustainable design is to change how people think and live, and how we use things" (Howlin 2002) This approach provides an understanding of the connection between the services or technologies of the building and the occupants, adding an additional layer of context to the

previously discussed technological approach. Such an approach to design makes users aware not only of the servicing of the building but also of the relationship between building and landscape, encouraging an interaction between the user and the various spaces they inhabit. Systems are expressed regardless of their technical currency; a traditional water tank is as significant in expressing the design approach as a current generation photovoltaic power system.

Unfortunately the expression of such a design philosophy through building form is often viewed by the user or consumer as experimental or controversial. Therefore this approach is most frequently employed in publicly owned, privately occupied or institutional developments but seldom crosses into the realms of the dominant private building market where it can be seen to carry investment risk. In the public realm of community buildings and educational institutions this approach plays a significant role in the demonstration of 'green architecture' solutions to the general population and in the ongoing education of building users. For this philosophical approach to continue to grow and be confidently engaged by private investment the sense of aesthetic risk and fear of newness would need to be overcome, which is not likely to occur rapidly in many nations which hold firmly to conventional practice.

1.3 Conventional approach

In contrast, many designers adopt a generally conventional approach to building form and materiality, which removes the previously discussed sense of newness or risk. These architects achieve the application of ecologically favourable features by incorporation into less threatening building typologies appealing to the average user and conforming to traditional tastes. Although such constructions are more easily accepted they seldom make the user aware of the importance of the systems employed to service the spaces as 'technological expression' suggests and do not change 'how people think and live' as proposed by the method of 'philosophical expression.'

Historically the development of a conventional or traditional building form has occurred over a significant period of time in response to local climatic and material considerations, suggesting this approach may result in appropriate thermal design and material consumption. However, in a global society this is not universally true, as the conventional in many locations has been imported from elsewhere. For example, the Australian built form has traditionally been developed in a manner that gives little consideration to the local conditions and climate due to replication of European building forms. To this day the majority of treasured and preserved buildings in this country express the lifestyle of another and conventional Australian dwellings continue to be constructed in a manner that reflects the past and requires considerable input of energy to make their interior spaces suitable for habitation.

Therefore the 'less threatening' approach of using conventional imagery is not universally appropriate and in many locations 'green architecture' needs to tackle the difficult issue of altering the conventional; persuading the consumer of an appropriate alternative.

1.4 Natural approach

David Deppen (1999) suggests, "building on the land is part of the great process of creation and change. What's missing from our current ways is acknowledging and respecting the living nature of the land." In the search for an architectural form and expression appropriate to place many designers seek inspiration from the natural environment; which leads to a broad range of design outcomes.

In his essay 'A Natural Architecture' Mickey Muennig suggests "a house should live and breathe as much as possible …. not in nature, but as a part of nature." The approach he employs is one of matching contours, burying buildings in the earth and morphing buildings into the landscape. This aesthetic clearly expresses the intrinsic connection between building and land yet appears to deny the impact of human dwelling. Human existence, by nature, interrupts the natural cycles of the earth and exploits natural resources.

Malaysian architect Ken Yeang focuses upon the connections between occupant, building and climate. He emphasises the importance of designing appropriately for various climate zones and advocates the consideration of orientation and location with respect to glazing, integrated planting, terraces and shading elements in the design of buildings. This physical response to climate generates a solution that visually communicates the intention of the design to acknowledge and respect its location.

The extreme differences between individual designers' approaches to 'designing with nature' are exacerbated by the variety of project types and environments we encounter. Whether the natural design approach is to integrate with or respond to a particular location, we must acknowledge also the variability of nature and land over time as suggested by Deppen; taking into consideration the impact of humans and buildings upon this variation.

Fig. 1.4a: Residence by architect Mickey Muenning
www.mickeymuennig.com

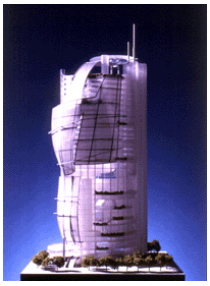


Fig. 1.4b: Shanghi Armoury Tower
http://www.jtcw.com.au

Fig. 1.5: Uluru-Kata Tjuta Cultural Centre. Architect, Gregory Burgess.
www.abc.net.au/architecture

1.5 Indigenous approach

It is worth noting that the generally accepted definition of sustainability is anthropologically focused. It is not concerned primarily with the preservation of ecological conditions, but with the ability of future generations of humans to meet their needs. Therefore an appropriate 'green architecture' aesthetic should express humans and their dwelling needs. The expression of human requirements becomes obstructed by the ever-changing perception of 'need'. Many designers suggest a return to indigenous building methods as a means of questioning and redefining human need in the built environment. In their book 'Green Architecture' (1991) Brenda and Robert Vale suggest the relevance of vernacular architecture yet also caution against its unquestioned adoption in our modern world: "…it must be recognised that a green architecture does not mean a return to such traditions. In a world of five billion people that is not possible. It is the attitude to materials and resources expressed in the vernacular approach that needs to be accommodated in future architecture."

An enormous variety of indigenous building forms are constructed around the globe, from a range of materials and with varying degrees of permanence. Gottfried Semper provides a useful interpretation of indigenous building in his 1852 article 'The Four Elements of Architecture' based upon a Caribbean hut featured in the Great Exhibition in 1851. Semper opposed the previously accepted theory that the hut was merely a result of nature's wish to shelter man and constructed an interpretation of architecture with both an anthropological and material basis. To Semper architecture was comprised of four elements: a hearth; an earthwork; a framework and roof; and an enclosing membrane. These elements can then be divided into materials and hence Semper gives us the frame and the mass (Frampton, 1996). The frame surrounds space, rising toward the sky while in contrast the mass anchors space, relating to the earth with its opacity. Together these elements and materials express the location of human dwelling between earth and sky.

Semper's analysis is not site or climate specific but expresses through the use of differing elements and material types the dwelling of humans upon the land over time. It achieves this in a manner which is flexible and expresses the universal and dynamic relationship between man and earth.

1.6 Beyond technology…….

These differing approaches to and expressions of 'green architecture' can be seen in buildings around the globe; no single approach is specific to any place. The resultant built form generally reflects not only the designer's intention but some qualities of the locality and society through materials, spatial design and climate response. By meshing the outcomes of the preceding discussion we can draw from the various successes and limits identified in each of the approaches to develop a global framework for the representation of the principles and decisions underpinning sustainable design. This framework must have the potential to be as diverse in its interpretation and expression as our global environments and cultures.

Table 1.

	Successes of approach	Limitations of approach
Technological expression	• Demonstrates cutting edge technologies, encouraging future uptake.	• Seen as an expensive added extra • Has a tendency to treat buildings as a framework for technical artefacts • May not encourage change in consumption / use habits, limiting effect of technical solutions.
Philosophical expression	• Communicates connection between the occupant and the surroundings through the built form • Encourages a consciousness of consumption and attempts to influence behaviour • Public buildings act as demonstration centres	• Seen as controversial or risky, limiting (but not halting) commercial and private uptake
Conventional approach	• Accepted by the general public, enabling numerous initiatives to be implemented provided they do not appear to "change anything"	• Not all conventional building approaches are appropriate to location, potentially reducing the effectiveness of any initiatives implemented. • Does not encourage change in consumption / use habits, limiting effect of technical solutions.
Natural approach	• Expresses the relationship between people, space and place. • Applicable, in different ways, to a variety of building types and scales.	• Often assumes the human relationship with the earth is non-exploitative • In some cases, climate responsive design is used to reduce operational energy loads without challenging the energy 'need'.
Indigenous approach	• Location specific approaches have potential to reduce construction and operating costs. • Questions modern consumption levels through materials selection and notions of 'need' • Reintroduces notions of dwelling upon land over time, leading to consideration of anthropological sustainability.	• Not all indigenous shelter / dwelling structures appropriate as direct translations for modern global life, with most requiring integration with other approaches above.

Therefore, from observation of these differing approaches, we may conclude that an appropriate global framework for a sustainable architecture aesthetic may be one which combines a range of attributes present in these previous approaches with others aimed at addressing the identified limitations. Current technologies and their inevitable inclusion in building design offers the global community an opportunity to address and curb the impact of the built environment, however the role of technology in design should be considered within a broader framework considering:

- the inclusion of technology in a manner which provides exposure and acts as a demonstration facility to encourage further uptake,
- its incorporation as an intrinsic component of design in a manner which avoids the notion of risk, including consideration for future technology update.
- the promotion of awareness of the relationship between the building user, the building and its environment
- honest expression of elements servicing the internal environment, making energy consumption legible and encouraging occupants to reassess their expectations.
- adaptation of conventional building approach in a manner which encourages occupants to challenge their current perception of conventional dwelling and need.
- recognition of the complex relationship which exists between people and the earth in any given landscape; acknowledging the dwelling of humans upon the land.
- acknowledgement of potential changes in occupancy patterns over time, preserving the location and building resources for future users.

PART TWO: building the framework

Richard LePlastrier (1939-) has completed numerous residences in and around Sydney since the early 1970's, his work also includes residences and public buildings throughout other areas of Australia. His designs feature a duality or tension between the meticulous detailing of traditional building methods and the innovative application of modern materials and structures. LePlastrier often discusses the teachings of both Jorn Utzon and Tomoya Masuda as major influences upon his career. He credits Utzon with expanding his appreciation of the landscape. Tomoya Masuda taught, among many other things, that humanity, not technocracy, is fundamental to architecture (Masuda, 1975). As a consequence of such teachings, LePlastrier's built dwellings are a physical manifestation of an attitude to living, addressing the essentials of human dwelling within the physical landscape of a certain place. LePlastrier's body of built works offer the

opportunity to examine how many components of the previously established global framework for sustainable design may be implemented within a specific climate and culture.

2.1 Acknowledging human dwelling upon the land; Challenging conventional dwelling and need

LePlastrier's interest in the essentials of human dwelling led to an esoteric proposal for the 1988 'Dream House' Exhibition in conjunction with Karen Lambert and Rod Simpson. Without the limitations of a client the 'Dream House' provides an unconstrained example of LePlastrier's 'basic house' mindful of the fundamental requirements of living a life. The 'Dream House' is located on the inland planes of New South Wales, Australia. It comprises three separate zones of enclosure; a small, solid room, a partially walled platform for living with an adjustable sheltering canopy overhead and an open, unsheltered platform exposed to the planes. An axis of services both traverses and unifies the three zones via the collection, flow and expulsion of water, psychologically connecting the dwelling to both the sky and the earth.

As a result of the basic universal nature of humanity LePlastrier's buildings, whether urban or rural, are often composed of a series of elements similar to those which constitute the idealistic 'Dream House.' The majority of LePlastrier's work can metaphorically be seen as composed of five elements:

- a 'cave' which can be closed to the external weather conditions and features a hearth;
- a 'tree' which provides a sheltering canopy for semi-external spaces;
- a 'platform' which becomes an unsheltered living space completely exposed to climatic conditions;
- a 'service spine' or area which deals with the processes of water and ablutions;
- a 'flexible element' which takes the form of a wall which "is and then isn't" or of a roofing element which raises or recedes. This feature enables the building to adapt to changing climatic conditions and often defines the transition between cave and tree or tree and platform.

LePlastrier's attitude to dwelling expresses itself through the use of these five metaphorical elements; together they show a response to human needs as dictated by the variations which inevitably exist within both human emotion and climatic conditions. LePlastrier's pursuit for a distilled and simplified way of living within the landscape has led to parallels with Gottfried Semper's tectonic analysis of the Caribbean hut. Therefore it is not surprising to find similarities between LePlastrier's use of materials and Semper's 'Four Elements of Architecture.' Semper's 'hearth' and 'earthwork' elements are present in LePlastrier's work within the 'cave'. The 'framework/roof' bounds the cave in the form of the 'tree', creating a transitory area between interior and exterior. This frame is then enclosed with the partially flexible 'membrane'. When contrasting the elements of mass and frame side by side, LePlastrier emphasises the differences between the two by anchoring the mass to the ground and allowing the frame to be suspended slightly above the ground plane, reaching up to emphasize its relationship to the sky. The tectonic contrast between mass and frame is emphasised through his reluctance to allow the two to meet. The earth and brick walls of the 'cave' element are completely isolated from the timber frame of the 'tree', which rises above them to support the roof. The framework exists within separate planes to the mass and is structurally isolated, even in cases where it would be physically possible to carry the force of the frame upon the mass.

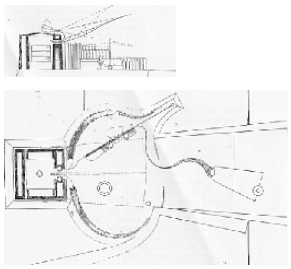
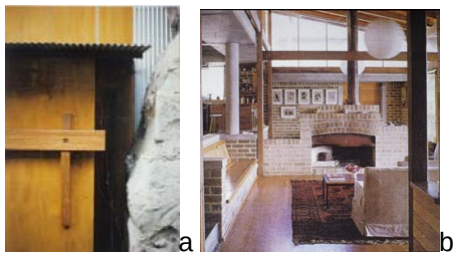


Fig. 2.1: 'Dream House'
Carter,A. "Richard LePlastrier"
Arkitekten, Vol.192, no.1 (1990)



a b

contrasting frame and mass / 'cave' and 'tree'
Fig 2.2a: Lovett Bay Residence
Fig 2.2b Cammeray Residence

Fig 2.3: 'flexible element' at Never Never Studio
Spence, R. "After Eames: the work of Richard Le Plastrier." AR, vol.180, no.1074.

Christian Norberg-Schulz (1980) suggests that a work of architecture expresses its content "by how it stands on the ground, how it rises up, how it extends in space and how it opens and closes. This defines how it "is" between earth and sky, constituting a place where human life can take place." LePlastrier creates climate appropriate spaces where human life can take place through his use of materials which reflect both the needs of human dwelling and its relationship to earth and place.

2.2 Adaptation of conventional building approach; Avoiding the notion of risk

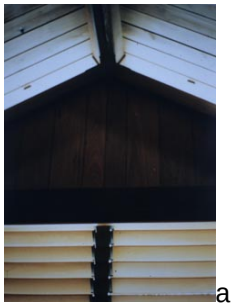
In the construction of these five metaphorical elements, LePlastrier employs materials common to the Australian building industry. This use of locally familiar materials makes the designs accessible and technically appropriate to the local industry. It also enables the gradual adaptation of conventional building approaches without over challenging social norms and avoiding the notion of risk, which is often associated with the new and the unknown.

2.3 Expression of elements servicing the internal environment

Many of LePlastrier's designs, like the Dream House, accentuate the links between the collection, storage, use and expulsion of water through the 'service spine'. This element of the designs indicates the influence of the culture and its location within a continent often affected by water shortages and excess consumption. The visibility of these simple, low technology building components provides awareness regarding water use and offers an opportunity to alter the occupants' patterns of use. Where renewable energy systems are installed a similar approach to user awareness is employed, identifying the point of collection / generation and expressing the subsequent path to point of use.

2.4 Awareness of the relationship between the building user, the building and its environment

"I've always hoped that my buildings focus well beyond themselves, that they're not objective. In fact it is a subjective issue, not about objects so much. The most important thing for me about this house is not what it is in itself,…"(LePlastrier, 1997) Similar to the relationship between mass and frame, the roof often rests above the wall, without joining it, and appears to almost float. This 'break' between wall and roof is generally glazed and varies from quite generously sized clerestories used for ventilation to small fixed glass panels which fill the spaces between rafters. Whatever the size, this dis-joint provides continual changes in lighting conditions throughout the day, exposing the occupant to the passage of time in place. It also allows the eye and mind to extend beyond the building itself and recall the landscape beyond. Together with the 'Flexible Element', which opens the interior to the exterior, this detail communicates LePlastrier's subjective attitude to architecture through allowing the building space to extend itself into the landscape.



a

b

Fig 2.4a: Balmain Residence 'disjoint'
Fig 2.4b Queensland Residence 'disjoint'

Fig 2.6: Lovett Bay Residence

Fig 2.5: Lovett Bay Residence

In LePlastrier's work there is no true boundary, in the form of a barrier to inclement weather, beyond that of the cave. Yet points of change do exist as in leaving this primordial shelter the buildings progressively open to the landscape beyond. This is a result of LePlastrier's attitude to living within a place and being a part of it and can also be paralleled with Heidegger's suggestion that "a boundary is not that which at something stops but, as the Greeks recognized, the boundary is that from which something begins its essential unfolding." In this effort to maintain a direct relationship between the sheltered or semi-sheltered dwelling spaces and the landscape beyond LePlastrier has generated joining and support methods that enable overhanging roofs to be self supporting. This effectively removes the need for vertical supports which can lead to the formation of cognitive barriers or boundaries.

An awareness of the building's environment is also achieved through the detailing of fenestration. Many of the punctuations in the frame and the membrane of the buildings are simply 'a hole in the wall,' enabling the sounds and odours of the landscape to penetrate the dwelling. In some cases the edges of the openings between interior and exterior, are detailed in such a way as to eradicate the edge element in itself and therefore the building as an object. "[Y]ou don't want to be conscious of the building, that's why the openings are bevelled back. If you don't bevel it back then what you do see is the rim of the plywood, if it is bevelled back from the outside then the cutting line is acute, like a razor blade" (LePlastrier, 1997)

2.5 Preserving the location and building resources for future users.

The temporary nature of the frame is illustrated through its flexibility and deconstructability compared to the rigidity of the mass. The method of construction used within the framing elements demonstrates LePlastrier's recognition of human existence as temporary. He sees man as responsible for a place whilst dwelling there; acting as a 'minder' for a time (Throsby, 1992). This is expressed not only through the temporary nature of the frame itself, but also through it's jointing. All timber sections are jointed in a fashion that enables their removal and reuse without damage. "[T]here are no nails in the house except in the flooring. The remainder of the structure is held together with screws and bolts,.. so the timber in the house can be recycled" (Uren, 1994). LePlastrier took the demountability of structure even further in the proposal of a timber construction system with students from the University of Tasmania in 1980. The system comprised small solid section (as a reaction to the reducing availability of large timbers) and was completely demountable and able to be reconstructed in different configurations.

For LePlastrier the building is: "a consequence of carrying out what is essentially, hopefully, a very simple, beautiful idea about living." (LePlastrier, 1997) Like Utzon, "he understands the true nature of architecture as buildings expressing their world through their standing and rising, extending, opening and closing. Through this understanding and his meticulous use of materials and their detailing in its manifestation, he keeps the tradition of architecture alive; a tradition which (like his work) is simultaneously modern and timeless."(Norburg- Schulz, 1980)

LePlastrier's buildings have provided an understanding of the manner in which materials currently employed in modern Australian construction can be utilised to redefine the way buildings and their inhabitants relate to their landscape. In his range of work LePlastrier demonstrates how this approach can be applied as easily to a suburban site as to a more natural landscape. These ideas could also be interpreted into more dense developments as well as into our future reinterpretation of currently existing buildings.

CONCLUSION:

The global design framework proposed aims to extend the notion of sustainable architecture beyond the use of a technological checklist and to be sufficiently adaptive to accommodate the range of landscapes and societies within which we build. The works of Australian architect Richard Le Plastrier do not feature overt modern technologies, yet consider the relationship between man, building and landscape in a way that encourages the user to redefine the conventional and reconsider modern notions of need. The buildings discussed demonstrate how the global design framework proposed can be adapted to a particular location, reflecting its culture and context.

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