EAAE
European Association for Architectural Education
Transaction on Architectural Education No 47

EAAE prize 2009-2010

Writings in Architectural Education

Climate Change: Sustainability/ Responsability

EAAE PRIZE 2009-2010
sponsored by **Montana**

The EAAE is an international, non-profit-making organisation committed to the exchange of ideas and people within the field of architectural education and research. The aim is to improve our knowledge base and the quality of architectural and urban design education.

The EAAE Prize aims to stimulate original writings on the subject of architectural education in order to improve the quality of teaching architecture in Europe.

The EAAE PRIZE 2009-2010, sponsored by MONTANA, invited teachers from all membership schools and individual members of EAAE to participate in the competition

"Writings in Architectural Education – Climate change: Sustainability / Responsability."

The 4 selected papers is published in this report.

EAAE prize 2009-2010

sponsored by Montana

EAAE Transaction no. 47

EAAE prize 2009-2010
sponsored by Montana

Writings in Architectural Education
Climate change: Sustainability/Responsability

Editor Ebbe Harder, School of Architecture, Copenhagen
Graphic design Jens V. Nielsen
Printing Vilhelm Jensen & Partners
ISBN 978-2-930301-45-7

The report is supported by Montana and The School of Architecture, Copenhagen

Montana

EUROPEAN
ASSOCIATION FOR
ARCHITECTURAL
EDUCATION

The Royal Danish Academy of Fine Arts
School of Architecture

EAAE prize 2009-2010

Writings in Architectural Education

Climate Change: Sustainability/ Responsability

PREFACE

Preface

In 2009, the EAAE announced a prize competition for the teaching staff at the EAAE member schools as well as "individual members". The ongoing, worldwide debate regarding climate changes influenced the theme and thus the subtitle of the competition: "Climate Change: Sustainability/Responsibility"

The EAAE Prize aims to stimulate original writing on the subject of architectural education in order to improve the quality of architectural teaching in Europe. Organized bi-annually, the competition focuses public attention on outstanding written work selected by an international jury.

The invitation and inspirational text for the prize competition read as follows:
"Ongoing research is documenting the climate changes and demonstrates that human activities contribute significantly to this process. The different types of climate changes form one of the most complex themes in the current worldwide debate and these challenges have implications reaching far into the future. These challenges span across a wide spectrum; from the identification of causes of climate changes and the scenarios associated with global warming, to assessments of the significance of these changes for all systems, to questions of adaptation to climate changes and to the development of new technologies that can contribute to counteracting these changes and their effects. It is well established that 70% or more of the CO2 is generated by cities including the production and operation of buildings. Architects thus play a crucial role in terms of architecture, urban design and planning insofar as they affect spatial organization and the design and maintenance of the environments of society into the future.

How is this challenge addressed in architectural education?
Are the challenges of climate change included in the basic knowledge delivered through the curriculum, are they addressed in the themes for student projects, or are they addressed through individual research about climate and architecture?
Which new educational initiatives do you find important?"

Among the submissions, the scientific jury selected 4 papers to be of an adequately high quality to proceed in the competition. Unfortunately, 4 papers did not create the basis for the planned workshop in Copenhagen. The workshop was replaced by the detailed comments from the jury to the authors of the 4 papers, and they were given approx. 4 weeks to re-write their contribution in relation to the comments. The improved papers (all 4 authors took the opportunity to consider the criticism) were placed before the jury, and the voting result is as follows:

First prize, EUR 5,000

Michael K. Jenson, PhD, University of Colorado, USA, College of Architecture and Planning
Ethics or Technology?

Second prize, EUR 4,000

Kim Sorvig, University of New Mexico, USA, School of Architecture and Planning
The Architect's Footprint: Toward a Green History and a Critical Practice of Building

Mention, EUR 500

Giovanna Franco, Faculty of Architecture of Genoa, Italy
Acting upon the Recent Inheritance Sustainability and Responsibility Towards the Contemporary

Mention, EUR 500

Isaac Lerner, Eastern Mediterranean University, Turkey
Form Follows Fiction; The Architecture and Urbanism of a Sustainable Responsive Environment

THE JURY

Professor Hilde Heynen	KUL – Department of Architecture
Professor Per Olaf Fjeld	Oslo School of Architecture
Professor Loughlin Kealy	UCD Architecture, School of Architecture, Landscape and Civil Engineering
Professor Chris Younès	Ecole nationale supérieure d'architecture de Paris la Villette
Professor Anne Beim	The Royal Danish Academy of Fine Arts, School of Architecture

THE ORGANIZATION COMMITTEE

The organization committee on behalf of the EAAE Council consisted of Ebbe Harder supported by Pia Davidsen (The Royal Danish Academy of Fine Arts, School of Architecture) and they handled the process and realisation of the prize.

THE PRIZE SPONSOR

The prize sponsor is MONTANA – a Danish furniture design company – which has a very precise environmental policy for production and the product cyclus. MONTANA supplies intelligent storage, tables and chairs for homes and modern work spaces.

Ebbe Harder
August 2010

1FIRSTPRIZE EUR 5.000

MICHAEL K. JENSON
University of Colorado, USA
College of Architecture and Planning

Ethics or Technology?

MICHAEL K. JENSON
ETHICS OR TECHNOLOGY?
JURYS COMENT

This is an arresting paper, strongly argued, that takes a strategic stance and argues with clarity. In its exposition on such maters as “techne” and “technology” the paper is reflective and critical. The juxtaposition of Heidegger and McLuhan is stimulating, as a way of encapsulating the thinking/acting/seeing dilemma that contemporary society faces. It evokes Bateson’s “habits of thought” formulation in his Steps to Ecology of Mind.

There are some paradoxical statements that might be explored further: for example, the opposition between “spectator knowledge” and “participant knowledge”. Here one is reminded of the axiom “dichotemising pathologies”. It is, from a logical perspective a similar disjunction to that which separated “means” from “ends”. A great deal of theoretical exploration has taken place within the social sciences on the whole question of the value of the “participant observer” where different value frameworks have somehow to be drawn into relationship. The jury wonders how critical is the dichotomy – the thrust of the paper’s argument in general is against an instrumental view of knowledge and in favour of an understanding of ethics that is not exclusively homo-centric.

The paper focuses on a very important issue in architecture, in fact a dilemma for many professions. In the abstract the author sets up a clear structure for a further discussion. The first subtopic (Sustainability: Ethics or Technology) brings up many interesting points, the examples are good, what is included in the term technology is fairly clear, but a understanding of what the author considers to be ethics in relation to sustainability is less clear.

In the second sub-topic (Reigning in unintended Consequences: The Need For Ethical Reflection in Architecture) there is a certain disconnect between the title and the actual content of this sub-topic. Again, what is ethical reflection in architecture? The author goes to great lengths to define and give specificity to some terms or ideas and backs these up with many quotes, and others are simply left open for the reader to define.

The third sub-topic (Techne, Technology, and Technical Dependency) and the last sub-topic (Techne, Technology, and the Return to Relevatory Technological Knowledge) pursue a very concrete line of thought. The author in an effort to clarify and backup the argument and use of terminology has paraphrased and quoted from a great many sources. To a certain extent there is a little “over-kill”. Is some of the interesting potential points lost in the process of defining terminology, and are some of the terminology and good points (as presented) suffering when the reader applies them to specific situations. The bridges or connections between the theoretical and the more specific issues in architecture and sustainability need more work, as some

areas are very open for interpretation. (Two different types of architects will have different perceptions of when their choices are within the realm of techne or technology). To bring this challenging paper up to another level is not a rewrite but rather more a second round of critical reading

The paper offers a pertinent discussion on the ethical role of technology and the numerous approaches to nature. The discussion focuses on the strategic level and weights the philosophical stand as a starting point. The intention of the paper is very clear; and it works well with the short abstract and the outline.

It is a well structured paper that offers a proper academic discussion with fine use of references and a great mix of highly abstract and real time examples to underline the points made.
The paper misses resent literature (eco feminism), but also literature that discusses techne in close relation to architectural production/edifice (Frampton, Leatherbarrow, Hartoonian).
The paper has a clear focus and presents a well elaborated argument. It is well researched, and well founded in the literature. However, the jury regrets the absence of feminist ecological thinking, which would tie in very well with what the author has to say. It seems that the Heideggerian critique of technology is being reworked and re-thought by eco-feminism and feminist ecologists, and it would be interesting to draw also upon that material.

The jury particularly appreciates the attempt to link the more abstract overall outlook with very concrete suggestions about the reform of the curriculum.

A very deep paper, at the core of argument about sustainibility to find a paradigmatic approach. Very relevant about question of nature, technolgy and ethics (technology as a source of revelation and not of domination). It would be interesting to question and develop the concept of environment.

The Jury
May, 2010

CCTV, Beijing. Photo by the author

The coming to presence of technology threatens revealing, threatens it with the possibility that all revealing will be consumed in ordering and that everything will present itself only in the unconcealedness of standing reserve. Human activity can never directly counter this danger. Human achievement alone can never banish it. But human reflection can ponder the fact that all saving power must be of a higher essence than what is endangered, though at the same time kindred to it.

Martin Heidegger "The Question of Technology"

MICHAEL K. JENSON
University of Colorado, USA
College of Architecture and Planning

Ethics or Technology?

ABSTRACT

Though the recent emergence of "green" practices and technology is positive, architecture's faith in technology overcoming all obstacles with more technology has not been sufficiently questioned. Until this occurs, sustainable practices will remain surface endeavors and will not truly change architectural convention. Architects must re envision technology as a revelatory process for gaining authentic insight, akin to the ancient Greek concept of techne. By re-examining this concept, the attitude necessary for a shift from envisioning the environment solely in terms of its being utilizable resources for technological advancement to its having inherent value to our existence can manifest. The rediscovery of techne as a revelatory epistemological process can temper modern technology's propensity to dominate allowing a truly sustainable attitude towards the environment to emerge.

In addition, before "sustainability" can truly transform the process of architectural design and building construction, the discipline must change the prevailing conception that the solution to the current crisis will be fundamentally technologically based. Foremost, it is an ethical issue entailing a shift in how the Human/Nature relationship is envisioned. This investigation then will focus on how ethical reflection must play a central role in the development of a truly sustainable design process and will be undertaken in three parts: 1) The necessity of developing a critically reflective process towards technology, 2) how this must lead to a revelatory process of reflection akin to techne and ecofeminism's valuing of difference, and 3) how a critical ethically reflective design agenda can revalue architecture's focus regarding the environment (agency verses product). Only then we can environmentally responsible strategies integrating technology and ecology be formulated.

SUSTAINABILITY: ETHICS OR TECHNOLOGY?

When surveying any skyline, the ecological impact it represents is overwhelming. Its gleaming forms exemplify a questionable choice made over the last several decades: advancing technologies reliant on fossil fuels at the expense of a healthy environment. The ramifications of this expenditure may be argued, but the need to address its consequences is without question. As David Orr points out: " We have good reason to believe that humankind will build more buildings in the next fifty years than in the past 5000. Done by prevailing design standards, we will cast a long shadow on subsequent generations" (ORR/15). This "boom" may bode well economically, but will be delivered at the expense of the ecosystems that sustain human life. As Jared Diamond asserts in his book *Collapse*, two choices must be made to stabilize our future:

"As we continue to convert large natural habitats to human habitats such as cities, farms, or recreational landscapes at an accelerated rate, we are faced with the prospect of two choices that will dictate our success or failure in coming to terms with the relationship between our goals and their impact on the environment. "…. Long-term planning and a willingness to reconsider "core values" are crucial in tipping the scale either towards success or away from it in regards to the alleviation of the current state of extreme environmental degradation that many of our current agendas induce" (DIAMOND/522).

In regards to architecture, this core revaluing must be directed towards our fascination with technology's potential to transform life benevolently as well as the unquestioning faith in the technical expertise founding its advancement. Though the recent spread of "green" practices and technology is positive, our continued faith that technology can overcome any obstacle with more technology has yet to be adequately interrogated. Two recent personal experiences exemplify how the current paradigm of sustainability has not reached the level of significance demanded by Diamond.

The first came on a studio critique for a small housing project. One student's project amounted to the addition of several types of "green" technology to a concrete box. When asked how this specifically addressed an intriguing problem — a counseling center/transitional housing for returning female Iraq war veterans with post-traumatic stress syndrome — she became confused and defensive. When pressed harder, she embarked on a further recitation of the virtues of being "Green". The basis of my critique was simple: Sustainable technologies in themselves did not constitute a design strategy. In addition, she had not critically analyzed the appropriateness of the technology chosen. When asked about the implications of proposing a wind turbine within a tight knit urban neighborhood — how the noise and scale of the turbine might affect the recovery of returning veterans— she had no answer.

Further questions were posed: In any urban system is there not a human "ecology" to be considered? Shouldn't the spatial and material qualities of the project contribute to the welfare of its inhabitants as well as be integrated with more environmental friendly technologies? Her

continued silence indicated that her intentions were good, but were lost in an uncritical romanticism for green technologies. The second arose in a faculty meeting when the architecture chair announced a search for a "sustainable technology expert" to reinforce recent college efforts to achieve "distinction" in sustainable practices. The wisdom of narrowly defining the position was questioned by several individuals, which infuriated the chair. The concern was that sustainability was a larger issue than any single technological expertise could address and had overarching pedagogical and theoretical implications pertaining to the nature of both education and practice. How might sustainability best be developed to become a connective tissue woven through the entire educational experience? The conflict here stemmed from differing conceptions of sustainability. Some saw it as a "big picture" issue affecting the entire discipline, while others envisioned it as a focused technological expertise.

These examples illustrate how latent prejudices affect potentially transformative attitudes that might lead to a lessening architecture's environmental impact. The first exemplifies the belief that overcoming the current crisis means the creation of more technology, while the second holds that this technological increase should be precise, narrowly focused, and ethically neutral. The discipline seems caught in the trap of convention described in a statement often attributed to Albert Einstein: "You cannot solve a problem from the same consciousness that created it. You must learn to see the world anew."

This underscores the difficulty of questioning prevailing conventions of practice while developing innovative strategies of integration with the environment as well as simultaneously providing shelter to a rapidly expanding population. Technological advancement alone will not suffice; there must be an ethical foundation for understanding the entirety of the ecological impact of these strategies. A new generation must be introduced to the critical thinking skills necessary to navigate immediate needs while contributing to a paradigmatic shift in how the environment is valued. We must become more strategic and less tactical in our thinking. As contemporary architectural culture comes to terms with the rapid technological development that spawned this crisis, the absence of sound philosophical foundations is apparent.

To claim that architecture today faces a philosophical problem and to suggest that philosophical reflection should be part of any well-constructed program of architectural education is to claim not just that architects have become uncertain of their way and of the maps on which they have been relying, but that such uncertainty reflects a deeper uncertainty about how we ought to live, where our place should be, and how architects are to help shape that place, to "edify", to build in that sense." (HARRIES/11)

This uncertainty is masked in a "green" fervor that avoids a truly constructive revaluation of the Human—Nature relationship. In fact, the reassessment of the MAN—TECHNOLOGY—NATURE connection is warranted. Architects must be trained to read, understand, and operate on a larger systematic level (ORR/15).

Technology must be re envisioned as a revelatory process of learning, akin to the ancient Greek concept of *techne*. By re examining this concept, the shift from envisioning the environment as the raw material for technological advancement to an inherently valuable attribute of our existence can take place. *Techne*, thus conceived, can temper modern technology's propensity to dominate allowing authentically environmentally responsible strategies integrating technology with ecology to be formed.

Before "sustainability" can profoundly affect present architectural conventions, the perception that the solution to the current crisis is necessarily technological must change. This paper proposes that at its foundation, this issue is ethical and entails a revaluation of the Human/Nature relationship. This investigation then will focus on how ethical reflection must play a central role in sustainable practices and will unfold in several steps: 1) The necessity of developing a critically reflective process towards technology, 2) how this must lead to a revelatory process of reflection akin to techne and ecofeminism's valuing of difference, and 3) how a critical ethically reflective design agenda can revalue architecture's focus regarding the environment (agency verses product). Only then, can authentically sustainable practices emerge allowing the discipline to rise to the challenges it now faces.

ARCHITECTURE, TECHNOLOGY, AND TECHNOLOGICAL DEPENDENCE

Architecture has become a discipline both practiced and taught as the science of building. Consequently, important ethical issues are often cast aside due to budgetary constraints or client predilection. Current architectural conventions propagate negative consequences found in all environmental problems: they are unforeseen, largely unintended, and often ironic. For instance, in striving to manifest material prosperity, architects have affected the environment so detrimentally that the very prosperity they seek to materialize is undermined. The looming environmental catastrophe is a direct result of a miscalculation between overly focused human intentions and their wide-ranging ecological results — a disjunction cultivated by an uncritical reliance on technical prowess (ORR/16).

The scale of recent technological advancements has induced a collapse of "knowing into making" causing "knowing as loving" to be supplanted by "knowing as willing." The former attempts a metaphysically oriented comprehension of the natural order by seeking to understand its meaning. Modern society no longer values this type of reflection that differentiates modern attitudes from those of the "ancients". The latter envisioned human existence as part of a greater order and subordinate to natural laws whereas "moderns" envision their lives as more detached from this because there is seemingly little limitation to the transformative power of technology over Nature (BRADSHAW/10).

However, this "power without limits" exacts a price. Willing and reasoning have come together to serve as the foundation for the successes of our modern science. Willing is directed towards action and when tied to reasoning envisions the world as a field of potentially subjugated objects

ripe for our technological control (BRADSHAW/11). Hannah Arendt sums up the danger of this marriage as: "Technology's very nature is the will to will, namely to subject the whole world to its domination and rulership, whose natural end can only be total destruction" (ARENDT/178 & BRADSHAW/15).

As a multitude of large scale environmental crises emerge in the wake of our technological advancement attest, "scientific progress alone would be a hollow victory without the moral and ethical progress that must accompany it and ensure the humanization and humanity of our development and use of science" (SOMERVILLE/3 & BRADSHAW/15). As the search for an ethically critical process founding sustainable practice unfolds in the context of this technologically myopic attitude, a central question emerges: how can a space for reflection concerning large scale systemic consequences of current design practices be formed? This is difficult due to a narrowed vision of practice based on technologically dependent attitudes. However, within our western intellectual traditions, there are clues to how such reflection might emerge. Grant's speculation on thinking and production, will and reflection, illuminate a potential path:

"In the ancient world, though knowing was put in a productive relationship to making, the differences in the mentality were very distinct. The term techne described a type of knowledge that was a form of poesis or production where the knowledge base was a "leading forth" or a theoretically explorative endeavor. This "leading" emerges from outside of human willing and had as its fundamental goal a process of knowledge acquisition related directly to making, not as domination, but as comprehension (BRADSHAW/09 & CAYLEY/184-185).

Techne then, is limited in its potential for transformation as its attempts to overcome the hardships of Nature from within the natural order. Technology, on the other hand, is fundamentally limitless in its impact to its surroundings in both complexity and scale (GRANT/11-13). In addition, *techne* can be considered defensive in that it seeks only to guard against the immediate hardships placed upon humans and to manifest something specific that may not have existed previously. Technology distorts core elements such as natural laws or entire ecological systems regardless of the long-term consequences and is therefore inherently offensive in posture (ROSEN/73). The former mindset fails to challenge the primacy of Nature whereas the latter, in its sheer complexity, scale, and power, transforms it to its core. Therefore, "contemporary technology is not simply more complicated or of a greater scope and size than ancient techne, but is fundamentally different" (TABACHNICK/92 – 93).

Technology is so ingrained in the collective consciousness that its renders contemporary individuals thoroughly dependent on its instruments. This dependency runs so deep it prevents any objective assessment regarding its usage because our conceptual understanding of it is clouded by the preconception that technology will necessarily self-correct (GERRIE/186). Continued Reliance on its "fixes" creates a chronic situation where society is unable/unwilling to question the continued use of problem technologies. There is frequently misleading "evidence"

produced asserting that certain social or ecological problems are being repaired by the technologies that created them, thereby reinforcing problematic behavior, and thwarting any truly corrective action from being taken (GERRIE/187).

This over-reliance on technological fixes rests on what Marshall McLuhan feels involves a "subliminal and docile acceptance" (McLuhan/103 & GERRIE/191) brought on by an unawareness of the real and overarching effects of our technological activities. The result is that "a man is not free if he cannot see where he is going" (McLuhan/103 & GERRIE/191). Attempting to maintain an intensive self-consciously aware attitude continuously is likely to fail in creating any meaningful avenue for reflection because it is the mundane nature of our technology that dulls our awareness of its adverse effects. Simply maintaining awareness of bad habits is the most difficult part in overcoming them. As a result, a majority of the underlying conditions of our present environmental crisis rest on destructive, yet routine habits involving polluting technologies that fuel our contemporary lifestyle:

"…this attempt to repair the harm of a technology by modification, is a technological fix. If, on the other hand, we question the very purpose and intent behind the technology (e.g. of insecticides) and thereby develop alternative approaches that might require modifying our values and goals, then we recognize the limits of the technological fix" (DRENGSON 1984/260 & GERRIE/186).

TECHNE, RELEVATORY TECHNOLOGICAL KNOWLEDGE, AND THE ENVIRONMENT

How does technology then become a source for this type of revelation? Two of Heidegger's statements in *The Question Concerning Technology* provide clues for distinguishing techne and technology, as well as the potential of a return to the ancient Greek concept. This return could overcome our current dependency on technological fixes that dominate the environment to be set aside in lieu of a path seeking understanding, valuing, and working with what ecologies provide sensibly.

The phrases, "The essence of technology is not technological" and "Where the danger of technology lies, so does its savior" are both insightful and perplexing, as well as the foundation for the re conceptualization of the MAN—NATURE—TECHNOLOGY relationship. By Heidegger's reckoning, human activities like sailing or hunting were not attempts at controlling or intellectually detaching from Nature, but were manifest "scenes of disclosure" illustrating its supremacy. For example, the power of the sea was exhibited by a ship's attempt to navigate its stormy waves and to overcome these dangers the contemplation of Nature's potential to overwhelm was necessary. *Techne* then, was a knowledge cultivated to first comprehend, and then surmount a *particular* hazard in Nature (TABACHNICK /100).

Contemporary technology neither wishes nor allows such disclosure to take place. Whereas *techne* is fleeting, temporary, and continually transforming, technology manifests as a detached, inflexible, and instrumental rationality seeking to permanently impose its desire. With *techne*, an

artisan's craft is described as a "bringing forth" (HEIDEGGER & TABACHNICK /101) where Nature is a partner in a cooperative relationship and "shines through" the crafting of an artefact. For example, the characteristics of wood, stone, or metal were disclosed for Greek artisans in their alteration. Wood still decomposed similarly to its natural state and the specific characteristics of soft woods distinguished them from hard woods. These characteristics informed the capacity to forge specific materials in a congenial fashion to the final artefact (HARTOONIAN/29). By manipulating these within the context of the natural order, an understanding of their characteristics and position within that context were understood. Thus, techne maintains "an openness" towards the revealing of natural processes (TABACHNICK /101).

Contemporary technology is not a "bringing forth", but is a "challenging forth" (HEIDEGGER & TABACHNICK/101). It alters material properties so drastically that they become unrecognizable. For instance, fission transforms atoms at a level not seen directly. This makes the process difficult to comprehend. It unleashes a force so destructive it speeds up the effects of decomposition to the point that thousands of years pass in an instance. It is an "undisclosing artifact" where "we are cut off from, become unaware of, or forget the movedness or transience of existence" (TABACHNICK /102). Heidegger describes this blocking of the "shining-forth" of Nature as "enframing" (*Ge-stell*). In this state, technology does not disclose natural attributes authentically, but decontexturalizes and "frames" them squarely within the human agenda. Here, technology objectifies Nature by treating it as a repository of material waiting for technical manipulation (TABACHNICK /102). This makes comprehending authentic properties difficult and reflection outside of human action impossible.

What then is the essence of technology or rather what *ought* it be? It must again become the knowledge gained through the formation of artefacts necessary to mediate the harshness of the natural environment. What then is the danger and savior outlined in Heidegger's quotes? The danger lies in technology's potential to emerge as an "enframing" which utilizes *techne* to overpower the natural environment. This impedes humans from appreciating its essential structure and processes.

Its s*avior* lies in the re conceptualization of techne from "the will" to impose our will on nature permanently to readily accepting that our technology must be transient and limited. The "saving" of technology emerges, as humans u*nderstand* the complexity of our natural environment, but not as an attempt to acquire dominion over it. "Late in the twentieth century, we still need to think through anew the basic principles of our view of nature, and of man and especially of the relation between nature and man" (GRENE1974/346 & WIESS/112). Technology is a means towards this, but only if considered a tool for analysis. One that, at its base, holds a reverence to our most important subject: Nature *Techne*, as the ancient Greeks understood it, was a continually transforming, transient knowledge that was contextually situated. It is a type of critical practice allowing the investigation of a problem at hand, its solution, and contextual appropriateness to be assessed sensitively within the nuanced ecologies surrounding it. In our quest

to work *with* Nature, technology then is more than a "fix"; it is a type of knowledge needing continuous questioning. As Ihde reminds us: "You need to have a series of multiple perspectives, to recognize the shape, structure, and complexity of the phenomena you are investigating". (IHDE/125).

This re conceptualization of technology as a reflective process dissolving attempts at environmental colonization by Universalist rationalistic desire is akin to ecofeminist calls for an end to the domination of women and the environment by patriarchal structures. As Karen J. Warren describes, "Ecological Feminism", is a theoretical umbrella "which captures a variety of multicultural perspectives on the nature within social systems of domination between those humans in subdominant or subordinate positions, particularly women, and the domination of nonhuman nature" (WARREN/01). It is a philosophy demanding the understanding and commitment to the valuing and preservation of ecosystems through a "plurality of positions". It rejects universalized or essentialist approaches to social/ecological issues and favors searching for appropriate answers to particular problems by reflecting upon the implications of the immediate historical, political, and material implications of a given situation, at a given moment. In other words, ecofeminist "reads" can vary culturally, temporally, or even geographically as the analysis moves from one circumstance to another (WARREN/02) and consistently acknowledges the world's active agency in discourses that are "not of universal truth but of local truth, bioregional truth or an ethical vernacular" (CHENEY/172).

Cheney argues for a process of ethical reflection focused around "the other" (difference) in an interactive conversational relationship involving selfhood. He doesn't propose the elimination of metaphysical Universalist visions involving the overall structure of systems, but envisions a relationship valuing difference as well as rejecting their potential as colonizing agents. To offset this tendency towards a false unity and domination, a "grass roots" metaphysical conception must be adopted that is bioregionally based and cultivates a responsiveness to authentic encounters with environmental systems. The insights gained are not considered transportable to other contexts, but are expressions of specific interactions between individuals, environmental systems, and place (CHENEY/166). By focusing on difference, the desire is not to develop a strategy of dominance, but one of comprehension. Our interaction with the environment then;

"…has a different goal: not prediction per se, but understanding; not the power to manipulate, but empowerment — the kind of power that results from an understanding of the world around us, that simultaneously reflects and affirms our connection to that world" (KELLER/166, CHENEY/167).

So, ecofeminism is concerned with the "transvaluation" of societal values to cultivate the nurturing side of human culture. (Salleh 1992: 203) Because our technological dependency has become so pronounced, most of the modern era has been obsessed with the search for a singularly defining language that frames multiplicity and difference (enframing). Perhaps these latter aspects now must

frame questions involving intellectually unified metaphysical systems and their attempts to dominate social and environmental contexts (CHENEY/170). By this, the world becomes the active agent in the construction of knowledge where possibilities for conceiving "relationality" within social worlds disrupts "previous taxa of the human, the natural, or the constructed" (HARAWAY/03).

ARCHITECTURAL ETHICS, REFLECTION, AND THE CREATION OF A REFLEXIVE RELATIONSHIP TO THE ENVIRONMENT

Within this study, it has been asserted that it is our relationship with technology as much as with the environment that illustrates the uncertainty of our present "maps" leading to a harmful domination of the ecological systems that support us. We must learn to utilize the power of technology to reinforce and reveal the beauty and necessity of the world's natural attributes (ORR/31). Technology must become a source of revelation, not domination for our modern culture. In short, the ethical structures that found our actions, our attempts to "edify" (Harries's term, see introduction above), must become more reflective, and reflexive in regards to the environment.

Though call for ethical reflection in architecture as illustrated in karsten Harries's quote above is valid, his conception of an architectural ethics is problematic. It is based on the ancient Greek notion of ethos and connected to an authenticity related to a preconceived notion of community and its subsequent constitution of place. By this, architecture is the manifestation of community values and should reflect these in the social practices producing place. To the philosopher, this idealized relationship has been lost as technology both dominated and alienated humans from the environment. Reactionary "postmodern" movements in architecture failed to address this alienation because they focused on architecture's decorative aspects and the sensibility of the architect as the communal "watchdog" of aesthetic Taste. (FISCHER/174-75).

The proposed answer to technologically driven design is a prescriptive ethical/aesthetic agenda demanding that architects submit their creative instincts to the values of the community. If this occurs, we return to an architecture rising to the authentic or ethical standards the ancient Greeks obtained (FISCHER/175). This demand is akin to what was proposed by new urbanism as its proponents set out to prescribe the "proper" forms, programs, scales, styles, and materials of the developments following its agenda. These projects have never rose to the level of community that either Harries or their proponents envisioned. A central criticism towards this agenda is the ambiguity surrounding who defines the values of the community and the needs of its members. Ironically, this was left to market forces that have a dismal record providing for the greater common good of the community. Also, community values do not manifest in the materiality of buildings. The process of communal formation is far more complicated and even if the architectural prescriptions are followed rigidly, there is no guarantee that a cohesive community will form.

These limitations arise from a focus on the products of architects and not their design process or practices. Buildings are artefacts not inherently moral or ethical in themselves, thus it is impos-

sible for them to reflect values without understanding the ethical intentions behind the agency of their creators. As Saul Fischer asserts: "Whatever approach to guiding moral choices of architects is workable, it needs to recognize the significance of the architect's moral agency" (FISCHER/175). This echoes Alberto Perez-Gomez's assertion "…that the common good has always been a primary concern in architecture. This is evident in the writings of Vitruvius and others over the centuries who have attempted to elucidate the meaning of architectural praxis" (PEREZ-GOMEZ/02).

The philosopher Warwick Fox has developed a theory based on ethical analysis similar to the *reflective equilibrium* theory described by John Rawls. Though Fox describes it by a different name, *responsive cohesion*, its reflective nature is essentially the same:

"The term cohere literally means to cling, hold, stick or adhere together (from the Latin cohaerere, from co, together and haetere, to cling, adhere). The adjectival term, responsive (from Latin respondsum, answer) suggests that the way that we should strive to reach a state in which theory and personal evaluations cohere or 'cling together' is through a process in which each side is responsive to, or answers to, the challenges thrown up by the other side…The upshot of the process is that cohesion between the two sides is ultimately brought about, assuming this goal is reached through a process of mutual accommodation, adjustment, adaptation or reconciliation between theory and evaluation" (FOX/212).

The strength of this paradigm is that individuals are free to pursue their goals and desires, but must respond to the goals and desires of others (including the environment). Ample freedom is entertained for individual expression and self-fulfillment, but not so much that it infringes upon or impedes another's pursuits. The moral community then is the social arrangement emerging by the "clinging together" of individuals in a loosely defined order that strikes a balance between a rigidly designated ethical community (major infringement or no freedom at all) and one that is too loosely defined (no sense of community) (FOX/213). This theory goes a good distance in addressing the relationship between thinking about all life (the environment) and the development of a position in architectural design that is sensitive to those needs. By this, and in the terminology of Leopold's, "Land ethic": "a thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise" (LEOPOLD 204, RADFORD/512).

Though achieving an internally cohesive logic underlying an activity like architecture is important, reaching a responsive cohesion with a surrounding context is seen as paramount. It follows that the largest context to address in reaching a cohesive state is the natural environment. The well being of the largest context (earth) is hierarchically more important than regional or urban contexts. This is not to say that internal cohesion in the design process is not important, for to not achieve this is a failure of the design process, but protection of this larger context must be the primary basis for all decisions, technological, aesthetic, economic, or otherwise (RADFORD/516).

If an ethic of responsive cohesion underlies our design process, the architect's core set of skills moves from being purely the invention of beautiful forms through a spatial/material language to a core aptitude involving the connection of all natural, social, and material contexts surrounding a construct. In other words, "the core skill of an architect is the ability to give effect to a general foundational value within the *specific* domain of architecture. This skill distinguishes architects from other members of society" (RADFORD/523).

For sustainability to truly transform our conventions, it must demand an understanding involving all "contexts" surrounding a project. These might span from the ramifications of resource extraction globally (affecting material choices) through to the affects of specific planning codes as well as a broader conception of efficiency involving the technologies incorporated into the logic of the design process. In other words, the architect must first comprehend, and then frame the appropriate elements that must cohere in a particular circumstance as well as understand the implications that this frame brings to the system. This is a complex, demanding, but necessary expectation of the discipline. To be authentically architecturally sustainable, our conception of it must move from its being a more technologically sophisticated arsenal founding an environmentally ambivalent universalized design logic to an outwardly focused means of analysis that appropriately addresses the general needs of the environment and the specific needs of the project simultaneously. It must become a logic that utilizes design to adequately comprehend the relationship between our needs, the needs of the ecosystem, and the balance that must be struck for each to thrive. As Fox asserts: *achieving a sustainable way of living is not just a technical issue (although it is often discussed as if it were), but also (and fundamentally) an ethical one.* (Author's italics) (FOX/06).

CONCLUSION: AN ETHICAL PRELUDE TO A CONTINUALLY EMERGENT SUSTAINABLEATTITUDE IN ARCHITECTURE

The environmental crisis has exploded onto the contemporary global consciousness with surprising force and speed. In the face of this looming crisis, the hocking of greener projects and products not only eases the conscious of the modern consumer, but also keeps alive a frame of mind offering no long-term solutions. Our reliance on consumption and convenience has forged this path and the goal of architects should be to embrace our role as potential educators in the transformation of this mindset to embrace alternate ecological possibilities. If our houses, offices, and means of transportation, are seen as educative, then architecture can stem its recent trend towards the margins and serve as an ethical "midwife" to a more environmentally sensitive attitude. (ORR/30) If our creation of the built environment is 70% of the natural resources utilized globally per year, architectural education seems a likely starting point to influence the environmental education of the general public. A design "rethink" is necessary that reveals environmentally appropriate technological applications to overcoming immediate and tangible problems.

The central revelation of the writing of this text was that though my focus was sustainability, it became apparent that the criticism struck upon issues not new to the discipline. They are just

more pressing due to globalization and the environmental crisis it has produced. The calls for a focus on agency, the understanding of the complexity, connections, and nuances of the varying scales of context, a critical outlook towards technology, and a reflective/reflexive attitude towards the environment have been presented in various formats (ranging from aesthetic and stylistic concerns, to formal and functional ones) for decades, if not centuries. The difference now is that the circumstance is such that the potential for this crisis to negatively affect a huge number of lives is immense, very real, and imminent. The positive aspect of a crisis is that it demands action, and thus is an opportunity for the discipline to exercise some "demons". The grandest of these affects education and is based on the search for a universalized ideology of architectural design that organizes a curriculum to the point that architecture is portrayed as a uniformed system. This re conceptualization of both education and practice demands stepping outside conventional views reliant on entrenched ideologies:

…professions tend to impose (as far as they can) a fixed cohesion on situations, disciplines tend to acknowledge and embrace the inherent impossibility of a fixed cohesion and offer a loose label under which a continual search for responsive cohesion can thrive. (Radford/525)

The former has dictated the identity of the practitioner and the "frame" for their education for decades. At the beginning of the 21st century both need to change by reinforcing the latter's disciplinary attitude.

This study also contained another revelation. Though the call for a paradigm shift is seemingly simple and straight forward, the ripples, connections, and effects it causes touch a myriad of topics and disciplines including ethics, technology, and the environment. However, it is important to attend to as many of these as possible. On the positive side, understanding this complexity is a majority of the work. This is true for most influential works of philosophy. The concept is simple, the ramifications immense. An example I use to illustrate this to my students is Heidegger's seminal text, *Being and Time* (Sein und Ziet). The fundamental assertion of this text is that existence is temporally based. In other words, you cannot consider existence outside of temporality. This was a simple concept that took only several hundred pages to explicate and consider the ramifications of its thesis. Given the scale and complexity that we must now address to achieve this "sustainable revolution", the present conventions of architecture need this type of rigorous consideration.

Giving up a Universalist paradigm for practice and the education of architects means adopting a vision emphasizing the importance of agency and ethical reflection. This brings individuality, personal views, and accountability back into the formula. Simple in concept, but the ramifications of such a move will affect the entire discipline. The need for architectural programs to become more integrated and interdisciplinary is paramount to our success in this quest. The vision of the architect as "all knowing" has to be cast aside permanently altering the design studio format considerably.

The role of the studio should enlarge to structure the entirety of a student's education. Each semester would be considered one studio, not three to five different courses. All instructors would be involved in the integrated education of the designer, being present at mid-term and final critiques as well as giving individual critiques regularly. Also, to specifically address the need for ethical reflection encouraging social and environmental responsibility, the coursework involved outside the conventional studio structure should be multi-disciplinary. For instance, an environmental ethics course must be taught by an environmental philosopher, not a "sustainable" architect with a cursory knowledge of the relevant issues within this discipline.

In addition, subjects that deal with larger context issues would always be paired with more focused ones. A structures class (taught in the engineering department) might be given with a philosophy of technology course (taught in the philosophy department) and a history course (perhaps taught in a history or art history department) under the studio umbrella. At the beginning of each semester, the design faculty would convene the "teams" (not as a "head", but as a facilitator) to discuss and outline semester goals so distinct disciplinary material could be integrated to highlight potential ramifications for the studio project. Mid-term and final critiques could assess how well students understood larger context issues, incorporated this information into all levels of their project, and utilized the knowledge base of other disciplines.

To conclude, the roles of technology and ethics in regards to sustainability must be revalued to transcend the mentality of the technological "fix" which forces us to be only tactical, when we must really be strategic. The emphasis for being sustainable must become more than increasing the efficiency of our technology in regards to energy and focus on formulating innovative design processes that seek integration into surrounding ecosystems. The sensitivity necessary for this is only possible if attaining a better understanding of the complexities and fragility of the natural environment is considered the highest priority. This is an ethical stance, one that demands a reflective relationship with a particular context and a clear respect for "difference." Again, this involves the formalization of a strategy, because we must understand our goals clearly, but the paths to reaching these cannot become artificially fixed or unnecessarily uniformed.

As Ivone Gebara reminds us, "…any ethics is always an ethical prelude that can never become a totalitarian and static system. It must always be attentive to the complexity of situations and to new elements that occur" (GEBARA/174). To date, architects have been addressing sustainability as a kind of technological appliqué to conventions founded upon an internalized design agenda that has not changed considerably since the time of Vitruvius. In ways, architectural practice and education are truly closed systems. For "sustainability" to meet the needs of the current crisis it must be envisioned as an open and flexible means towards a greater understanding of the environment that questions the entirety of the design process continually. The strength of this attitude is that one must choose only to begin and then be open to the lessons learned and the understanding that is forthcoming.

REFERENCES

ARENDT, H. 2000. "The Concept of History." in *The Portable Hannah Arendt*. Peter Baier, editor. New York: Penguin. (Reprinted from Review of Politics 20, no 4 1958.)

BRADSHAW, L. 2005. "Technology and Political Education" in Te*chne* 9:1 Fall 2005 P. 8-26.

CAYLEY, D. 1995. *George Grant in Conversation*. Toronto: Anansi Press.

CHENEY, J. 1994. "NATURE/THEORY/DIFFERENCE: Ecofeminism and the Reconstruction of Environmental Ethics" in *Ecological Feminism*. Karen J. Warren, editor. London: Routledge. P. 159-178.

DIAMOND, J. 2004. *Collapse: How societies Choose to Fail or Succeed*. New York: Viking adult.

DRENGSON, A. R., 1984. "The Sacred and the Limits of the Technological Fix" in *Zygon* 19 (September): 260.

FISCHER, S., 2000. "How to Think about the Ethics of Architecture" in *Ethics and the Built Environment.* Warrick Fox, editor. London: Routledge. P. 170-182.

FOX, W. 2000. "Towards an Ethics (or at Least a Value Theory) of the Built Environment in *Ethics and the Built Environment.* Warrick Fox, editor. London: Routledge. P. 207-221.

GEBARA, I. 2003. "Ecofeminism: An Ethics of Life" in *Ecofeminism and Globalization: Exploring Culture, Context, and Religion*. Heather Eaton & Lois Ann Lorentzen, editors. Lanham, Maryland: Rowman & Littlefield Publishers. P. 163—176.

GERRIE, J., 2008. "Three Species of Technological Dependency" in *Techne* 12:3 Fall 2008. P.184-193.

GRANT, G. 1986. *Technology and Justice*. Concord: Anansi.

GRENE, M. 1974. *Understanding Nature*. Dordrecht: D. Reidel Publishing Company.

HARAWAY, D. 1988. "The Actors are Cyborg, Nature is Coyote, and the Geography is Elsewhere: Postscript to Cyborgs at Large." in *Technoculture*. Minneapolis, MN: University of Minnesota Press.

HARRIES, K., 1997. *The Ethical Function of Architecture*. Cambridge MA: MIT Press

HEIDEGGER, M., 1962. *Being and Time.* Translated by John Macquarrie & Edward Robinson. Oxford: Blackwell.

HEIDEGGER, M., 1969. *The Question Concerning Technology and Other Essays.* Translated by William Lovitt. New York: Harper Torchbooks.

HARTOONIAN, G. 1994. *Ontology of Construction: On Nihilism of Technology in Theories of Modern Architecture.* Cambridge University Press.

IHDE, D., 1983. *Existential Technics.* Albany: SUNY Press.

IHDE, D. & SELINGER, E. (EDS.) 1993. Chasing Technoscience: Matrix of Materiality. Bloomington: Indiana University Press.

IHDE, D. 2002. *Bodies in Technology.* Minneapolis: University of Minneapolis Press.

INNIS, R. 2003. "The Meanings of Technology" in *Techne* 7:1 Fall 2003, P. 49-58.

KELLER, E.F., 1985. *Reflections on Gender and Science*. New Haven: Yale University Press.

LEOPOLD, A. 1968. *A Sand County Almanac*. London: Oxford University Press.

MCLUHAN, M. 1977. "From Understanding Media: The New Science" in *Technology and Man's Future,* 2nd ed., A.H. Teich, Editor. New York: St. Martin's Press.

ORR, D., 2007. "Architecture, Ecological Design, and Human Ecology" in *The Green Braid: Towards an Architecture of Ecology, Economy, and Equity.* Kim Tanzer & Rafael Longoria, Editors. New York: Routledge

PEREZ-GOMEZ, A. 1994. "Introduction" in *Architecture, Ethics, and Technology.* Louise Pelletier & Alberto Perez-Gomez, editors. Montreal: McGill-Queen's University Press.

RADFORD, A. 2010. "Responsive Cohension as the Foundational Value in Architecture" in *The Journal of Architecture,* 14:4, P. 511-532.

ROSEN, S., 1993. "Techne and the Origins of Modernity." in *Technology in the Western Tradition*. Arthur Melzer, Jerry Weinberger, & M. Richard Zinman, Editors. Ithaca: Cornell University Press, P. 69-84.

SALLEH, A. 1992. "The Ecofeminism/Deep Ecology Debate: A Reply to Patriarchal Reason" in *Environmental Ethics,* Volume 14, Fall 1992. P 195-216.

SOMMERVILLE, M. 2000. *The Ethical Canary.* Toronto: Viking/Penguin Press.

TABACHNICK, D., 2004. "Techne, Technology, and Tragedy" in *Techne* 7:3 Spring 2004. P. 91-112.

WARREN, K., 1994. “Introduction” in *Ecological Feminism*. Karen J. Warren, editor. London: Routledge. P. 01-07.
WEISS, D., 2008. “Human—Technology—World” in *Techne*, 12:2 Spring 2008, P. 110-119.

2SECONDPRIZE EUR 4.000

KIM SORVIG
University of New Mexico, USA
School of Architecture and Planning

The architect's Footprint: Toward a Green History an a critical Practice of Building

KIM SORVIG

THE ARCHITECT'S FOOTPRINT: TOWARD A GREEN HISTORY AND A CRITICAL PRACTICE OF BUILDING

JURYS COMENT

This is a strong paper, with a clear focus that addresses the area of concern that has stimulated the competition. The essay translates the metaphor of the "ecological footprint" into a physical measure, with a playful but intellectually challenging reference to impact on the surface of the earth of architectural thinking and practice. The author suggests that this translation can critically affect core teaching and practice.

There is, within the essay, a crucial step, and one that is less well argued than one would wish. The question "To what extent is the 'land footprint' an architectural issue?" is answered in a sketchy way, quickly conflating impacts of planning, landscape design, architectural practice and the construction industry. One does not doubt that these disciplines sing largely from the same hymn-sheet, but one wishes that the essay would demonstrate this with the same sharpness of argument that is visible in other parts of the essay, rather than simply proclaim it to be so.

The paper is very straight forward, organized and has a balanced argumentation. The subject of the paper is very important, little discussed, and interesting both in relation to education and the profession.

There are a few areas that could benefit from one more round of critical reading and adjustment. The jury thinks it is very important that the reader is not able to label the argument as "romantic or not feasible in the real world". An example is the questions starting on page 39 that give concrete examples of pre-modern construction, and then the counterbalance or bridge to what this means in today's situation is less clear. There is a danger that what are very good points, important, in relation to sustainability in architecture can be interpreted as nostalgic.

Another area that could benefit with a little more discussion is what is involved in downsizing – the consequences will also impact social and political agendas, most individuals on a very basic level, design methods and architectural aspirations, as well as the ecological footprint. Who will be asked (or forced) to downsize for the problem will impact more than just Western cultures? The conclusion would also benefit with a second round of critical reading keeping in mind the above remarks.

The paper addresses a very important and relevant topic, but how to incorporate an architectural footprint analysis or approach is not fully described. E.g. In the section (p. 36): To what extent is the 'land footprint' an architectural issue? The architectural issue is here very briefly

touched upon. There are no references to any sources who deal with this matter or any helpful elaboration (examples or scenarios) of how architects, planners, developers, building contractors affect ecosystem services. The paper introduces a number of clearly stated ideas that also reach beyond architecture. They often seem relevant but some of them are not sufficiently argumented. In particular when discussing the Jevons Paradox it is important to choose the right examples to underline the point. Here the jury finds the argument that; the 'green revolution' has led to obesity, describing a problem that is way too complex. It cannot be mentioned 'en passant', like this … It either has to be explained in greater detail or left out.

The paper only roughly describes/holds a methodology. In its present form it is most of all an inspirational essay suggesting ideas to be dealt with in architectural education. It may benefit from elaborating the underlying scientific question: In what way and to what extend can the architectural profession contribute to minimize the environmental footprint in future construction. This could in particular be dealt with in the conclusion that is quite light hearted.

The jury has really enjoyed this paper and we believe it makes a great point about the need for a green history. We also appreciated the idea that an architect should be worried about the land footprint of his/her buildings.

The paper can still be improved by giving it a clearer structure and a more integral argument. Now there are really two parts to the whole that could be developed independently from one another. The jury suggests to make it more clear from the beginning what exactly the focus will be and how the idea of 'green history' ties in with the idea of the smaller land footprint.

The author's argument is very relevant for sustainibility. Strong line of argumentation as education and strong references used as analysis and questioning. It makes statement of foot-print and opens a frame of thinking and resaerching. It would be interesting to develop this approach not only about building but about the urban environment.

The Jury
May, 2010

KIM SORVIG
University of New Mexico, USA
School of Architecture and Planning

The architect's Footprint: Toward a Green History an a critical Practice of Building

A number of years ago, before global climate change had become a daily topic for anyone except a few worried scientists, the noted American geographer J.B. Jackson addressed the graduating class of an architecture school.[1] His message was mercifully short (for such an occasion); it startled some instructors, and delighted most students. Quit trying to create conceptual conundrums or rivals for your favorite Great Building, Jackson told the new initiates. The prime task of an architect, he continued, should be designing the *smallest* and *simplest livable* house.

Today, climate concerns are widespread, and what Jackson was advocating is often called "reducing one's footprint." It is increasingly clear that architects must do so (along with landscape architects, urban designers, and the entire industry that designs, constructs, and maintains the built environment).[2] Jackson, a notorious curmudgeon, might have disdained the popular phrase, but the concept of an *ecological footprint*, thoughtfully expanded beyond its current usage, has much to offer the architectural professions.

This essay considers the architect's footprint from several perspectives:

- Defining 'footprint' environmentally and in architecture, where it has dual significance
- Implementing a reduced footprint in practice
- Enriching design history by *comparative* analysis of footprints in different eras and cultures
- Educating the next generation about architecture's impact and potential

Because the topic is both broad and new to many architects, the essay is intended to stimulate

discussion, research, and teaching. Rather than prescribe, it suggests how we can develop rigorous scholarly and pedagogic approaches, and priorities for practice.

An expanded concept of footprint implies changes, not only in the pragmatics of design, but in the way architects conceive of their work, their place in human society, their relationship to the more-than-human world, and the ethical responsibilities involved in this web of relationships. Among the most urgent of those responsibilities is action to slow the rate of climate change. We cannot shoulder that task without thorough-going awareness of our industry's impact. The footprint concept, applied methodically to the built environment, is an essential tool for advancing and critically informing that awareness in practice, theory, history, and education.

TRACKING A CONCEPT

Using a footprint to represent the environmental cost of acquiring consumer resources began in the early 1990s. The original 'ecological footprint' was expressed as the *area of land* required to produce the resources consumed.3 Although it refers to land as a generic expanse rather than a specific site, this footprint metaphor is explicitly s*patial* and quite evocative: a measurable area of earth trodden underfoot by human passage. The concept dramatized differences in footprint among nations, and showed that extending industrialized consumerism to all humans would require several more Earths.

More recently, a 'carbon footprint' has become popular, and, by extension, a 'water footprint.'[4] Useful though they are, these resource footprints are no longer expressed in terms of land area.[5] They are measured in *tons of carbon* or volumes of water. Not inconsequentially, they no longer truly fit the poetics of a footprint. Carbon and water 'footprints' are simply abstract quantities of a resource consumed. They are not site-spand in fact, are considered portable. Unlike the original hectares-per-person , they doevoke the impression of boots on actual soil.

This conceptual difference – between spatial and non-spatial footprints – takes on special importance when applied to architecture, construction, and development.

THE ARCHITECT'S FOOTPRINT – A TWO-STEP CONCEPT

Humans as builders use resources to shape, control, and give meaning to space.[6] Like a consumer's footprint, the architect's resource 'footprint' can be expressed as so many hectares/acres required to produce lumber or mine clay or stone for a structure. This resource footprint is a *spatial abstraction*, usually localized off-site (in a distant and often generic forest or quarry, for example).

When applied to buildings, however, the footprint also has a literal component: a *specific* area of land on the building site itself. The impacts of this literal 'land footprint' are related to but independent of the level of resource efficiency achieved.

In its impact on climate change, the often-ignored literal *land footprint* may equal or exceed in

importance the metaphorical *resource footprint*. The architect's footprint includes both. Thus, it is important to consider differences and interlinkages between these two concepts, and the impact that each has on the profession's attempts to act – and teach – in sustainable and responsible ways.

Buildings clearly have the abstract type of resource-cost footprint. The *materials* an architect chooses may vary widely in life-cycle environmental costs, due to availability, renewability, durability, and embodied energy for production, as well as transportation required from source to site. The *configuration* of those materials (by engineering requirements or functional layout) also affect resource quantities needed to meet a given function, and operational efficiency of the facility. Often overlooked is the human or *cultural factor*. Buildings that are meaningful and/or beautiful to their owners and users are treated respectfully and thus endure; meaningless, banal, and ugly structures are treated as disposable, increasing their life-cycle costs dramatically. Similarly, where construction work is construed as banal drudgery, systemic waste is likely, with associated environmental costs.

Improving cradle-to-grave (or cradle-to-cradle) resource efficiency of building and building-operation practices is clearly one aspect of 'reducing the architect's footprint.' This is the major argument put forward by the organization Architecture2030.7 With study after study showing that production, operation, and decommissioning of buildings consumes 40 to 70 percent of all resources in developed countries,[8] Architecture2030 stresses that architects bear both the responsibility and the power to scale back climate change. Students and recent graduates are among Architecture2030's most enthusiastic supporters, and have pushed hard to include climate-responsible topics in all design school curricula.

As noted above, however, the 'resource footprint' usually leaves out the spatial aspect that is so central to building. In architectural parlance, 'footprint' has a specialized meaning: *the area occupied by a structure, as projected upon the ground plane*.[9] This is the area of literal impact upon the site itself.[10]

No matter how few resources are used to build the walls and roof, the act of constructing an impervious box over living soil has significant impact. Creation of impervious surfaces is the root cause of a wide range of ecological problems attributable to urbanization.[11] Thus, taking J.B. Jackson's suggestion literally, reducing the size of every building's on-site footprint, in square meters or square feet of land occupied, is one of the most important actions any architect can take in defense of a sustainable world and a livable climate.

Yet despite increasing public demand for sustainable construction and products, the literal land footprint is treated as a side issue, at best. Fascination with efficient technology pushes land aside: for instance, what Americans call 'MacMansions' (grotesquely oversized trophy homes) often sport all manner of 'green' technology, a bitter irony for those serious about sustainability

Fig. 1

Taos Pueblo (New Mexico). Earthen construction makes this World Heritage Site's resource footprint very small. Its land footprint is extensive, although compact when considered per capita. (Photo by author).

and/or 'deep ecology.' There is even evidence (the Jevons Paradox, discussed below) indicating that resource efficiency leads to *increased* resource consumption.

Obviously, architects and their professional colleagues are not singlehandedly responsible for such cultural blindness. The roots of the problem can be seen in legal definitions of land as 'unimproved' until a building is placed upon it. Even if this 'improvement' destroys critical habitat for a dozen species, the developed structure is *legally* construed as the 'highest and best use' of the land.[12] This pernicious mythology leads to the displacement of productive farming (not to mention nature or scenery) in favor of warehouses, tract homes, or parking. A basic need – structural shelter – has become an ever-expanding and seemingly limitless commodity.

Reducing the *resource footprint* of buildings is necessary to produce genuine sustainable architecture, but is by no means sufficient unless the *land footprint* is also reduced. Architecture2030 reasons that architects must own responsibility for energy use. Similarly, architects, landscape architects, planners, urban designers, and civil engineers have significant influence over the extent of land impacted by building or development. This confers great responsibility, but also great potential, to reduce that footprint.

By insisting that minimum livable size is a fundamental criterion by which architecture must be judged, J.B. Jackson was acknowledging that the land – as a source of materials and as a living system – has a carrying capacity.[13] There is, in other words, a limit to the total area that humans can build without disrupting the biosphere – even if every constructed square centimeter were completely carbon-neutral, non-toxic, and renewable.

Respecting the carrying capacity of the earth upon which we live and build has been called a 'land ethic.' One of the foremost proponents of this concept, and possibly the originator of the term, was conservationist Aldo Leopold. His criteria for human relations with the earth are widely quoted: "*A thing is right*," he wrote in his 1949 *Sand County Almanac*,[14] "*when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise*." Although many works of architecture aspire to these ends, the industry often treads heavily upon the biotic community, deliberately or accidentally damaging its integrity, stability, and beauty.[15] Without changing this relationship, no amount of technical 'greenness' will make architecture, landscape architecture, and urban development meaningfully sustainable.

Developing a land ethic for architecture must be a major priority of professional education, especially in view of climate change. Schools are attracting an increasing number of students dedicated to sustainability (and concerned about climate); increasingly, curricula include green techniques and strategies. What most needs to be strengthened is a rigorous understanding of how the footprint of architecture can be reduced; an unromanticized perspective on how the architect's footprint has evolved, usually toward a heavier impact; and a deep ethical and practical appreciation of the land upon which buildings, cities, and regional infrastructure impress their tracks.

THE FOOTPRINT ON THE EARTH

The land footprint – the space occupied by structures – has an obvious indirect effect on resource consumption: a larger spatial footprint increases the construction resource footprint (assuming methods and materials are the same). Less obvious are two *direct* effects of occupying land surface. Detailed below, these are:

- Diminished or lost 'ecosystem services'
- Climate change d*ue directly* to land clearance

Neither concept has yet been integrated thoroughly into 'green building,' although a number of efforts are afoot to do so.[16]

Ecosystem Services[17]

Human life, like all other life on Earth, depends on biosphere interactions. Soil, climate, and non-human life-forms allow human survival, a fact many 'high' civilizations take for granted. The number of such services for which there is no mechanized replacement, at any cost, is sobering. Many of these 'services' take place at or near the land surface. Many depend for their function

Table 1
Ecosystem services affectedby site clearance and construction

- food production; pasturage (Photosynthetic plants are Earth's only truly productive creatures; all animals rely on vegetative capture of solar energy.)
- crop pollination; limitations on pest and disease spread; seed dispersal
- medicines
- fuel production (including wind and sun, which are part of ecosystems)
- water ('pumped' by solar energy and gravity, purified by solar distillation, and filtered by soils, microbes, and plants); hydropower
- global climate regulation; microclimate stabilization
- air purification
- soil stabilization and regeneration
- waste decomposition ; carbon cycling
- intangibles: cultural and scientific inspiration, recreational opportunities, 'scenery' (which confers well-documented health benefits) and many others.

on specific spatial relationships, such as location within a regional pattern, or necessary ratios between surface area and volume, for example.[18] Thus ecosystem services can be interrupted, displaced, or halted by almost any structure placed on or into the earth. Inappropriately located development may also be so far from any natural source of these services that artificial or technological substitutes must be created, usually at significant cost.

Extraction of resources, particularly mining of non-renewable ones, disrupts ecosystem services directly. In addition, using those resources to site and build structures has an impact separate from resource extraction itself. In this sense, architectural resource use has two footprints on ecosystem services.

On-going attempts to assign financial value to ecosystem services have produced varied estimates. It is clear that the value of such services is not only very high, but also great value for money. In one widely cited early study,[19] New York City achieved water quality control by buying and restoring land in its reservoirs' watershed, at a cost of US$1.5 billion. The cost of the same control by mechanical and chemical treatment was estimated at six to eight billion in capital – at least four times as much – plus recurring operating costs (avoided by ecosystem services). Another study put the value of services by non-crop vegetation globally at US$2.9 trillion annually.[20]

Land Clearance and Climate Change

Fossil-fuel consumption in cars, machines, and power plants is the focus of most press coverage, and most credible science, about human-caused climate change. Within the past decade, however, at least a half-dozen major studies have also shown that land clearance produces u*p to half of all CO_2 emissions*. That is, clearing land of its vegetative cover is responsible for greenhouse gases in quantities approaching those produced from fossil fuels.[21] This throws society's 'land footprint' – including clearance undertaken for development – into sharp relief as a major cause of climate change.

The mechanisms by which vegetation removal affects climate are relatively well understood; quantitative documentation is still a work in progress, and effects vary regionally.[22] In general, however, the process is basic enough to be familiar to any student ofbiology or ecology – but not, unfortunately, to students of architecture or even landscape architecture. In an ecosystem with mature vegetative coverage, canopy vegetation lessens the physical impact of raindrops, decreasing erosion and runoff (see Fig. 2). Where runoff doesoccur, it is less likely to contain sediments or pollutants than runoff from exposed soil, pavement or roofs. There is evidence that transpiration (in which plants 'sweat' water thrtheir leaves) keeps local microclimates cooler and moister, and tends to 'attract' regional precipitation. Vegetation sheds organic matter into the soil, and helps hold it there. Organic matter in turn helps precipitation infiltrate the soil, and holds it avaiable for plant roots.

When major amounts of vegetation are removed (whether replaced by impervious structures, paving, or monocultures such as lawns) these processes are reversed (see fig. 3). Less organic matter is produced, and more lost via water or wind. Runoff increases in volume, speed, and erosive force, and carries higher quantities of sediments and pollutants downstream. With water less available to roots, any remaining plants are stressed and often die, which produces standing fuel for wildfire. Bare soil is exposed, increasing its susceptibility to erosion, and in some climates, baking it in the sun. Humidity and shade are lost, resulting in a harsher microclimate that is seasonally both hotter *and* colder than under vegetated conditions. Loss of vegetated habitat displaces animals that might serve as pollinators or vectors for seed spread, reducing the likelihood of revegetation.

These conditions contribute to extreme and unpredictable weather of all sorts: not only the popularized issue of 'warming,' but also flood, drought, extreme winds, fire (fueled by drought and driven terrifyingly by wind), and unstable temperature swings. Cumulatively, clearance is called deforestation,[23] and leads to creation or expansion of deserts. In short, land clearance has strong causal links to almost every phenomenon of concern under the broad heading of climate change.

Land clearance and disruption of ecosystem services can often (though far from always) be traced back to activities of our professions: creation of buildings, paving, infrastructure, and

Fig. 2
Simplified diagram of healthy vegetation/climate interactions. (Graphic by author.)

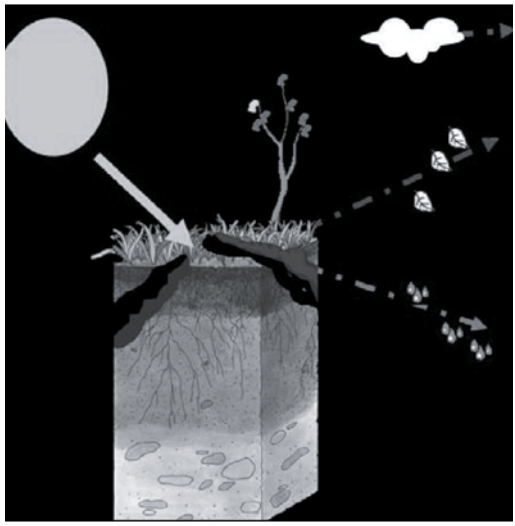


Fig. 3
Simplified diagram of climate effects of vegetation clearance. (Graphic by author.)

urbanization, and planted landscapes that can dramatically reduce site biodiversity. It is important, however, to ask two questions about development-specific land impact:

- Is it as large as the impact of agricultural clearance?
- Is it as serious as the consumption of raw materials per se?

HOW DO THE LAND FOOTPRINTS OF DEVELOPMENT AND AGRICULTURE COMPARE?

Land clearance occurs for varying reasons, but in industrialized countries at least, architecture and allied professions are involved in a significant proportion of it. It may be argued that ecosystem services and vegetative cover are less affected by architecture than by other human pursuits, especially agriculture and forestry. The validity of that argument depends on whether one takes a wide historical viewpoint, or a current one.

In developing countries, agriculture remains the primary reason for land clearance (along with mining and timbering in some regions). Similarly, in the *history* of most industrialized nations, a first wave of land clearance was carried out in pursuit of agriculture (and mining and timber). For example, some 95% of pre-colonial forest and wetland were cleared in the United States by the late 1990s.[24] Nations like Brazil are now rapidly following the same trajectory.

Today, however, in most industrialized nations, areas devoted to cultivation are actually shrinking.[25] In those countries also, mining, drilling, and timbering have been limited by social and

Fig. 4

Both agricultural clearance (left; source USDA) and urban clearance (right, by author) vary in approach and intensity; both affect huge areas. In industrialized countries, and increasingly worldwide, more new clearance is done for development than for agriculture.

environmental laws, pushing such activities into developing nations where regulation is lax.[26] Although precise statistics are seldom available, these trends in land-use leave *development* as the biggest factor in land-clearance in wealthier nations today.

In the US, for example, about 3 million acres (1.2 million hectares) are 'lost to agriculture' annually, much of it consumed by nearly 1.4 million acres (566,000 hectares) of new housing sites.[27] In addition to new sites, areas previously cleared for agriculture or forestry are re-cleared for development. It can also be argued that agricultural clearing is less final than clearance for construction. Once occupied by buildings, sites are repeatedly clear-cutunder mandatory 'wildfire prevention' policies of dubious efficacy.[28] Areas formerly cleareagriculture, then abandoned due to economic changes, revert to 'second-growth' forests. Areas cleared for structural development retain as little as ten percent of their permeability,[29] and unlike agricultural clearance, this reduction is usually permanent and difficult to restore.

Thus, although the largest *historical* land footprint of most societies has been due to agriculture, today in Europe, North America, and parts of Asia it is the architect's footprint that has greater impact. In such places, the work of landscape architects, planners, developers, building contractors, and architects is probably the largest force directly affecting ecosystem services and vegetative clearance – whether negatively or positively.

WHAT IS THE RELATIVE IMPORTANCE OF *LAND FOOTPRINT* AND *RESOURCE FOOTPRINT*?

Because distinctions between development's land and resource footprints are not yet widely studied, it is difficult to find quantitative assessments of these two types of impact. In fact, one of this essay's purposes is to urge that research be undertaken to provide such quantitative comparisons. In the meantime, there are several indications that the land footprint should be considered equally important as the resource footprint:

First: ecosystem services and land area are essentially irreplaceable. Some construction resources, like timber, are renewable in a timeframe that allows humans to 'borrow' the resource without long-term degradation. Even these are usually land-based. Once rendered lifeless, soil as a resource is very slow to renew. Land area is essential to life, whether as 'open space' or simply as the emptiness that allows function to occur.[30]

Second: not all resource consumption has a direct impact on climate. Use of quarried granite, *per se*, does not affect climate much; it is the removal of vegetation and soil, and fuel for mining operations and transport of the material, that have greater impact. Consumption of land and removal of vegetation *always* have major direct impacts on climate.

Third: spatial land impact is usually *additional* to off-site resource impacts. To put this another way, even if humans obtained all building materials from exploiting another planet, *placing* those resources as structures on the earth would have its own impact.

THE JEVONS PARADOX:[31] FURTHER ARGUMENT FOR A FRUGAL LAND ETHIC

First formalized by William Stanley Jevons in 1865, the Jevons Paradox is an under-appreciated economic theorem. It states that *increased efficiency in the use of a resource leads not to decreased total use, but to increased consumption*. Jevons initially applied this to coal; it has since been used to explain less-than-hoped-for results of technical efficiency in fuels, foods, and other consumables. For example, the 1970s 'energy crisis' stimulated increased fuel efficiency for American cars; this led to cheaper gasoline and *increased* per-capita miles driven, compounded by population growth. Similarly, fuel-efficient building design in the 1980s failed to reduce *cumulative* total usage. Several studies have also shown that the more a community recycles, the more it also is likely to consume.[32]

As the authors of *The Myth of Resource Efficiency: The Jevons Paradox*[33] state, "Many scientists and policymakers argue that future technological innovations will reduce consumption of resources; the Jevons Paradox explains why this may be a false hope."

A true paradox, Jevons' concept could explain why many architectural clients are incorporating efficient 'sustainable' materials and technologies into over-sized houses: efficiency fosters conspicuous consumption. The Paradox could, conversely, be one reason why green building remains

affordable only to the relatively wealthy: to take advantage of new 'sustainable' efficiencies requires money upfront. The poor, who would benefit most from drastically reduced operating costs of, for example, passive solar heating, cannot afford to invest in future life-cycle savings no matter how efficient.

In short, if major reduction of our resource footprint is a vain hope, reducing the land footprint *gains* in importance. As one reviewer of *The Myth of Resource Efficiency* stated: "Efficiency does not [result in] frugality; it makes frugality less necessary. But if we seek frugality first we get efficiency second…"[34] This underscores JB Jackson's somewhat cryptic insistence that making the *smallest* possible house should be the first imperative in architecture.

IN PRACTICE: REDUCED FOOTPRINT AS NEXT STEP

Most of today's 'green building' literature discusses techniques for reducing the resource footprint of structures. If, as argued above, reducing our land footprint is equally important, what can building professionals do toward this end? Table 2 lists suggestions for efforts in developed countries; some involve direct influence over clients and markets, others indirect influence to change policies.[35] Specifics vary among countries: Europe is generally ahead of the US in legal protections for land, for instance.

Policy for developed nations can seldom be applied directly in developing ones.[36] 'Third-world' housing may already be at (or below) minimum size. Land impacts in developing countries frequently result from excessive population density, resulting in unsustainable pressure on local water, firewood, food, and other resources (often depleted by colonial and current exportation). Rather than further reduce home sizes, in such situations the struggle against climate change may require spreading buildings apart to reduce crowding and restore ecosystem services. This would have not only local, but in many cases global impact. It is, however, in developed nations, with our wildly disproportionate consumption, that the major footprint changes must occur.

FOOTPRINTS AS TRACES OF OUR PAST

The concept of the architect's footprint has great potential for directing action against anthropogenic climate change. However, much of that potential could be lost if the concept is applied *only* to technological solutions in the present.

No change in society occurs without shifts in awareness and understanding. Change in *activity* without changed *understanding* can produce unintended consequences and failure. Conversely, when human actions fail, examining the theories (and myths) that guided those actions is often the most important key to redirection.

As the Jevons Paradox suggests, counting on resource efficiency to solve or avoid climate disaster may be a myth-ridden response, afflicted with the prevailing ethos of 'progress' and favoring technological rather than behavioral or ethical solutions. Equally important, the footprint concept applied to history offers a baseline against which to assess what is architecturally necessary or sustainable. Without such a baseline, behavioral and ethical decisions about building may be impossible, or shallow, or both.

Table 2
Design and planning methods to reduce land footprint

- Use methods suited to each land-use. The same impact-reduction techniques are unlikely to work on every building, transportation facility, brownfield, under-used landscape, or easement for future access.
- Avoid Le Corbusier's mistake – assuming tall buildings truly have small footprints. Their actual footprints include permanent shadowing and wind on adjacent land; wear from intense use; energy costs of construction and operation; and health problems due to isolation from living landscapes – to name only a few. Multistory buildings may be sustainable, but only if carrying capacity factors into the decision of how tall to build.
- Use regenerative technologies, especially porous paving, water harvesting, green-roofs, and vegetation restoration, that reduce site impact while actually increasing the usable size of development.
- Improve public spaces and urban densities so they become more attractive than excessively large private spaces.
- Design the built environment to provide ecosystem services, not merely to achieve visual or mechanical goals. Ensure this approach applies to all projects, including public works and engineering infrastructure.
- Limit 'pre-clearing,' (bulldozing sites before they are even placed on the market). Clearing without a site-plan destroys vegetation, soils, and site features needlessly and prematurely.
- Consider every development first at the large scales used in site planning, urban design, and landscape design, rather than as isolated structures.
- Use 'suitability analysis' based on overlay mapping of land patterns to determine appropriate siting for specific types of development.
- Anticipate land conflicts among development, agriculture, and resource extraction as population and depletion (e.g. 'peak oil') drive up demand.
- Rewrite outdated 'prescriptive zoning' that hinders density and mixed-use development. Apply 'performance zoning' which sets functional goals for development rather than merely imposing strict separation of functions.
- Encourage trends such as the Not-So-Big House, New Urbanism, Smart Growth, and Walkable Cities, favoring quality design and compactness. Resist trends toward bigger-is-better, not only in homes and offices, but in excessive parking allocations.
- Acknowledge 'the elephant in the room': population growth, unless checked by human initiative or natural disaster, will outstrip all footprint reduction efforts.

In the face of climate change, an important role for architectural scholarship and education should be to make *comparative* footprint analyses as a step toward a 'green history of building.' Properly developed, such a history would not be singular, but reflective of diverse histories of shelter and construction in a variety of eras and societies, each with its own footprint. Comparison and recombination of these histories may be the best hope for sustainable future architecture.

The discipline of critical theory, as well as more conventional 'critical thinking,' asks people to take possession of their own history as the first step in reshaping it. Architectural history and theory today seem divorced from a broader history: from the means of production in either the Marxist sense or that used in the history of technology; from socioeconomic history; and (like most 'Western' history) from awareness of ecosystem services as a major force in human civilization.

'Green history' is a relatively recent development in historiography. Although it might appear to impose modern sensibilities on history, the best examples focus on clear-eyed critique and explication of historic events in terms of energy, resources, technology, and ecosystems. Among such works, perhaps the most explicit are Clive Ponting's *A Green History of the World*,[37] and Jared Diamond's *Guns Germs and Steel, and Collapse*.[38] A growing number of works take a similar approach: Tim Flannery's *The Weather Makers: How Man is Changing the Climate and What It Means for Life on Earth*;[39] Tom Athanasiou's *Divided Planet: The Ecology of Rich and Poor*;[40] *Nature Out of Place: Biological Invasions in the Global Age*, by Jason and Roy Van Driesche[41]; James Howard Kunstler's *The Geography of Nowhere: The Rise and Decline of America's Manmade Landscape*;[42] David Suzuki's works, including *The Sacred Balance*;[43] and David Abrams' incomparable *The Spell of the Sensuous: Language and Nature in a More Than Human World*.[44] Each of these, and indeed much of the literature of environmentalism, attempts to reframe conventional history within the context of ecosystems. Of course, that reframing faces stiff resistance from those invested in humanity as the cusp of creation, independent of biology or any concept of nature.

Architecture, as yet, lacks a green history. There are many books on sustainable or ecological design and construction; few discuss the *evolution* of unsustainable architecture and the growth of pressure for sustainability.

Part of this paper's purpose is to propose to architectural educators and scholars that we develop such a green history. There will clearly be no single narrative; rather, varying analyses and interpretations will need to begin a dialogue or dialectic. Imperfect though the initial attempts may be, they will be critical (in all senses) in changing the conventional history and theory of architecture sufficiently to make it relevant to such global issues as climate change. Without self-awareness as agents of social, technological, and ecological change, architecture cannot make a coherent contribution, and indeed, remains part of the problem.[45]

A green history of architecture, using comparative analysis of the footprints of buildings and urbanizations as its basis, would offer the architectural disciplines several benefits:

- a method of comparison of buildings across cultural and class boundaries, which today's architectural histories generally avoid or treat superficially.
- an antidote to the romantic assumption that pre-Modern buildings were *always* more sustainable than those of our own era.
- a means of integrating and enriching social and technological analyses, so often separate today. For example, the degree to which we invest (or do not invest) resources to build for privacy, style, 'gendered' space, or historically-referential appearance, is indicative of our priorities and perhaps our metaphysics.

THE ARCHITECT'S FOOTPRINT AS HISTORICAL TRAIL

Table 3 suggests a range of questions that are within our current capacity to answer – imperfectly, but with some degree of critical and quantitative thought. Each question addresses an aspect of the architect's footprint, or specifies needed data.

The fundamental method would apply 'quantity take-off' calculations to historical architecture, resulting in estimates of materials, energy, and land consumed for buildings in a given period or culture. Measured drawings, archaeological records, and even artist's recreations of historic buildings can serve as a rough basis for quantity take-off; analysis of energy used in construction can at least be approximated from existing sources. The source of materials, how they were extracted, transported, and processed, is frequently part of the historical record, but deserves consistent inclusion in architectural histories.

Applying consistent questions to a range of historical building types, and scaling up that analysis to the known populations responsible for each type of architecture, would produce significant deepening of our profession's self-understanding.[46] It could even, albeit indirectly, supply clues about what a building *meant* to its builders.

Taken together, these questions *begin* to measure the footprint of construction across history (the list being by no means exhaustive).

One conclusion from such a study seems especially likely. Pre-industrial tectonics – the production of structures – were *self-limiting*. Geographic, ecological, and human givens constrained what was physically and economically feasible to build: material sizes and weights, transportable and liftable distances, local abundance or scarcity of specific materials. These constraints resulted in architectures that were usually, by default if for no other reason, adaptive to the land. Along with design responses to climate, local resource and land constraints underlie stylistic regionalism.[47] Mechanized production, transportation, and construction have, each in its own way, decoupled design and construction from the carrying capacity of land, and ultimately from one another as well. This decoupling succinctly defines *unsustainable* development.

Table 3
Basic Methodology for Assessing Comparative Architectural Footprints

- *How much and what kinds of resources were used for constructing each typical building?*
  For instance, a yurt takes a fairly specific quantity of felt, thin wood laths, and fasteners. An adobe 'pueblo' requires a calculable volume of soil within a range of clay-sand-loam composition; temporary use of a volume of water to make the material workable; and specific types and quantities of wood for roof and ceiling spans.
- *Can the amount of resource use be expressed as a land area required for its production?*
  This is the classic 'ecological footprint,' integrating resource use with land-use, and urbanization with hinterland.
- *From what distances were materials obtained? How were they transported, with what energy and fuel implications?*
  The bulk of a yurt is produced from fibers from the owner's flock, and thus highly local; transport of raw building materials is essentially done by the sheep! Adobes are usually produced on-site, without transport of any kind. Although there are remarkable exceptions (such as construction in Venice with spoils transported from distant battlefields), much pre-modern architecture obeyed the dictum now applied to sustainability: source all materials locally.
- How durable were structures? What was their lifecycle: reparable; reclaimed; reused? Or in effect disposable?
  For example, Taos Pueblo (New Mexico) is adobe, a material that will completely disintegrate in a decade or two without maintenance. Biannual maintenance has made it the oldest continuously-used structure in North America – and a World Heritage site. By contrast Hadrian's Wall, and innumerable other ancient stone structures, were of material so durable that its re-use actually decreased the longevity of the original construction.
- *What is the regenerative period for the materials used in construction?*
  Wood, for example, is renewable within decades to centuries, depending on the species; for some uses of fas-growing wood stems, such as wattles and withies, regeneration may be annual. By contrast, neither stone, nor clay, nor iron or copper, are renewable within a timeframe relevant to human architecture (although they are durable and potentially recyclable). A similar analysis is required for energy sources. Plant-based foods and fuels take in energy over one or more growing seasons, store it for a period after harvesting, and release their stored energy at various rates. The ratios between collection time, storage time, and release

time are critical to sustainability. The problem with fossil fuels, for example, is that they concentrate millennia of photosynthetic collection, whose energy is instantly released under an entirely different sun.

- *What is the total area occupied by this type of building at the height of the society that created it?*
  The rough extent of ancient settlements is known in many cases, and can be used to calculate the total land footprint of that society at a representative period.
- *Based on the above, what is the per-capita area of structures for a given culture or period?*
  To understand the effectiveness of a culture's architectural adaptation, it is essential to consider it on a per-person basis. For example, the oft-quoted statistic that the US has 5% of world population and uses 25 to 75% of any given resource is the most revealing way to present such comparisons.
- *What is the frequency distribution of various sizes of structures in a culture or period?*
  For example, there are millions of homes in the USA around the average size of 2500 square feet (230 m2); there are a moderate number of much larger shared dwellings; a small number of expansive mansions; and a relatively small number of 'big-box' warehouses, factories, and other public buildings that in theory serve the entire society (whether benefitting the whole group, or only an elite). Expressed as a 'curve,' an egalitarian society would have a flat distribution of building sizes, while an aristocracy would tend to have a steep or spiky graph. Poor cultures would tend to have flatter graphs than rich ones.
- *What area is appropriated for building-adjunct uses: infrastructure, outdoor work or recreation, display landscapes?*
  Many traditional Mexican cities, for example, are compact, with an extensive plaza. Individual homes are small, even cramped, and much social interaction occurs in the public space of the plaza. North American cities devote more space to private homes and cars than the typical Latin American, Asian, or European city. Such ratios vary by culture, period, and functional arrangements.
- *What is the ratio of land occupation for architecture or urbanization compared to agriculture? To mining and timber?*
  This extends the conventional understanding of the 'urban hinterland' to global proportions. As noted in the main text, this ratio varies at different stages of the same civilization, and across different civilizations.

Clearly, comparing the architect's footprint across cultures and eras (especially before and after industrialization) is no exact science. Although quantified comparison ought to defuse the assumption that past resource use was always ideal, it could be abused in service of uncritical historicism.

Even if approximate, however, such comparison must begin to inform current consciousness and practice. Behavioral choices about building are based on awareness of alternatives, and must include historical examples. If one has lived in a traditional community where there is a single source of running water, for example, the contemporary insistence on multiple bathrooms, kitchens, and wet bars is irretrievably undermined.

It is perhaps in this role that a green history of architecture, a *comparative* study of the architect's footprint, would have its greatest value. Ultimately, the concept should begin to form a baseline for *ethical* questions: How much building is enough? How do we justify expending resources on space or functionality? What is the smallest livable house?

FUTURE FOOTPRINTS: AN EDUCATIONAL PATHWAY

Architectural education's major role in mitigating climate concerns and spreading sustainable practice is not a technological one. It is rather the raising of professional self-awareness. We as architects are asked to cope with the sustainability imperative honestly and effectively. To do so, we must educate ourselves and the next generation. This education must help us develop a strong sense of the evolution of our footprint in other times and societies; recognize our footprints now; and realize the potential to change our footprint going forward.

Increasingly, students are already receiving instruction in pragmatic tactics of 'green' building. As long as these are taught simply as technological problem-solving, however, they will have limited and sometimes unintended effects on climate change.[48] Students are often the first to perceive such limits, and to become frustrated or disillusioned with teaching that has more tactics than strategy. For architecture to fulfill its potential and its responsibilities about this pressing issue, it is critical to reframe green techniques in the contexts of carrying capacity, frugality, the smallest-possible building, and the 'land ethic.' As this essay has attempted to show, the dual footprint is a key concept in this expanded context.

Students can learn, almost by rote, to calculate life-cycle costs, source materials locally, use greenroofs, or minimize impervious surfaces; but these tactics gain resonance and effectiveness if taught as part of a frugal land ethic. Popular green movements (e.g. Walkable Cities) are valuable in isolation, but become more compelling if presented *within a framework* of minimal land impact. Thinking in terms of land and resource footprints can put curriculum choices in perspective, too. A land ethic clarifies the value of subjects often ignored in architecture (e.g. 'constructability,' a critical engineering specialization), and can restore a sense of proportion about subjects that are faddish (e.g. advanced visualization software as an end rather than an extremely important means).

Perhaps most important, the *spatially compact footprint* must also lead to newly derived (or reasserted) *meaning* and *beauty* in the built environment. A few examples can be suggested, in hopes that architectural educators will be inspired to greatly expand the list.

- Deliberately making our homes small and our communities compact is a meaningful assertion that humans are social animals. It repudiates the extreme individualism that prompts some societies to build to avoid neighbors.
- Respecting carrying capacity acknowledges that we are only part of and dependent upon the more-than-human world, rejecting the paradigm of absolute dominance over nature.
- The goal of footprint reduction strongly suggests that *sharing* resources, as families do, is a concept applicable to wider communities, and that communal ownership of some resources need not be the joyless exercise that authoritarian states have tried to make it.

Successful compact form-making is necessarily complex. It thus offers great challenges to creative designers. Adaptive, frugal complexity is nearly a synonym for exquisite proportionality of form – and in this relationship lie many renewed opportunities for beauty.[49]

Making the small footprint livable will require jettisoning the oversimplified, featureless, large-scale geometries of cheaply mechanized construction (and 'Modernist' aesthetic notions when they become merely an excuse for such construction). Small needs to be beautiful with the richness of detailed proportional design, with experiments in fractal geometry and biomimicry. Big-box commerce and rigidly unornamented design are primary sources of banality in contemporary architecture. Creating a compact footprint stands to restore a great deal of lost interest and beauty to structures and cities. In this, the *re-education* of architects, landscape architects, and planners must play an important role.

This essay suggests a direction for our professions, a large-scale map to inspire journeys of exploration. As a compass, it recommends a seemingly concise guideline – designing the smallest and simplest livable house, reducing the architect's footprint. Actualizing that vision will require the best efforts of our professions. If architectural education and scholarship take the first strides, we may hope to find the world following in our footsteps.

ACKNOWLEDGEMENTS

The author would like to thank the EAAE 2010 jury for their careful reading and thoughtful suggestions.

CONTACT

the author at ksorvig@unm.edu.

NOTER

1 Jackson wrote *Discovering the Vernacular Landscape* and other classic essays on the ordinary built environment. He spoke at the University of New Mexico, School of Architecture & Planning, a few years before his death in 1996; the exact date does not seem to be on record. See undated reference at www.newswise.com/articles/ under the title "Cultural Landscape Historian Leaves UNM Gift."

2 Throughout this essay, 'architect' is used to include any member of the building industry. Sustainability or climate impacts are relatively similar across professional boundaries. A large-scale developer, a landscape architect, and a home-furnishings supplier all affect use of resources to shape space. (To expand on the EAAE jury's poetic image, these disciplines sing varied parts from the same hymn-sheet: bass, contralto, even castrati perhaps, usually though not always in some semblance of harmony!) Citizens outside the building industry tend to be far less involved in the actual shaping of space (regrettably); their impacts on sustainability focus on consumable goods and 'operation' of spaces. This is not to dismiss some very complex overlaps and interactions. Nor is generalized use of the term 'architect' intended to marginalize any of the other independent professions that are allied under the 'building industry' umbrella. 'Architect' seems the clearest available general term; where other professions are discussed specifically, their usual titles are used.

3 *Excerpted from* http://en.wikipedia.org/wiki/Ecological_footprint : "The ecological footprint represents the amount of biologically productive land and sea area needed to regenerate the resources a human population consumes and to absorb and render harmless the corresponding waste. Using this assessment, it is possible to estimate how much of the Earth (or how many planet Earths) it would take to support humanity if everybody lived a given lifestyle….The first academic publication about the ecological footprint was by William Rees in 1992. The ecological footprint concept and calculation method was developed as the PhD dissertation of Mathis Wackernagel, under Rees' supervision at the University of British Columbia in Vancouver, Canada, from 1990-1994. Originally [called] 'appropriated carrying capacity'. To make the idea more accessible, Rees came up with the term 'ecological footprint,' inspired by a computer technician who praised his new computer's 'small footprint on the desk.'" [Note the explicitly spatial definition.]

Rees, William E. (October 1992). "Ecological footprints and appropriated carrying capacity: what urban economics leaves out". Environment and Urbanisation 4 (2): 121–130.

Wackernagel, Mathis & Rees, William (1996) *Our Ecological Footprint* (New Society Press)

4 Compare the following Wikipedia definitions with that given for Ecological Footprint: "A carbon footprint is 'the total set of greenhouse gas (GHG) emissions caused by an organization, event or product.' " "The water footprint of an individual, community or business is defined as the total volume of freshwater that is used to produce the goods and services consumed by the individual or community or produced by the business. Water use is measured in water volume consumed (evaporated) and/or polluted per unit of time."

Both these analytical concepts are very valuable; in the author's view, they should be used in parallel, along with life-cycle assessment, land impacts, and energy evaluation, when assessing overall sustainability of any activity.

5 It would of course be possible to express a carbon footprint as the area of forested land required to produce the carbon; even a water footprint could be made spatial, as a percentage of world's fresh-water surface area. This might tie the impact to everyday geographic experience, but would complicate units of measurement significantly. To date, the author is unaware of scholars using a spatial version of either carbon or water footprint.

6 This is in fact a serviceable *definition* of architecture or design. The author uses this definition in teaching to avoid separating spatial design from the larger universe of human activity, and to avoid dichotomizing along the functionalistic/stylistic or construction/conception fault lines.

7 See www.architecture2030.org .

8 One of the most recent architecture books to note this situation is *Ecological Reflections in Architecture*, by Claus Bech-Danielsen (2009, Danish Architectural Press). Architecture2030's site lists such studies by their founder, architect Ed Mazria, and others.

9 This definition of 'footprint' has been widespread among building professionals for decades, but is too specialized to be found in most English-language dictionaries. The 1999 edition of the *Encarta World English Dictionary* (New

York: St Martin's Press) does include a parallel usage by technicians: "the area covered by something, especially the amount of space a piece of computer hardware occupies on a desk, floor, or other surface." Perhaps because Microsoft was a main partner in publishing this dictionary, this geeky usage is given space while older architectural usage is not – one of many tangible design terms appropriated by digital industry.

10 A closely related concept used in planning is the 'building envelope,' which limits all construction activities and gardenesque landscape interventions to an area perhaps 25% larger than the building footprint proper. Outside the envelope, the existing landscape and native plants are not to be disturbed. Envelope-based subdivisions have proved to increase property value significantly.

11 These problems include increased stormwater runoff volume, speed, and erosivity; decreased soil infiltration and root availability of precipitation; increased sedimentation; increased downstream pollution; structural disruption of wetland and estuary functions; spiking of hydrographs resulting in aquatic habitat disruption; and many others. For detailed discussions, see Thompson & Sorvig, 2007, *Sustainable Landscape Construction: A Guide to Green Building Outdoors*, Second Edition, Island Press (Washington DC). A parallel issue, making interior space 'impervious' or sealed from the surrounding atmosphere, is a root cause of most 'indoor air quality' issues. Baker-Laporte, P., 2008, *Prescription for a Healthy House*, New Society Publishers; Third Edition.

12 This issue is less pronounced in some European legal systems than in those modeled on US law or the World Trade Organization's pro-development, pro-corporate stance.

13 As noted above, the Ecological Footprint was originally termed 'appropriated carrying capacity.'

14 Oxford University Press, London.

15 This charge has been leveled at architects since at least John Vanbrugh (d. 1726), designer of Blenheim Palace. His epitaph is famous, and presages concern with 'footprints': "Lie heavy on him, Earth, for he laid many a grievous weight on thee."

16 For example, the US Green Building Council and American Society of Landscape Architects 'Sustainable Sites Initiative,' a point-based rating system like LEED but specific to landscapes, is conceptualized in terms of ecosystem services. Whether it or any point-based voluntary system succeeds in applying the concept to diverse sites remains to be seen.

17 Definitions and categorization of ecosystem services were formalized after a four-year international study in the Millennium Ecosystem Assessment (MEA). Published 2005 as *Ecosystems and Human Well-Being: Synthesis.* Island Press, Washington. Scenery as an environmental service is the author's addition based on (among other sources) Cooper-Marcus, C., 1999, *Healing Gardens: Therapeutic Benefits and Design Recommendations*, (Wiley, NYC) ,and Tyson, M., 1998, *The Healing Landscape: Therapeutic Outdoor Environments* (McGraw-Hill, NYC).

18 Wetlands are a prime example. For example, Ferguson, B., 1991, "The Failure of Detention and the Future of Stormwater Design," *Landscape Architecture Magazine,* (Dec), Washington DC, documents the critical importance of siting stormwater ponds in relation to existing topography, drainage and soils; poorly located ponds can be worse than none at all. Similarly, Galatowitsch and van der Valk, 1994, *Restoring Prairie Wetlands: An Ecological Approach*, (Iowa State Univ, Ames IA) notes that there are specific minimum volume and area considerations if a reconstructed wetland is to have any effect on regional flood infiltration.

19 Chichilnisky, G. and G. Heal. 1998. "Economic returns from the biosphere." *Nature* 391: 629-630

20 Pimentel, David (Cornell Univ.) 1997 *Bioscience.*

21 The range of estimates for land clearance vary from a minimum of almost 20% to a high of 60% (the latter includes clearance for agriculture since prehistoric times). The earliest studies appear to have been done by R. Pielke, Colorado State University; the IPCC has its own studies and reached similar conclusions. See summary and detailed citations in Thompson & Sorvig, 2007, *Sustainable Landscape Construction: A Guide to Green Building Outdoors*, Second Edition, Island Press (Washington DC); esp. pp. 14-19, and notes, p. 350-351.

22 For a contemporary example see www.environment.gov.au/biodiversity/publications/series/paper6/bioch-summary.html . As an example of historical research on the topic see Dumayne, L., 1993, "Iron age and Roman vegetation clearance in Northern Britain: Further evidence," Botanical Journal of Scotland, Volume 46, Issue 3, pages 385-392

23 See http://rainforests.mongabay.com/deforestation/

24 For a map of this devastation worldwide, see www.greenpeace.org/international/campaigns/forests/our-disappearing-forests/.

25 US Department of Agriculture estimate of agriculture land losses, from www.usda.gov.

26 The results are documented in the movie, *Crude* (2009). Lacking the appropriate legal protections, developing countries and especially the poorest peoples suffer pollution that is almost unimaginable in developed regions. However, resource pressures (expressed in the McCain campaign's chant of "Drill Baby Drill") are changing this picture, as documented in another 2009 movie, *Split* Estate, by Debra Anderson; see www.splitestate.com.

27 USDA estimates (see previous note), and US Natural Resource Conservation Service estimate of acreage devoted to housing annually. For details, see Thompson & Sorvig, 2007, *Sustainable Landscape Construction: A Guide to Green Building Outdoors*, Second Edition, Island Press (Washington DC), p. 351.

28 See two articles by Sorvig in *Landscape Architecture Magazine*: "Will Wildfire Ravish Our Profession?" (Dec 2001, p. 32 ff.) and "Crying Fire in a Crowded Landscape" (Mar. 2006, p. 26 ff.)

29 See Ferguson, B., *Introduction to Stormwater,* 1998, Wiley, New York. Further data from Groesbeck & Streifel, *Resource Guide to Sustainable Landscapes and Gardens*, (1995, Environmental Resources, Salt Lake, UT)

30 An old joke has the population problem being solved when Earth reaches standing room only.

31 Polimeni, Kozo, Giampietro, and Alcott, 2009, *The Myth of Resource Efficiency* (London, Earthscan). Except as specifically noted, all examples are from this book.

32 A summary of such studies, based on interviews with solid-waste management specialists throughout the United States, is to be found in Killough, Kevin, "The Recycling Crisis" 17 April 2003, *Crosswinds Weekly* (Santa Fe, New Mexico), p 10-13.

33 Polimeni et al., op. cit, Introduction.

34 Op. cit., cover.

35 *In order to keep citations together (since Word does not allow endnotes in Tables!) all references from Table 2 are noted here, with an indication of topic for each:*

Greening of skyscrapers: See Gissen, David, 2003, *Big and Green: Toward Sustainable Architecture in the 21st Century* (Princeton Architectural Press). The greening of skyscrapers, which is the subject of this book (and similarly-titled exhibition at the US National Building Museum, Washington DC) is at best in its infancy, and quite likely an impossible dream. Where land footprint is considered at all in such design, it is limited solely to the area within the building's foundations; yet, like cities, skyscrapers require a 'hinterland' to support them, and are massive enough to impact their surroundings for significant distances.

Regenerative technologies: This phrase was coined by the late John Tillman Lyle; see his *Regenerative Design for Sustainable Development,* (most recent reprint, 2008 Wiley, NYC).

Suitability analysis: Ian McHarg's use of maps overlaid in registration sparked the official process of Environmental Impact Analysis, and led to the digital tool now called GIS (unfortunately often used as a storage format without analytical value). See McHarg's classic *Design With Nature;* although available in many editions (Wiley), it is best understood from the first edition (1970) or 25th anniversary edition (1995), which include full-size overlay maps.

Performance zoning: For a very good discussion of how zoning concepts, and their application, are changing, see Wright, Laura, 2010, "Redrawing the American City," *OnEarth* (published by Natural Resource Defense Council, Washington DC) Winter 2010, p 24 – 35. This article's particular value is in comparing three different Chicago-area neighborhoods, ranging from new and affluent to poor and deteriorated, as places where sustainable (re) development is working.

Not So Big House movement: Susanka, S. and Obolenski, 2009 (expanded edition), *The Not So Big House: A Blueprint for the Way We Really Live*, (Taunton Press).

New Urbanism: Katz, P., 1993, *The New Urbanism: Toward an Architecture of Community,* McGraw Hill NYC; Steuteville, R and Langdon, P., 2009 *New Urbanism: Best Practices Guide*, Fourth Edition (New Urban News); and the work of James H. Kunstler, beginning with *The Geography of Nowhere* (1994, Free Press). Some New Urbanist work has been criticized for recreating historicist building styles, while siting and transportation patterns

remain indistinguishable from conventional subdivisions.

Smart Growth: Duany, Speck, and Lydon, 2009 *The Smart Growth Manual,* (McGraw-Hill, NYC)

Walkable Cities: Soderstrom, M., 2009, *The Walkable City: From Haussmann's Boulevards to Jane Jacobs' Streets and Beyond*, (Vehicule Press)

36 Chiras, D., 1994, *Environmental Science: Action for a Sustainable Future*, 4th Edn; Benjamin/Cummings Publications, Menlo Park CA. This standard textbook, for example, devotes separate chapters to sustainable development in the industrial world (Ch. 21) and the developing world (Ch. 22).

37 1991, London, Sinclair-Stevenson Ltd; later reprints by St. Martin's and Penguin.

38 1997 and 2005 respectively, NYC: Viking Penguin. GG&S won the Pulitzer Prize. The Further Reading section in Collapse, p. 529 in particular, lists a number of notable 'green histories.'

39 2005, NYC: Atlantic Monthly Press.

40 1996, Boston: Little Brown.

41 2000, Washington DC: Island

42 1993, NYC: Simon & Schuster

43 1997, Vancouver, BC: Greystone

44 1997,Vintage Books, NYC

45 Schmidt, Anne Marie Due, and Kirkegaard, Poul Henning, "Tectonic Transformation – the architect as an agent of change." This pdf, available at http://vbn.aau.dk/fbspretrieve/6299036/, website of Aalborg University, offers useful perspective on relationships among theory, applied methods, and material innovation.

46 The range of standard architectural histories is too broad to cite fully here. Footprint comparison could help overcome a common weakness of 'Western' histories: the tendency to exclude non-European and/or vernacular buildings. A charitable interpretation of this lapse is that describing structures in stylistic or social-function terms leaves almost nothing to talk about once one crosses cultural or class boundaries. Consumption of resources and land area, by contrast, can be discussed meaningfully across such contexts, and would actually add depth to analyses of style and cultural significance.

47 Amos Rapoport's 1969 *House Form and Culture* (U. Wisconsin) dealt carefully with regional issues of resource and climate, and remains an excellent overview.

48 A parallel exists, for example, in the bio-fuels concept. Technologically, it is possible to grow non-fossil fuels; but the market for bio-fuels has increased rainforest clearance to produce the crop. Little consideration was given to land or carrying capacity in this technical 'solution.'

49 Although not about architecture, E.F. Schumacher's 1989 classic, *Small Is Beautiful: Economics as if People Mattered* (Harper Perennial) made this relationship part of the early environmental movement – a part in need of renewal.

MMENTION EUR 500

GIOVANNA FRANCO
University of Genoa, Italy
Faculty of Architecture

Acting upon the Recent Inheritance
Sustainability and Responsability Towards the Contemporary

GIOVANNA FRANCO

ACTING UPON THE RECENT INHERITANCE

SUSTAINABILITY AND RESPONSABILITY TOWARDS THE CONTEMPORARY

JURYS COMENT

This paper addresses is topical, addresses the core concern of the competition, is well structured and well thought through. The adaptation of buildings of the recent past, buildings whose purpose, provenance and technology are still, in a way, contemporary, certainly raises theoretical and practical issues. The author links the arguments with the pedagogy, in a way that ensures that many readers will find value in this essay. The author is not afraid to identify a paradox within the pedagogy: could the means adopted subvert the ends? The challenge is always to ensure that the ends are encapsulated in the means.

The essay could be improved in two respects. The first would involve some further exploration of this "ends versus means" dilemma as it related to teaching methods. The second would be to look at the learning experiences provided by the teacher from the perspective of the students who engaged in this exploration: to what extent were the paradoxes apparent to the students; were they the subject of discussion, and what reflections can the author bring to these aspects of the matter. This would create a stronger analytical character to an already well considered paper, and, in a way, close the circle.

The subject of this paper is very relevant in relation to future architectural education. Much of what is discussed will be an everyday reality for many future architects. The technical and statistical information is well presented. Important technical/scientific issues and methods are listed in relation to teaching, as well as a discussion around how this can be applied outside of the classroom. The choice of the case study was also positive in that the author avoided the usual brick factory conversion to culture center, and instead chose a difficult site/building and a difficult but needed task, social housing.

The author questions on several occasions if a focus and reliance on technical aspects is enough and also if set methods could over time be counter productive. This is discussed in sub-topic (Means and aims – final objectives vs. technical tools). In this sub-topic there is an opening for a deeper and a broader inclusion of issues concerning sustainability as well as a broader discussion around the architect's critical input in relation to technology's influence in the process of reuse and rehabilitation of existing building volumes. For example, how do we approach global and local media influence on potential builder's and user's ambitions, or the client's desires for long and short term profits that are in conflict the existing buildings potential, or the durability of new products or the measuring of the actual, on site, efficiency of newly installed technology. (Definition: their qualities as a finished product, on site, including the skills of the work force, the same work force that built the problem in the first place.) Political agendas also play into the overall picture and the next sub-topic covers this to some extent, but what is the big picture in

relation to how the future will deal with the expanse of existing 20th century built structures?
For the most part this paper is concerned with issues of methodology and technology, and how these can better clarify existing buildings' potential. When the author presses beyond this and brings up other areas of focus and approach, the paper loses some momentum. The larger more difficult questions important in defining direction and giving a critical overview in relation to sustainability and existing buildings remain more or less within the domain of technology - technology as the solution and technology as the problem itself. All of the points listed in the conclusion for improving curriculum are important. But, one must question if there would have been more and perhaps new points in relation to curriculum suggestions if the initial content of the paper ventured a little more outside of the parameters set by technology.

The question of refurbishment, resent inheritance and cultural heritage are important topics in the discussion of sustainability and architectural education. It presents an integrated model for teaching in sustainable topics that seems quite convincing. As such the author has chosen a very complex and highly technical study.
The paper tends to focus on the theoretical aspects - however it also offers a critical attitude to this approach. It is a very well structured paper, highly reflected and various examples of studio work are integrated in a fine manner, however some of the case studies are not sufficiently described.

An interesting paper that emphasizes design in relation to research…..this part could be elaborated further and hereby strengthen the paper. In conclusion, it is a highly informed and reflected paper that ought to be rewritten for improving its present qualities.
The paper is very topical and defends what is to ones mind a correct position with respect to heritage and sustainability. The author identifies a series of concerns that indeed need to be addressed and the case studies work well to exemplify the arguments.
The paper miss a sense of passion or enthusiasm. One can only agree with the statements that are made, but it is difficult to feel really engaged or energized. The only moment this reader felt a sense of surprise and engagement was at page 63-65, when the author is discussing how the high-density settlement somehow gave rise to a situation of sociality among the very young migrant population. This particular point, however, important as it is, is then not elaborated upon, although it presents the pivotal point around which the whole argument could be re-articulated. The suggestion therefore would be to reinforce the role of this particular case study, and to make the connections between the case study and the more general statements and observations more pointed.
Good paper with reflexion and creative critic against a reductionnist and technicist shift in education for environmental sustainability. It could be improved by developping examples and references.

The Jury
May, 2010

GIOVANNA FRANCO
University of Genoa, Italy
Faculty of Architecture

Acting upon the Recent Inheritance Sustainability and Responsability Towards the Contemporary

Introduction

The paper collects some ideas developed teaching "Technology of Architecture", a disciplinary peculiarity of the Italian Schools of Architecture, in graduate and post-graduate programs, beside the courses of Architectural Design and Construction, where the environmental and sustainable issues find a pre-eminent place.

The teacher has been and is still involved in different "classes": in the first year (giving basic notions about the foundations of the discipline, materials and building elements), in the second year (organizing the "laboratory", where students have to develop simple projects focused on the relationship between a new intervention and the context, implementing constructive details) and in the fifth year (when the student, in the design studio, concludes his training facing more complex projects, dedicated to the topic of environmental sustainability). Further education inside the specific discipline continues, often developing the final thesis and at the third educational level (PhD). Some results reported in the paper relate mainly to teaching activities during the fifth year and the final thesis, and address design problems. Despite the obvious differences of topics and methods, the education attitude does not change substantially in teaching lessons *ex cathedra*, even at the first year. The teacher tries, in fact, to propose a multi-perspective approach (Gardner 2006) to the same theme (or problem), underlining different ways in which it can be seen and solved, to help students to move within the "fence" of the discipline but, at the same time, to be able "to gaze" beyond it. This is, in fact, a necessary requisite to give convincing answers to the emergence of growing environmental problems and this requisite has oriented

the teacher to search constant improvement of the didactic programs, with the indispensable help of professors of different disciplines.

Finally, the teaching takes place with the full consciousness that the path of learning and knowledge is always a process of long durée, whose effectiveness is measured on time, and, therefore, the teacher should promote the use of methods and approaches that can "break through" the student with a certain speed but can leave signs and messages for future development.

Education for environmental sustainability

According to its original definition, sustainable development is a development that «meets the needs of the present without compromising the ability of future generations to meet their own needs» (Brundtland report, *Our Common Future*, 1987). In ecological and environmental terms, the principles enforced are, therefore, a use of resources which does not exploit more than nature can regenerate and the emission of pollutants only insomuch as they may be recycled, absorbed or neutralized by the environment.

An environmental emergency marks, in fact, the beginning of the new millennium. «The demographic boom, the global warming of the atmosphere, the increase of poisonous chemicals in the waters, the erosion of the earth, the thinning of the ozone layer, the dwindling of food resources, the reduction of the number of species: all these phenomena cannot but set the stage for inevitable ecological catastrophes» (Hösle 1991).

Faced with a rather alarming situation and in consideration of the arduous - and often conflicting - decisions taken at the global and European level, it is time to ask if, and how, the new generations may be trained (each person in his or her own field) to face global and local emergencies. An "environmentally-oriented" education - involving the careful use of resources, rationalization of consumption, and aware, responsible choices during the entire arch of an artifact's life - has by now taken its rightful place in every sector of architectural education, although it has, naturally, taken different forms to fit the various disciplines. Many Schools of Architecture nationwide have inaugurated environmentally-conscious academic programs which cover various aspects of a project, most of which are developed within the courses of Environmental Technology:

- on the territorial scale (urban mobility plans, strategic environmental-impact evaluations of planned changes, search for a balance of environment and land use actions, also incorporated within planning tools);
- on the urban level (harmony of context and project, environmental analyses, impact and consequence evaluation, adequate use of natural atmospheric/climatic agents, careful employment of resources, energy efficiency and innovative technologies);
- on the level of the single construction (employing low-impact materials and building technologies, designing settlements based on the surrounding context, searching for energy efficiency and integrated technologies, considering the building's entire life-cycle, including demolition techniques, recycling and dismantling);

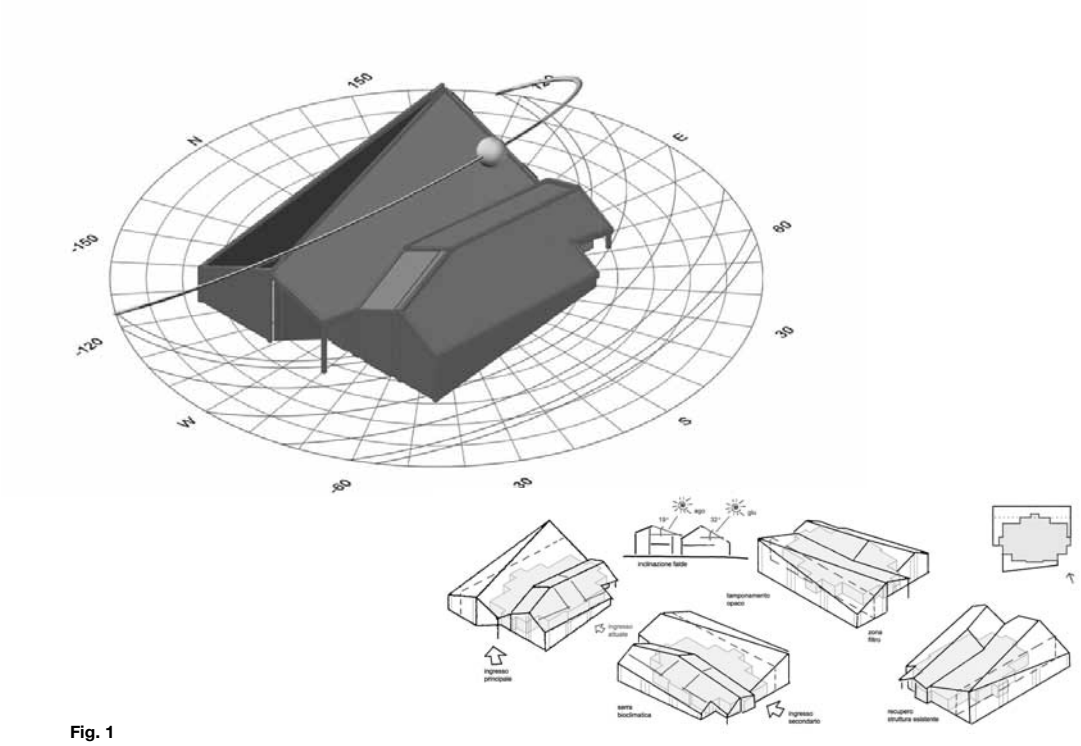


Fig. 1

Studies to achieve the better solar gain from the new roof, refurbishment and enlargement of a school.

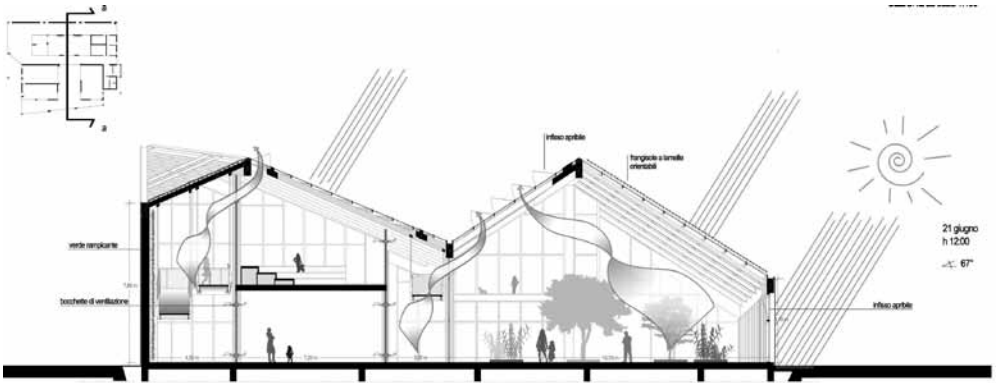


Fig. 2

Refurbishment and enlargement of a public school built in the '60, bioclimatic principles.

- in the field of re-use (conservation and refurbishment of existing buildings and artifacts as an already available resource of our built environment, the demolition of which could mean a useless waste of energy).

A lot of attention is anyway given to that which is yet to be built or transformed through new buildings and infrastructures, with the aim of educating the young to work in full consciousness of the complex problems and effects which may derive from their planning intentions/actions.

Acting upon our recent heritage

At the same time, the peculiar historical condition we live in leads us to enquire into the significance and role of our recent architectural and urban heritage and of the present times (what we call "the contemporary") upon the construction of the near and far future and, therefore, into what should be our attitude towards them. Now that the vast urban expansion process and building boom is over and due to the environmental urgency and to the economic recession, which continues to this day (Latouche 2004), the architectural discourse must come to terms with the needs, requirements and structures of our most recently built heritage. A quasi-total absence of maintenance and a state of abandonment, decay, inefficiency and un-trustworthiness in terms of performance, scarce architectonic and environmental quality, lack of safety in living and working spaces, absence of any process of identification and cultural appropriation, often translating into social distress and individual and collective alienation... all these problems are common in the urban sprawl and, generally speaking, in many European cities from the second half of the Twentieth Century. Today, as well as having to deal with serious issues in the vast urban sprawl - which are social today and will soon be material tomorrow - Italy must face the urban, territorial, landscape-related and environmental consequences of its "infamous" building policies.

A focus on the refurbishment of the contemporary urban space, as well as carrying a social - and, in some cases, ethical - urgency, is thus even more justified by the economic interest of stakeholders, evident from data available on the national scale. All these considerations lead future architects to timely devote their studies to the conscious appropriation of a field which will certainly prove rewarding:

- the percentage of newly constructed buildings, if compared to the existing amount of residential complexes, has gone below 1% in 2007 (and might further decrease);
- from the '80s onward, building refurbishment has attracted 60% of investments in the construction sector;
- 40% of residential buildings in Italy were built between 1946 and 1971, and approximately 39% of the population lives there (of these buildings, at least 1 million is considered in bad state of conservation);
- it is estimated that, from 2020 onwards, actions upon this recent heritage may make up about 80% of the real estate market.[1]

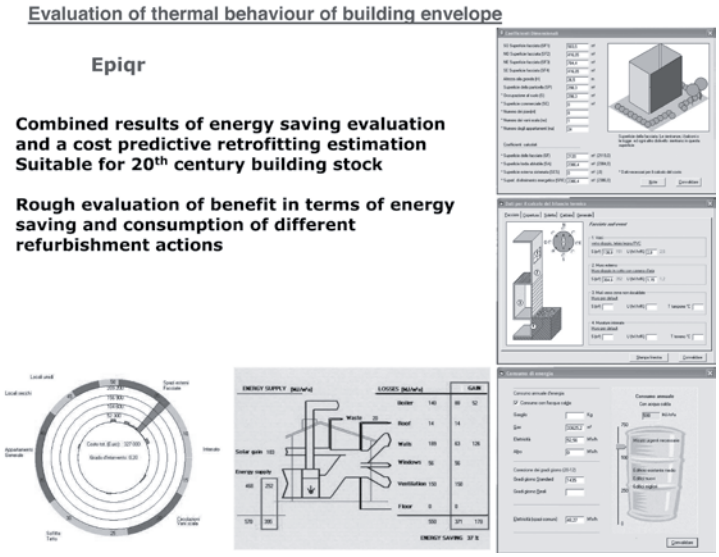


Fig. 3

EPIQR is a tool developed within an European Research Program, devoted to sustainable maintenance and refurbishment of residential building stocks edified in XX Century. Results of EPIQR combine energy saving evaluations (of the actual state and of refurbishment actions) and a rough cost predictive retrofitting estimation.

The topic of real estate refurbishment has also been boosted by the growing awareness of the energetic and environmental emergency. The recent 202020 plan designed by the European Commission [2] emphasized the priority of taking action in the land use sector, improving buildings' energy efficiency and reducing the environmental impact of housing. [3]

Teaching environmental "sustainable" refurbishment: the role of technical competence

To prepare students for their future professio[4], education in the fifth year of teaching is dedicated to the theme of assessing the "quality" of recent architectures and settlements, (single buildings or building stocks) and to the definition of appropriate strategies for their possible refurbishment. According to the statutes of the discipline (Technology of Architecture), quality assessment refers primarily to:

- safety of the built heritage in relation to environmental and accidental hazards (against the seismic risk, the fire risk, the risk of collision, collapse or other accident, in particular because of the conditions of deterioration or failure of components);

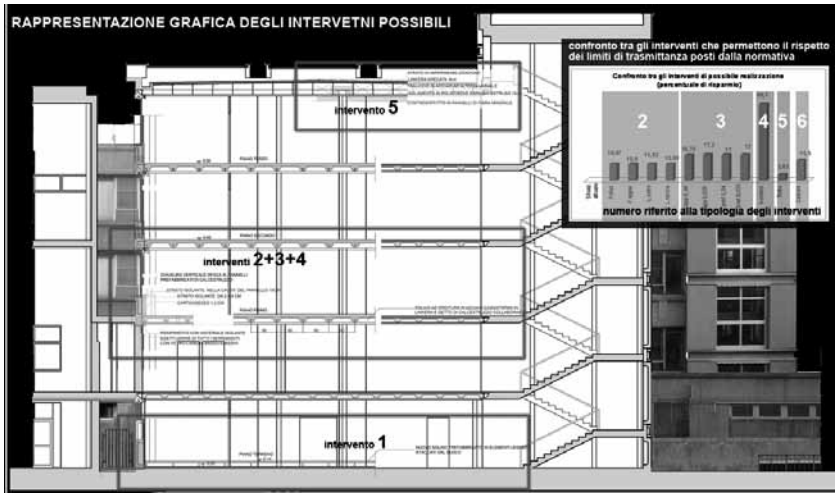


Fig. 4, 5, 6

Studies for sustainable refurbishment of a public school in Genoa (actual state, proposal for a new screen to defend students from solar.

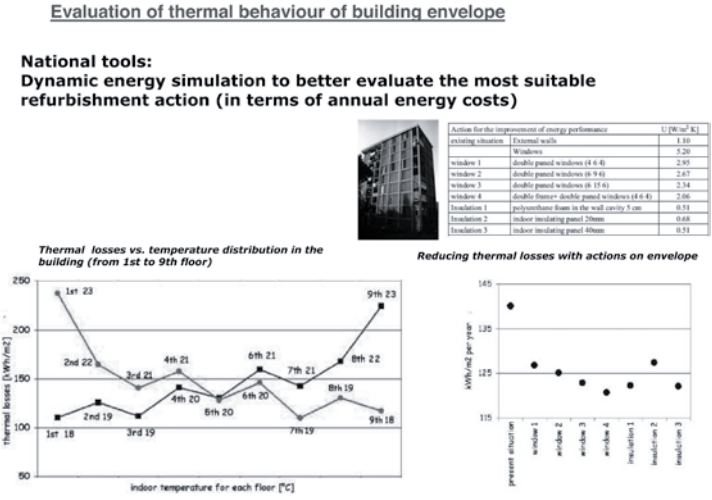
- accessibility and “usability” of buildings (compared to the needs of the current and future users);
- eco-efficiency of buildings (environmental quality of the settlments compared to the established geological, climatic and morphological features; energy efficiency of buildings and of the building envelope; integrated technical systems, use of renewable sources);
- durability of materials and components;
- Life Cycle Assessment and low emission of pollutants.

The aim of teaching has been to help the students to develop, at a sufficiently detailed level, the ability to recognize different possible problems (be they related to the material aspect and state of obsolescence, or related to performances, anyway often expressed in the form of numerical parameters or in the form of requirement to be achieved), put in relation among themselves and to set refurbishment actions that give coherent answers to the identified objectives.

Undoubtedly, the “permeability” between research and teaching activities is very profitablev, as it allows a process of continuous updating of the teacher too[6]. Very interesting and effective is the contribution of experts both within and outside the School, in the fields of eco-efficiency (in Building Physics and in traditional and innovative materials, especially translucent ones) to assist students in using software tools for calculation and simulation of thermal behaviour and energy gains, more or less simplified (Ecotect, Epiqr, Design builder, Energy Plus or other national tools).[7]

After several years of experimentation and teaching, and looking at the achieved results, the author has been wondering if her proposed and adopted way of teaching was truly effective.
The analytical approach and the widespread use of testing and simulation methods, setting up a refurbishment design, are certainly necessary but not free of risks. The user-friendly software are, in fact, just “tools” and we have to avoid the risk to transform into “data” themselves. Every tool, in fact, less or more simplified, keeps in count only a limited number of variables involved in the problem. Further on, the large part that teaching activity sometimes devotes to digital tools could possibly give rise to a segmentation of the design process, and the student could fall in an excessive reductionism (against holism!), using all his mental energies in the analytical and scientific assessment, forgetting that the architectural project is mainly a synthesis of a complex process.

The accumulation of scientific competence, the control of technical tools cannot be separated from the acquisition of a rigorous “disciplinary knowledge”. «Science can never be enough for an education because it does not say how we should behave. The way of action is determined by one’s own system of values and neither science nor technology have an autonomous and self-sufficient system to propose» (Gardner 2006). The “discipline” in fact, rather than the “matter” (in this case, the ability to use tools), proposes a way of seeing things, also in relation to the crucial issue of sustainability, which cannot be considered only environmental or architectural, neither be reduced to the fulfillment of standard requirements and customer needs (not to men-



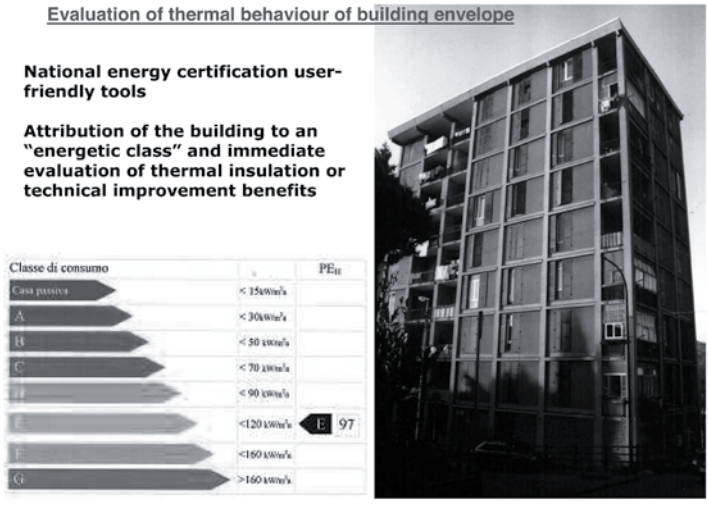


Fig. 7, 8

Software tools allow dynamic energy simulation to better evaluate the most suitable refurbishment action (in terms of annual energy costs) but the choice of intervention, especially modifying architectural characters, does not depend on calculation.

Fig. 9, 10, 11, 12
Various attitudes towards the recent built heritage
(disembowelment, overlapping of a new glass envelope, changing façade).

tion the role of “icons”, so pervasive in contemporary formal), but involves a social, economic and cultural dimension. If it is true, as Jacques Le Goff says, that the city has a «material face» and a «mental face», it is on this difference that we should work, as on the sense of identity, citizenship, on the presence or absence of symbolic values hidden in the buildings that the Twentieth Century culture has conspicuously produced.

How best to prepare the new generations to intervene upon “the present” to build “the future”? Is it true that the low quality which characterizes recent constructions can only be improved by working on increasing (quantitatively measurable) efficiency? The problem is surely larger, less easy to quantify, involving, as it does, a deep reflection on the role that technical solutions have played, and are still playing, in contemporary times, where technique has often prevailed over actual aims, which have been silenced, and rarely shared.

Means, ends and aims – final objectives versus technical tools

On these items many architects (and students, in their final thesis) are working today with refurbishment projects which provide increases in eco-efficient performances with approaches that tend, unfortunately, a shift toward a fascinating “technicism”. To this we must add the “fatal attraction” for innovative technical solutions (devices, materials, components) that substantiate the architectural language of their design experimentations, mainly concentrated only on the building envelope, as the boundary between indoor space and the surrounding environment, as well as a skin bearer of new messages. Sustainable refurbishment is therefore, in the discourse of several magazines and textbooks, equated to projects which employ - in whatever terms - “bioclimatic” and so defined “sustainable” technical solutions. And yet, nowadays, when control over energetic resources has become one of the main collective needs, the bioclimatic approach risks going from useful tool to one of the most evident expressions of architectural reductionism. New

Fig. 13, 14, 15, 16
Substitution of a glass and iron skylight with PV cells, zero environmental impacts, 2008.

specialisms are emerging from the environmental emergency, expressing their preeminence through the construction of sophisticated digital tools, pure technicisms leading to building choices and architectural decisions which have nothing to do with architecture and the context. The language spoken by the new architecture makes all-too-easy recourse to the codes of a sort of new "international, or global, style", now expressed in the use of technical devices (a new "ecological aesthetic" revolving around the use of *brise-soleil* on the façade and of various systems to capture the solar rays) (Lauria 2008).

Even in our educational programs is missing a preliminary discussion that leads students to investigate the attitude that we can or should have against the most recent "products" of the last century. It is right and legitimate to forget quickly, remove the traces of a recent history through projects of substantial transformation, if not dismantling, that seems to be the only mean and end to solve a large amount of problems? It is right and "sustainable" to considered architecture as consumer goods to be quickly replaced or, even worse, as a collection of images to be substituted because they are not "in fashion"? And, at last, which are the best teaching tools to improve students' awareness? The issue is serious. It involves the real reasons - no longer merely technical here, but deeply cultural - for conservation, demolition, or transformation and modification of our built heritage (Gregotti 2002, Pedretti 1997).

Fig. 17, 18
New residences in a disused cinema, Milan, 2008 emphasizing the volumetric composition.

If the architecture we produce today (even modifying what is already built) will really represent the "heritage" of the future, it is time to wonder if, and how, the heritage we leave to future generations really expresses our aspirations, our cultural references, our values. It is time, therefore, to reflect on our actual responsibilities, as teachers, in educating for environmental, economic and social sustainability, in a truly holistic, systemic and dynamic dimension.

When students, in the design studio, are invited to comment recent refurbishment projects, selected by teacher, and to identify the concepts that are behind them, given answers are often very simple, if not poor. The reason does not depend completely on students' maturity, it probably involves the perception that we have about contemporary, and the difficulty we have in its comprehension.

Every historical era creates, in fact, its vision of the present, past and future; to understand this assumption, it is proposed to read a short story by Kafka. Many of the contradictions and the complexity of the «short Twentieth Century» (Hobsbawm 1994) are summarized in *The City Coat of Arms,* centered on the building of the Tower of Babel, that will reach to heaven. «That being so, however, one need have no anxiety about the future; on the contrary, human knowledge is increasing, the art of building has made progress and will make further progress, a piece of work which takes us a year may perhaps be done in half the time in another hundred years, and better done, too, more enduringly.» Kafka's words, written in 1920, encode all of Twentieth Century man's trust in progress and in technical advancements, humanity's belief in the progressive increase of knowledge, in pursuit for the optimization of means, with no care whatsoever about the ends which require their use. But as the text continues a new problem emerges. «It is far more likely that the next generation with their perfected knowledge will find the work of their predecessors bad, and tear down what has been built so as to begin a new». A prophetic forewarning of mankind's attitude towards the products of an era, of contemporary times, and of the debate, quite fashionable nowadays, on whether demolition and oblivion represent the only truly effective answer to a demand for architectural and environmental quality. The words clearly spell out, to contemporary eyes, a plea to finally take responsibility for our actions in the name of future generations yet to come.

Fig. 19, 20, 21
Conversion of a manufacturing building into public offices, Rome, 2009: new technological screen.

After almost one hundred years, at the beginning of a new millennium, we are all focused on the present, unable to formulate a vision of the future and to have a clear understanding of the past, as Marc Augé and Pierre Nora recently wrote: «The present dimension has become overwhelming and hegemonic, collapses the past and saturates the imagination of the future» (Augé 2008); «Between the oppressive unpredictability of a future infinitely open and a cumbersome multiplicity of an opaque past, the present becomes the category of the comprehension of ourselves» (Nora 1992). Nevertheless, our time has difficulty in becoming aware of itself, partly because of the strategic power of technology and the overabundance of technical tools (Severino 2003).

To think about the subject of values necessarily implies a reflection on the significance of the term “contemporary”. Especially in architecture, the word *contemporary*, used as a synonym for

Fig. 22, 23, 24
"Conservation" of a monument whose value is widely recognized (before, after and during works), Rome, 2007.

simultaneous, contains the concept of the changing character of time, as the provisional, the ephemeral, is continuously redefined based on what just happened and on what is in the process of happening.

Historians like to say that we cannot really understand ongoing processes because things need time to reveal their "true self". Not by chance, old and recent episodes of architectural restoration show us very clearly that, far from the present, it is easier to recognize values and to preserve them. Time, in other words, is a necessary factor in the construction of memory - and oblivion as well (Cacciari 1993). Our task is therefore to collect (or to save) the signs offered by the contemporary in an effort to transform it in a historic experience.

To become aware of our time we must therefore be aware of the past, historicizing, contextualizing, giving contents and meaning, and this aim has suggested to invite students look and read at the history (Olmo 2010)and to speak with the authors of the various refurbishment projects selected [8], inviting them also to critic the ongoing work «The surest way not to break free from the past is, in every field, to forget it (...) The true "liberation" from the past requires that you really know it and you protect its vestiges» (Severino 2003). The total demolition of traces of our more recent past (as has already happened in the past) is only the evidence of an «abandonment that does not keep».

Contradictions and complexity in the «short Twentieth Century»: the role of a paradox
To focus students' attention on these considerations, the author chose to work on an "extreme case", considered as a sort of paradox, severely degraded social housing, now the subject of tensions or even of instances of demolition (not much "sustainable" for people who in those spaces are living), specifying the various aspects of the problem with the help of different actors. Students have to reflect on the destiny of a high-density settlement, imagined as a sort of "dam" between two valleys (the two red and white "sticks" in the image).

Fig. 25, 16, 27
Demolition" of social housing, whose inefficiency and inefficacy is widely recognized.

As part of a general rethinking of the role that the built inland territory can play for the future of the city of Genoa, INU (National Institute of Urban Planning) section of Liguria, on behalf of the Mayor, has launched a campaign of study, ended with the realization of a video-inquiry, of strong emotional impact, and the organization of a national conference. In this set of actions, the writer gave a contribution in relation to architectural questions, constructive and "ecological" items. The comparison between the opinions of administrators, citizens, experts of various urban, social, architectural and economic systems has enabled the development of a big frame, where problems, constraints and conflicts constitute the indispensable requisite to imagine any future intervention, be it refurbishment, modification, volumetric adaptation or, even, total or partial demolition.

Built in the early '80s with a heavy prefabricated constructive system (*banches et table in situ*) and finished outside with lightweight sandwich panels, the two buildings in question arise as a "barrier" to the valley. Designed to solve the emergency of social housing problem (to re-allocate people evicted from the historical centre, in that period interested by an extensive demolition), the two "dams" constitute a new *emergency* for public administration, because of difficult social situations that are rooted in them, for their isolation from the urban centre, for the environmental and landscape negative impacts on the collective perception, as well as for obvious technical problems (technological utopia as source of social troubles).

This is, in fact, a settlement built under the subsidized housing, with a unit cost (per square foot of area) equal to one third of the cost of private housing from the same period (in similar location). This is an episode in which "creative" freedom of the architect imposed a model of housing

Fig. 28, 29

Genoa, quartiere Diamante, the two “dams” of Begato.

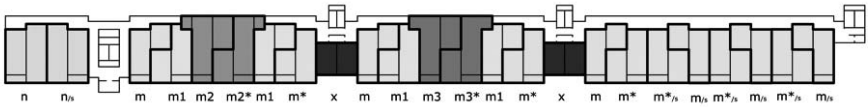


Fig. 30

Distribution system of the “dams” and typologies of dwellings.

Fig. 31, 32, 33

Linear settlements from the Twentieth Century: wheat silos in the old harbour (1905), the red “dam” (1982), the rationalist settlement of Forte Quezzi, strongly refused when built and now revalued (1962-68).

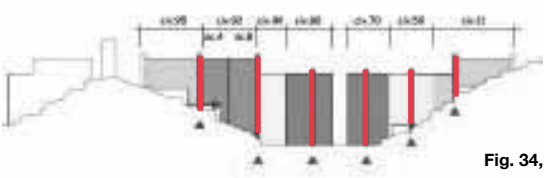
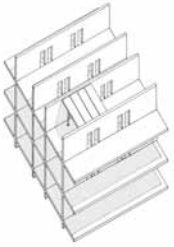


Fig. 34, 35
Original distribution of the two "dams" (red lines mean public passages between the valleys) and actual state, after the insertion of new elevators that radically changed the architectural idea (vertical red lines).



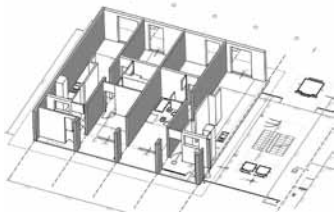


Fig. 36, 37, 385
Structural system of the two "dams"; studies for possible modifications vs. a new flexibility.

(horizontal distribution of long corridors and pathways linking the two valleys at height) that perhaps the time had already manifested, in other contexts, its weakness and ineffectiveness.[9]

This is one of the built "monsters" that constitutes a serious problem for the local government, which invests money to make some cyclical improvements (particularly on the distribution system, almost completely transformed few years after the construction through the insertion of new lifts to break the linearity of the corridors) and has pledged to reshape the future even with a total demolition. This is a place of strong social segregation (elderly people living alone, illegal occupiers, people living under house arrest) where, paradoxically from the common distrust, the students little by little discover that the very young migrant population has managed to create situations of a new kind of intercultural and interethnic sociality. It is also an area in which the residents

themselves, through a long process of "active participation" and with the help of social services, were able to create bonds of solidarity among themselves and with the place Paradoxically, again, what is now perceived from outside as a site totally free of "identification" and as the "paradigm" of insecurity, for the people themselves has instead become, at least in part, grounds of "identity" and belonging to a place. (Bauman 2003) A total demolition, feared by the Mayor, could suddenly (but only in appearance) solve more of a problem but also destroy a strong social network that over the years took root around some of those spaces, animating the life of the district, creating social groups where there were no (elderly unable to leave their home when the elevators are out of service, which happens often), developing in different social groups, and revived a clear "sense of the place" (which, moreover, has its advantages for locating in one of few green valleys remained "untouched") and report the inhabitants to a greater care and attention to building structures, avoiding new episodes of vandalism and anti-social behaviours.

All these different aspects of the theme, offered by the actors invited to speak and summarized in the video, have been assumed as starting point to define the following key actions in the design studio:

- *a process of historicizing:* the two "dams" represent the best response given at that time by the Municipality to solve the problem of social housing, at very low cost, in a very short time.
- *the urban scale:* the need to bind the "dams" to the infrastructure system and network services, that in the future will radically change in that part of the city (due to the conversion of industrial abandoned complexes and to a new urban mobility system);
- *the landscape scale:* positive effects of the presence of green and the absence of pollution, negative impacts of environmental agents (as wind and rain) on the building of such a huge height;
- *the economic/financial dimension:* the demolition of the entire volume represents a huge problem of dismantling; and what about the money already spent to improve efficiency of the buildings after only thirty years of life?
- *the social sphere:* identification of real needs of the tenants (diversified, enlarged, weak, multicultural and rapidly evolving users);
- *the constructive approach:* towards a new flexibility and a better way of life, to accommodate numerous foreign families (according to structural constraints), new performances, even working hardly on the building envelope, the less durable part of the "dams".

Working on such negative conditions, and discovering, little by little, that there are some positive signs, although weak and not immediately obvious, it means, first of all, to undermine some prejudices about the destiny of this heritage, and to teach students to develop a «relevant knowledge», namely «to promote a knowledge and understanding of the key global issues and to inscribe them in the partial and local knowledge» (Morin 1999). This also means helping them to understand the results of the diverse culture of the Twentieth Century under points of view not only related to architectural thought.

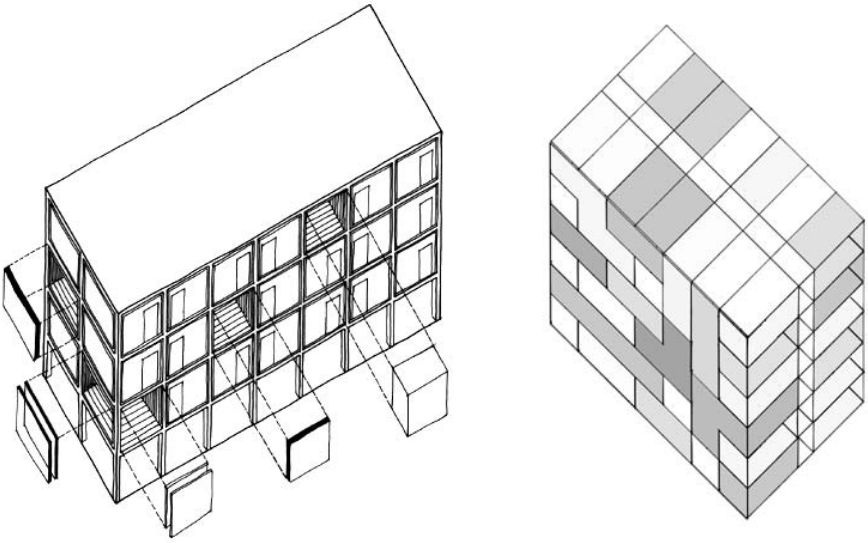


Fig. 38, 39
Modification, alteration, adaptation, flexibility: means or ends?

Responsibility towards the Contemporary

The students' reactions to the proposed case study in a multi-perspective vision help to make some partial conclusions (although not yet formalized, because of the work in progress).
Working on a "paradox" (perhaps more dramatically and effectively than would be offered by the choice of a more traditional theme, such as the conversion of an abandoned industrial settlement), was able to develop in the students what Gardner calls «respectful knowledge»; respectful of the multiplicity of people living in that spaces, with their needs, their background, their expectations, but also respectful of the collective built heritage that represents the cultural product of the contemporary era.

The students are forced to work on different dimensions, the "public" one (the Municipality is the owner, manager of public money and, in the meantime, the decision maker for the future arrangement) and the strictly "private" one, addressed to the deep sense of living. The two dimensions, and the real connections between them, lead the students to think very carefully about the possible consequences of the changes they are proposing, fully embracing the concept of responsibility that contemporary philosophical thought has already clarified. «A person acts responsibly when taking into account all the predictable effects of his actions»: this is one of the fundaments of the "ethics of responsibility", first expressed by Max Weber and later projected, by Hans Jonas (Jonas 1979), into the future: «Act so that the effects of your actions are compatible with the permanence of genuine human life».

Fig. 40, 41
Modification, alteration, adaptation, flexibility: studies for a reinforced concrete structure.

Addressing this kind of inquiry, respecting the multiplicity of actors involved and the many arguments (among them contradictory or conflicting), can definitely help students to understand the real difference between putting beside disciplines and integrating their knowledge and analytical methods. But - more than anything else – the exercise of contextualization and the prediction of possible effects help students to get rid of a thin determinism (analysis-project) that, within their curriculum, often force them to sophisticated analytical procedures as paralyzing as closed in themselves.
Finally, the choice of such a "fragile" and complex issue will oppose some of the myths of contemporary society, including: the rapid consumption, the predilection for teaching themes regarding entertainment or leisure and the proliferation of pre-fabricated images from which the student draws, without reflecting enough, to create, often too superficially, his own architectural references (Calvino 1985).

Education for responsible actions: few more issues and aims about quality

Quality presents, without any doubt, the desirable aim of any design approach. Providing quality for the future cannot simply mean respecting certain technical parameters and needs (which are, by the way, constantly evolving and changing), but must also include the ability to imagine, to operate upon and to manage a complex process, and this is particularly true for the two "dams". Students are therefore investigating how to achieve their own set of objectives:

- to satisfy the needs of a vast, differentiated user-base (searching for a more flexible set of typologies, acording to the constraints of structural system);
- to build spaces that are healthy, safe (also in terms of environmental risks) and accessible to all (both in the sense of urban mobility and accessibility to single dwellings);
- to put in place an efficient and effective service network (especially with the help of public social services that are now working with young and old people);

- to raise the quality of urban space at the ground, again with the help of public authority and services;
- to reduce the use of resources and set the scene for responsible consumership;
- to mitigate environmental impacts, including those linked to a wasteful leakage of heat and energy.

Objectives are reached through means that can vary from volumetric reduction, to fusion of dwellings, to insertion of loggias and balconies that solve, in the meantime the scarce durability of exiting envelope.

Responsibly planning means setting out, first of all, the aims to be pursued. It means being familiar with systems (in a multi-scale and multi-focal dimension) and with the relationships that govern them, strenuously pursuing the optimization of such systems (and not merely the maximization of a system to the detriment of all others), knowing how to pinpoint conditions, conflicts and boundaries and, only after all this has been mastered, knowing how to choose the tools most suited to match set objectives. Projects, in this perspective, are essentially marked by a transversal, multidisciplinary and trans-disciplinary approach. The potential for different systems of knowledge to establish fruitful dialogue must be enhanced and encouraged if the process is to be managed at various scales. Different approaches must come together, learn how to compare each discipline's scale of values, and how to build models which may effectively describe the living interaction of data, even when information comes from very different spheres of learning.

The students are moving the attention from the design experience as a single act focused to search for a new configuration (and a sudden act, concluded at the moment of conception) to the design experience as a *program and process*, that is a progressive set of operations involving different actors, from time of conception and formulation of choices to the construction and operation over time (Musso 2009[10]). This, by the way, entails some important consequences. Considering the intervention on Twentieth Century buildings as a "program" (and as a procedural action) means to enhance the value of the strategies for action on building segments rather than the development of fashionable drawing using sophisticated digital tools.

This is particularly significant for the case study of the "dams", on which the local administration has spent, during the last years, large sums of money, beside the insertion of new elevators, to rectify any failure, or to solve some existing inefficiencies, especially against infiltration from the covering and the façades. These interventions have been thought out from a program containing a coherent and comprehensive set of measures covering different items (for example, enhancement of social initiatives, diversification of users and surfaces of dwellings, improvement of management of external areas and of public system of transportation). Maintenance operations, further more, have been set without any serious reflection on the real cause of the state of decay (first of all due to the bad connection of prefabricated components) and, in fact, the buildings are after few years again affected by the same problems. The construction of a whole

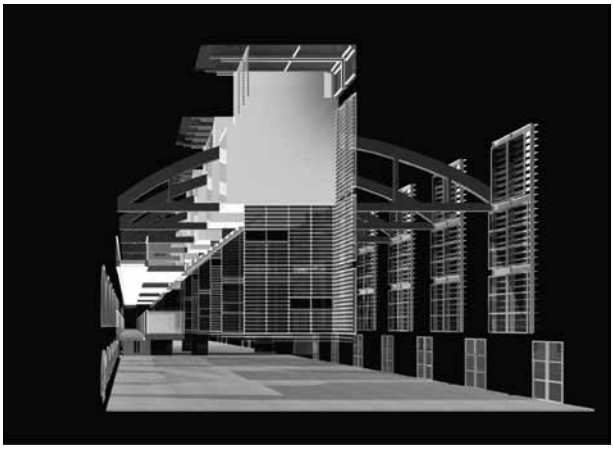


Fig. 43, 44, 45
University residences and services in a manufacturing building, Murano, Venice, 2009.

Fig. 46
University residences and services in a manufacturing building, Murano, Venice, 2009.

program might have succeeded in preventing the squandering of money on ineffective interventions over time, why not aimed at solving the problem by removing the causes to temporarily buffering one or more “emergencies”.

Contextualizing the program of actions, beside the search of new configurations that are in harmony with the landscape and the environment, make the students able to provide for the mutual interactions between the actions identified and, above all, the likely induced consequences. This is particularly important because the student has to imagine to evaluate the feasibility and gained benefits, not only in terms of efficiency (energy saving and reduction of harmful emissions) but also in terms of effectiveness (response to real problems of people and durability of the buildings).
This kind of teaching is, hopefully, helping students to grow up their own real and sustainable “creativity” as an act of synthesis, moving away from a reassuring deterministic approach, whereby a technical action directly corresponds to a problem detected during the diagnosis. Students are stimulated to practice a thought able to connect more than one able to separate, even at the cost of instilling doubts more than certainties, and to help, as Morin writes, them to «learn to sail in an ocean of uncertainty through the archipelagos of certainties» (Morin 1999).

References

Augé M., *Ou est passé l'avenir?* Editions du Panama, Paris, 2008.

Bauman Z., Intervista sull'identità, Laterza, Roma-Bari, 2003.

Cacciari M., *Conservazione e memoria*, in "ANANKE", n. 1, 1993.

Calvino I., *Six Memos for the Next Millennium*, 1985.

Curtis W., *Modern Architecture Since 1900*, Phaidon Press, London, 1982.

Frampton K., *Studies in Tectonic Culture: the Poetics of Construction in Nineteenth and Twentieth Century Architecture,* MIT Press, Cambridge, Massachusetts, 1999.

Franco G., *INVEST-IMMO: a decision making tool for long-term investment strategies in housing maintenance and refurbishment*, in Fiore V., De Joanna P. (editors), Urban Maintenance as Strategy for Sustainable Development, Liguori, Napoli, 2002.

Franco G., Lanzu S., *INA-Casa quarters in Genoa: construction culture, pathologies, preservation*, in Pietroforte R., De Angelis E., Polverino F. (editors), *Construction in the XXI Century: local and global challenge,* Edizioni Scientifiche Italiane, Napoli, 2006.

Franco G., *Atlante cronologico del Novecento in Italia, Interventi di architettura in Italia, in Atlante della Riqualificazione degli edifici,* UTET, Torino, 2009, italian version and adaptation of Giebeler G., Fisch R., Krause H., Musso F., Petzinka K.H., Rudolph A., *Atlas sanierung,* Detail, München, 2008.

Gardner H., *Five minds for the future*, Harvards Buisiness School Press, Boston, 2006.

Gregotti V., *Architettura, tecnica, finalità,* Laterza, Roma-Bari, 2002.

Hinks J., Cook G., *The technology of building defects*, E&FN SPON, London, 1997.

Hobsbawm E., *Age of Extremes. The short Twentieth Century 1914-1991*, 1994.

Hösle V., Philosophy of ecological crisis, 1991 (or. Philosophie der okologischen Krise).

Jonas H., *The Imperative of Responsibility: In Search of Ethics for the Technological Age,* 1979 (or. Das Prinzip Verantwortung).

Kieckens C., *Several C-words concernig architecture,* in Lombaerde P. (editor), *Bringing the world into culture,* University Press Antwerp, 2009.

Lauria A., *Note sui rapporti tra i saperi nella ricerca architettonica,* in Torricelli M.C., Lauria A. (a cura di), *Ricerca Tecnologia Architettura. Un diario a più voci,* Edizioni ETS, Pisa, 2008.

Latouche S., Survivre au développement, Mille et une nuits, Paris, 2004.

Morin E., *Les sept savoirs nécessaires à l'éducation du futur,* UNESCO, Paris, 1999.

Musso S.F., *Planned conservation as a challenge for innovative Cultural Heritage preservation*, in Canziani A. (editor), *Planned Conservation of XX Century Architectural Heritage,* Skira, Milano, 2009.

Nora P., *Le Lieux de mémoire*, III, La France, I, Gallimard, Paris, 1992.

Olmo C., *Architettura e Novecento. Diritti, conflitti, valori*, Doncelli Editore, Roma, 2010.

Pedretti B. (a cura di), *Il progetto del passato. Memoria, conservazione, restauro, architettura*, Bruno Mondadori, Milano, 1997.

Rossi A., *L'architettura della città,* Marsilio, Padova, 1966.

Severino E., *Tecnica e Architettura*, Raffaello Cortina Editore, Milano, 2003.

Venturi R., *Complexity and Contradiction in Architecture,* The Museum of Modern Art, New York, 1966.

Weber M., *Politics as a Vocation*, 1919.

Picture credits

Fig. 1, 2: Final thesis by E. Rezzani, C. Landini, 2009, tutor G. Franco

Fig. 3: EPIQR software tool

Fig. 4, 5, 6 : Research committed by CAE Energy, scientific responsible G. Franco, 2007

Fig. 7, 8 : Research on sustainable refurbishment of INA-Casa heritage, scientific responsible G. Franco, 2007

Fig. 9, 10, 11, 12: Berlin, Berlin, München arch. Herzog&De Meuron, Basel arch. Herzog&De Meuron, photo G. Franco

Fig. 13, 14, 15, 16: Palazzo Strozzi, Mantova, arch. Franco Biondi MPS, from *Atlante della Riqualificazione*, 2009, authorized by the editor

Fig. 17, 18 : Ex cinema Embassy, Milan, 5+1 AA, from *Atlante della Riqualificazione*, 2009, authorized by the editor

Fig. 19, 20, 21: Ex Manifattura Tabacchi, Rome, Seste Engineering arch. A. Aymonino, from *Atlante della Riqualificazione*, 2009, authorized by the editor

Fig. 22, 23, 24: Palazzo della Civiltà del Lavoro, EUR, Rome, arch. Paolo Marconi and Fenoce Restauri, from *Atlante della Riqualificazione*, 2009, authorized by the editor

Fig. 25: Le Vele, Naples

Fig. 26: Clichy-sous-bois

Fig. 27: Residences Burse, Wüppertal

Fig. 28, 29: Quartiere Diamante, Genova Begato, website

Fig. 30 : INU Liguria

Fig. 31: Photo G. Franco

Fig. 32 : Photo R. Bobbio

Fig. 33: Archivio Daneri

Fig. 34, 35, 36: INU Liguria

Fig. 37, 38, 39, 40: Studies for the "dams" and refurbishment of recent built heritage, G. Franco

Fig. 41, 42: Final thesis by A. Scotto, V. Serando, 2010, tutor G. Franco

Fig. 43, 44, 45, 46: Ex conterie, Murano, Venice, C+S Associati, from *Atlante della Riqualificazione*, 2009, authorized by the editor

Notes

1 Data source: CRESME, Centro Ricerche Economiche, Sociali, di Mercato per l'Edilizia e il Territorio.

2 20% reduction of CO2 emissions, 20% reduction of energy demands and 20% increase of the energy produced from renewable sources by 2020.

3 In Europe, social/public housing absorbs about 18% of the total residential energy demand. In Italy, a complete refurbishing of residential buildings, both private and public, may lead to a 25% to 70% reduction in energy use, and would reduce the Country's energy needs by 8TWh/year, equal to a theoretical 19% reduction, in line with the commitment made on the European level.

4 In accordance with recent EU directives and national regulatory requirements, which introduced the instrument of compulsory energy certification documentation as required during acts of real estate.

5 The teacher took part in European research programs focused on the issue of refurbishment of the Twentieth Century buildings, as the INVEST-IMMO project within the Fifth Framework Program, in which she was responsible for the development of the evaluation of quality and upgrading potential of residential building stocks.

6 Through, for example, the construction of a database on building features, forms and phenomena of degradation, on durability of materials and components, on performances and energy efficiency techniques for the rehabilitation

7 In particular, one of the aspect that is commonly investigated – through the use of simulation methods – is the energy consumption monitoring and the testing of possible benefits deriving from the application of insulating systems on the building envelope and innovative technical disposals (through the use of renewable sources).

8 The author has been recently in charge of the Italian translation and adaptation of Atlas sanierung, Detail, München, 2008, dedicated to the intervention on XXth Century built heritage; in this work she improved the text with the most recent Italian projects.

9 It is rather clear the cultural reference to the promenade architecturale by Le Corbusier, which is already embodied in the urban settlement of Forte Quezzi, built at least twenty years before than "dams", and strongly refused by public opinion.

10 The essay by Stefano F. Musso constituted a starting point to focuse and develope some ideas written in the paper.

MMENTION EUR 500

ISAAC LERNER
Eastern Mediterranean University
Turkey

Form follows Fiction
The Architecture and Urbanism of a Sustainable Responsive Environment

ISAAC LERNER

FORM FOLLOWS FICTION – THE ARCHITECTURE AND URBANISM OF A SUSTAINABLE RESPONSIVE ENVIRONMENT

JURYS COMENT

At the outset, this paper seems to set itself an ambitious task. It begins with de Chardin' concept of "noosphere", moves to the concept of "Social Construction of Reality" and thence to McLuhan and on to a discussion of simulacra. It evokes coherence between these nodes, and all the while it tries to develop a connection with a particular conceptualization of projects in architectural education. The paper's address to the issue of "sustainability" is elusive.

The paper is more than interesting in its arguments, but one would look for a stronger, driving coherence of argument that could bridge the many leaps in argument and association. One would hope that the author can stand back from the work achieved so far and consider how the argument can more clearly address the topic of the competition.

The introduction, in particular the last paragraph, opens for an important and interesting area of study in relation to the EAAE competition topic. The closing points also touched on very essential issues and drew attention to factors that are having great impact on our built environment as second hand influences. Unfortunately, the basic structure or organization of the paper is a little weak, and this lead to a somewhat uneven development within each sub-topic and an underdeveloped potential within the relationship of one sub-topic to another. This structure also affected how well one was able to connect the direction and issues presented in the introduction to the rest of the paper.

In first sub-topic, the general presentation and definition of Social Constructed Realities was thorough and there was a clear attempt to connect it to architecture, but the minimal introduction of the Gazimagusa study project was not. Presenting a method of study at this early point in the paper was confusing, and even more so when so little information and reasoning in relation to why this particular case study was chosen.

Throughout the paper, there are some topics that are thoroughly discussed while others that directly affect the first are barely touched, and the author's sources and images around his case study also suffer with this problem. They come off as somewhat random and range from very personal (his wife) to well documented standard academic sources.
If the structure and direction of this paper had been thoroughly worked out from the start, many of the weak points would have been clear to the author at an earlier stage. It needs a good round of weeding out non-essential information, making sure that what is treated only peripherally is in fact peripheral to the argument or theme, and questioning, particularly in relation to the balance and focus building up to an argument. There is a great deal of unrealized potential in this very interesting and challenging paper.

The paper is based on somewhat far fetched arguments that only briefly touch upon the question of architectural education, which is asked for in the competition brief. It somehow seems written for other purposes than the present one. This could be taken into consideration when rewriting it for the next step in the paper competition. In its present form it appears as a paper dealing with 'how to evoke critical thinking as a premise for what the author calls 'deep ecology'. In that sense it becomes a very abstract discussion that scarcely touches upon sustainability or architectural education. These elements ought to be better integrated into the text. However the paper offers an interesting notion, how to bring cultural analysis into the theoretical discussion of sustainability. The notion appears somewhat difficult to follow in its argumentation. As it is presented now in the text it could be read as: The holistic approach = sustainable = sociological/ psychological. This 'direct' correlation seems somewhat blunt and not self critical enough in terms of argumentation.

The paper lacks clarity. It appears as one long theoretical thought. The author does not elaborate on why/how SCR offers critical thinking but only that it is capable of doing so. The example of student work that is included in the article justifies the paper in this present competition context. However the paper would work even stronger if more examples of relevant kind would be included.

The paper is interesting. It is first and foremost about the space of consumerism and the simulacrum, and only secondly about sustainability and ecology. What this paper needs most of all, therefore, is a much clearer articulation of how its apparent focus – the simulacrum - is relevant for a discussion of ecology and sustainability. If one looks at the references, most of the bibliography pertains to publications about communication and signification, with only a few references making the link to ecology. This a-symmetry and unbalance should be rectified and the argument should be made much more concretely and explicitly as to why simulacra are not helpful when it comes to sustainability. The crisis of sustainability, it seems from my vantage point, is first of all a matter of the geosphere, or even of the biosphere. What the article should articulate is how concerns related to the noosphere are nevertheless symptomatic, indicative, damaging or whatever with respect to the geosphere and biosphere. As long as that doesn't happen more clearly, the paper remains unconvincing.
It's interesting for the new context of sustainibility to focus about imagination which is probably a critcal issue. The connexion with education has to be improved.For, in this paper, education seems a pretext!

The Jury
May, 2010

ISAAC LERNER
Eastern Mediterranean University
Turkey

The Architecture and Urbanism of a Sustainable Responsive Environment

INTRODUCTION

Contemporary developments in architecture and urbanism affect environmental sustainability in novel ways. Since human activities are a significant factor influencing climate change then this requires a more humanistic or holistic understanding regarding sustainability. This is an understanding not simply reduced to concerns about the natural world but includes a more inclusive perception of the interplay between that world and culture, i.e. the effective sociological and psychological dimensions of the built environment. The accelerando for human evolution, since the development of prehistoric tools, has been a co-creative and co-formative interplay between technology and society, with the concomitant realization that our inherent 'natural' context is not 'nature' but rather 'culture'. Historically, nature and culture have been inextricably related in socially constructed environments of progressively regenerative technological development whereby, we have experienced an amplification and intensification of the pace, scale and pattern of human activities.

Today, an emergent information environment surrounds the planet. The natural world is contained in a manmade electronic infrastructure; a digital surround, or cyberspace, facilitating global communication and navigated through by means of the internet. The French philosopher and Jesuit priest, Pierre Teilhard de Chardin, who was trained as a paleontologist and geologist, anticipated the emergence of an intelligent interactive space which he referred to as the 'noosphere' (from the Greek nous = mind + sphere) and described it as an active formative process, enveloping the biosphere and geosphere. In his book *The Phenomenon of Man* (1959), he de-

scribed the evolution of the planet in terms of layered spheres, like skins of an onion, in which the noosphere is the third evolutionary stage, after the development of the geosphere and the biosphere. Just as the emergence of the biosphere transformed the geosphere, the technological extension of human cognition (the noosphere or cyberspace as an environment of engineering consciousness) is also transforming both the geosphere and biosphere as resource and recreational zones. Teilhard refers to these spheres as evolutionary phyla or, as a co-evolutionary ontological hierarchy of increasing "complexity consciousness". He believed that there exists a co-creative non-dualistic interplay of mind and matter of the total lifeworld, as mutually biased layers-of-being, or phylum, and therefore best understood in the manner of holistic co-formal determinism.

Last year (2009), for the first time in history, over half the world's population lived in an urban context. However, in retrospect, with the launch of the first satellite (Sputnik) in 1957, the urban context was obsolesced by an information infrastructural surround. Since the 1960's, and in tandem with the accelerated development of air travel and broadcast communications, such as live television and the internet, we now live in a global village. Within a global village, we engage with the urban and natural environments by means of data processing and digital imaging (e.g. think of TV news and weather reports or the various computer models for analyzing global warming). These models and images, and in particular the first pictures of our beautiful blue planet from space, consequently fostered the bias for the current use of the term ecology, rather than 'nature'. Our broadened horizons induced a sense of stewardship, or mutual interdependence between nature and culture by means of this electronically mediated view of the planet. However, if we factor in such human activities towards an understanding of sustainable environments, or the consequences of technological innovation on the pace, scale and pattern of concomitant cultural transformation, then we must concern ourselves not simply with the physical viability of nature but also with a concern for a deep ecology. That is, with an understanding of media and concomitant technological infrastructures that maintains, but not necessarily sustains, the overall well-being of our socially constructed realities (SCRs).

THE CONCEPT AND APPLICATION OF THE METHODOLOGY OF SOCIAL CONSTRUCTED REALITIES (SCRs)

Today, postmodern issues regarding identity and community, and the associated perception of cultural relativity regarding concepts about space, time and form, extend and inform the Modernist Functional and Rational bias, and as such, facilitated the turn towards a deep ecological understanding of architecture and urbanism. The meaning of these changing concepts and identities find their meaning in the dynamics of paradigm shifts, or in the temporal interface between socially constructed realities; e.g. today we stand between Modernism and Postmodernism as a potential space of under-standing. This space engages us with an in-depth awareness of the shifting co-evolution of architectural and environmental contexts that requires applying an *understanding*, or perceiving the subliminal influences, of infrastructural innovations; their psychological, social as well as material effects. This difficult apperception requires the education

of an 'architectural imagination', which reveals the formal cause influencing the design of architectural and urban forms. This phrase, the 'architectural imagination', is derived from the work of sociologist C. W. Mills, who referred to the development of 'the sociological imagination' as the goal for educating sociologists whereby, a holistic/gestalt analytic ability would be applied to the study and practice of sociology (Mills, 1959).

In cultural and media studies, an important methodology for the study of social change, as a dynamic cultural gestalt, is termed the 'Social Construction of Reality' (SCR). This includes the work of social theorists such as Peter Luckman, Peter Berger, and Walter Truett Anderson (Anderson 2002, 3). They apply this methodology towards understanding the significant interplay between human values, beliefs and social formations, i.e. a means of analyzing the social environment as a constructed formative dialectic between belief/value systems and social behavior.

In essence, these sociologists are concerned with the way narrative or 'fictions' – the stories we tell each other every day and grounded upon culturally relative systems (e.g. beliefs and precepts) sustain our sociological realities. This is what the philosopher of aesthetics, Nelson Goodman, referred to as 'world making' and is evident in the work of media and cultural theorist, Marshal McLuhan, but with a substantially different approach (McLuhan, 2004). In the latter's work, media does not refer to belief systems, narratives or basic tools as technologies, but rather to dominant technologies as emergent infrastructural environments. These environmental surrounds are active developmental processes, and not passive containers, in-forming or conditioning societies; a co-creative social/infrastructural environmental dialectic altering human sense, sensibility and consciousness or, to paraphrase the poet William Blake, 'we shape our tools and in turn our tools shape us'.

With regard to the idea of culture as a co-formative social/environmental dialectic, McLuhan applied the aphorism 'the medium is the message/massage' whereby, he re-evaluates or re-reads the meaning of "message" on the basis of an ontological empirical study of media as culturally relative environments. In this way he describes how each medium affects the human sensorium and alters human sensibilities and consciousness; i.e. an environmental 'massaging' of the embodied ratio-of-the-senses which in turn subliminally conditions sensibilities or generic attitudes towards space and time. This generic or culturally relative 'insight' informs 'outsight' or our conceptions of space and form (e.g. as conceived in art, science and architecture) as a way of attuning human consciousness. McLuhan qualified historical evolution in these terms and he elaborated upon why Western phonetically literate societies, which were predisposed in terms of subliminal sensibilities to a 'visual space' bias, conceived forms such as perspective art, Cartesian geometry and Newtonian mechanical physics. By contrast, preliterate and post-literate societies (i.e. postmodern) pattern and structure social reality as subliminally predisposed to an 'acoustic space' bias and conceived forms such as collage, non-Euclidean geometries and Einsteinian relativity physics (McLuhan, 2007).

Photos by the author

Fig. 1-2
Photos of the Populist Simulacra of Gazimaguza.

Without this effective understanding of the shaping gestalt between human perception and cognition, configured within our constructed social environment as a subliminally conditioning infrastructural ground, then we would be at a loss to understand the formal cause regarding sustainable or unsustainable environments. This relationship presumes a deep ecological analytic and without this understanding we remain victims and not authors, of our SCRs or as James Joyce punned, "we ape our tools and in turn our tools ape us". Hence, with regard to education, the study of sustainability, as informed by an architectural imagination implies a critical understanding. This requires an awareness of the metamorphosis of individual and collective forms of identity and meaning corresponding with environmental transformation through the development of technological infrastructure; evolution is increasingly technological and not biological.

A critical history of architecture and urbanism should inform the studio methodology as design-by-research. Critical thinking is not synonymous with criticism; the former implies 'thinking about thinking' or how we as individuals, as a member of a society, or budding young architects in school, acquire our habits of thought and perception with regard to space, time, or the co-evolution of human faculties with the changing environment. For McLuhan, a critical understanding

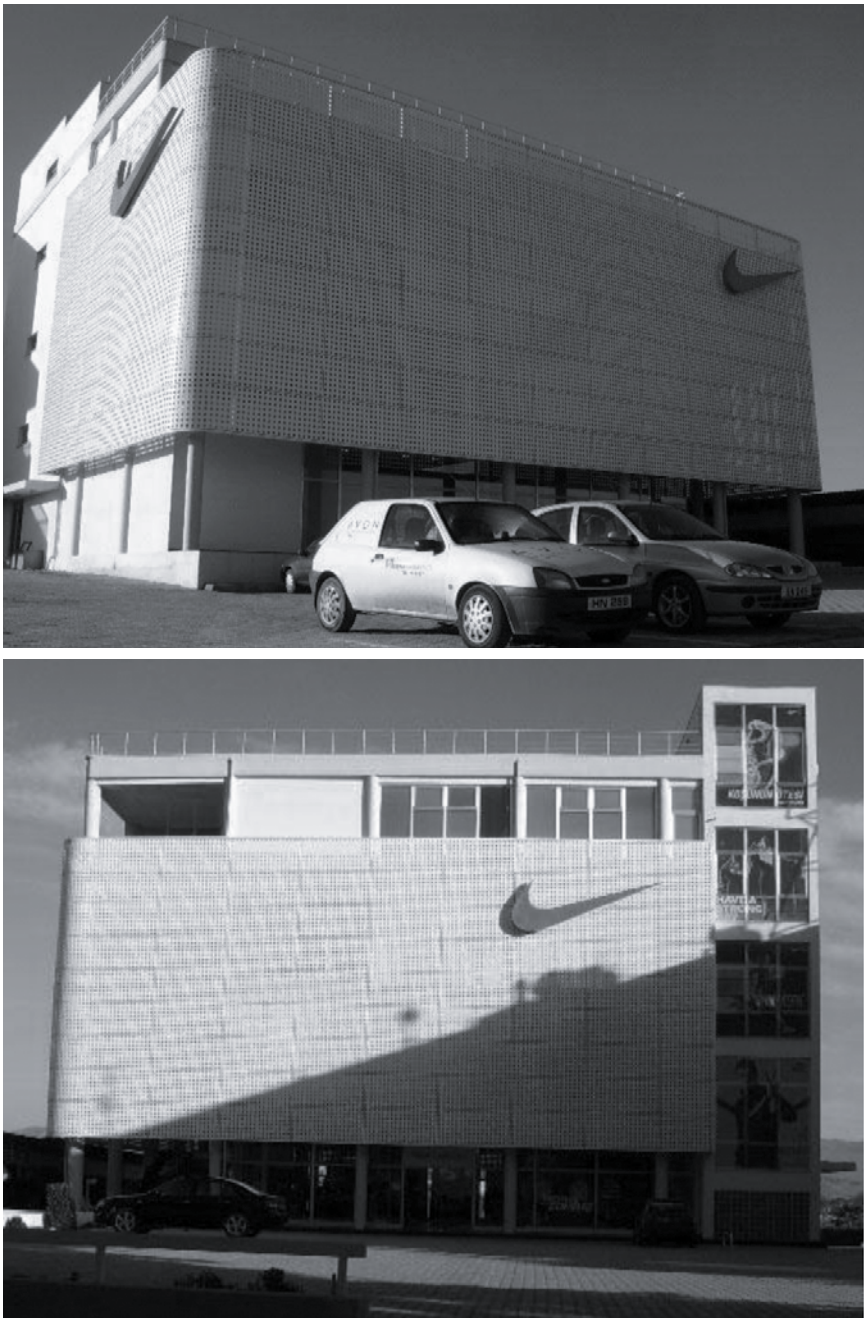
Fig. 3-4
Photos of the Populist Simulacra of Gazimaguza.

Photos by the author

involves a perception of communication systems (as a medium) underwriting the sense and sensibilities (perceptions) of a society. With respect to this paper, this involves identifying the effective characteristics of the corresponding media groundwork or infrastructural grammars, of the commercial street, that in-forms or dis-informs the viability of a sustainable culture.
At this point in the paper, it would be worthwhile situating McLuhan's methodology in relation to a studio problem and certain questions regarding the transformation of the local commercial street as an effect of current emergent global communication systems. The problem involved third year students, analyzing twelve blocks of the main commercial street (Salamis Road) in the community/college town of Gazimaguza, North Cyprus. The aim of the project was to locate vacant lots along this primarily consumer shopping street for immediate development, and with the stipulation that the students would try to imagine what the surrounding context might be like by the year 2015.

The study began with an urban analysis of the street. During discussions among tutors and students in front of presentation panels displaying elements of urban zoning, such as public, semi-public, and private spaces, as well as the texture of the blocks and other related contextual features, a particular question came to mind. This question related to the proliferation of large-scale graphic images that had progressively replaced the traditional facades along the street. It became evident, by reviewing photos and videos of the street, that over a relatively short period of five years the facades of many buildings were transformed from architectural elevations, (composed primarily of doors, windows, building materials and other tectonic features) into graphic façades composed of icons/logos and variations on billboard designs. It also became apparent that many older shops were replaced by new multi-national franchises, or branded businesses, such as Nike, Adidas, Gloria Jeans, Levis and most recently, Domino Pizza (Fig. 1, 2, 3, 4). During our discussions, it dawned on me that we were witnessing the architectural relocation of Robert Venturi's Las Vegas experience, but with a digital twist; (Venturi, 1977) i.e. not as an effect of an automotive suburban/exurban society, but rather that our street was becoming an emergent resonant node in a global network of instant information-movement. This accelerated transformation towards the populist commercial street reflected a major shift in the current cultural dimensions of our college community. This begs the question; what was behind or 'under writing' (under-grounding!?) this shift?

A particularly interesting example is the new Nike offices, located on the outskirts of the capital city of Lefkosa (Fig. 5, 6). A traditional modernist building disappeared under a perforated metal screen; a semi-matte aluminum screen simulating the fabric of a breathable Nike tennis shoe and with the Nike swoosh simply applied to the upper top-right corner on all sides of the building. This wrap-around metal sheath provides a salient metaphor regarding the global digital surround supported by information technology. Cyberspace has subsumed nature and traditional society in a sea and torrent of images, whereby the ubiquity of a graphic language, the style of populist architecture, has displaced the phonetic signs and tectonic features that composed the traditional Modern commercial facades. This displacement can help us understand



Photos by the author

Fig. 5-6
Photos of Nike Iconic Architecture, Lefkosa.

certain effects of globalization and consumerist culture currently expressed in graphic or iconic architecture, and the change of the urban commercial street into a derivative of theme-park architecture as populist simulacra.

The studio discussions also included other recent developments in the community, such as the ubiquitous appearance of mobile phones, wireless broadband, laptop computers and the infrastructure of telecommunication/microwave towers. We realized that the street was no longer a corridor simply facilitating the movement of pedestrians and wheeled vehicles (car, bus, taxi and bicycle). It was increasingly becoming a local resonant domain of information movement (glocalization) within cyberspace (globalization), and in this context, altering social behavior by shaping consumers' e-motions, i.e. the interactive intentional space of expectations, feelings and desires of people on the street. In this way, the studio was a springboard for a broader discussion relating themes of architecture, urbanism and architectural education, as well as interactive space of phenomenological space-time.

Branding architecture and cities, identified by the recent ubiquitous appearance of iconic-graphic language and digital communication (i.e. credit cards, 3G phones, etc.), is a measure of the degree that globalization is affecting the behavior and consequently the nature and meaning of movement and community along the street. Regarding advertizing and consequently the street as populist simulacrum Francine Edelman, "one of the leading practitioners of the new database-heavy style of direct marketing" said that marketing " has evolved and become very sophisticated and a lot more strategic, because you really have to get down very deep into your customer base and understand their psyche. What are the hot buttons that are going to make them respond?". (Rushkoff 1999, 246) The street is no longer simply a physical space but increasingly a phenomenological space, of collective and individual mindsets, constituting the consumer real-time market as an instantaneous digital resonant field. Therefore, the studio question mentioned above begs further development; i.e. is this form of a responsive environment responsible in terms of sustainability? In other words, what is the effective relationship between this emerging noosphere, with regard to coercing consumer behavior, and the sustainability of the biosphere and geosphere, which are increasingly exploited as resource bases? Consequently, as a possible antidote to commercial exploitation 'educated' by mass media, is it possible to co-opt the commercial simulacrum as a medium for schooling architects towards designing responsive buildings and urban forms, responsibly? These questions will be discussed below, after the following discussion regarding the evolution of the commercial street in recent history.

A BRIEF HISTORY OF THE COMMERCIAL STREET

Historically, if we evaluate the street in terms of the methodology of socially constructed realities, the pedestrian shopping street has its origins with the birth of the metropolis or industrial city. That is, by means of industrial mass-production and rail transport, a proliferation of shops and the new commercial form, the department store, enframed 'lineality' in the commercial zones

of the city. The organization by means of a continuous linear pattern of shops and stores embodies certain vital characteristics of this street space. The lineal continuity was essential in order to economize on the available street space, affording efficient movement by pedestrians as facilitated by eliminating gaps between buildings.

Lineality, for McLuhan, is synonymous with visual space, a conditioned sensibility that particularly represents a Western bias (McLuhan, 1962). However, with the new construction of the automobile infrastructure in America, between the two World Wars, the identity and space of consumerism changed. The street extended itself towards the automobile suburbs and it morphed into what became a shopping 'strip', or rather, the city as highway (McLuhan 1964, 217-225). The latter affords space and movement at a superhuman scale, or extended shopping by wheel and not foot, with the necessary development of omnipresent parking lots, drive-ins and shopping centers; the latter as a commercial island surrounded by a lake of asphalt. The blinding feature of this commercial strip-pattern is the lack of visual linearity, or a sense of continuity and connectedness. Buildings along the strip are detached, separated by gaps, in order to facilitate parking and drive-in functions between buildings. Therefore, 'interval' and not the 'line' organize the suburban pattern. The space conception and concomitant forms organized by interval/gap exemplify a pattern increasingly in-formed by a sensibility conditioned by an automotive environment of juxtaposition; i.e. these are buildings in space qualified by interval and defined in terms of fragmentation and associated as collage.

Formal organizations expressed in terms of 'interval' rather than the organizing principle of the 'line' represents configurations of 'acoustic' rather than 'visual' space as the generic sensibility (McLuhan 1967, 42). In this regard, the automobile suburbs consisted of a pattern of detached housing as a constitutive instance of acoustic space as opposed to the railway suburbs that were patterned as continuous terrace housing. These examples illustrate how we author our environments in accord with emergent social and psychological predispositions/sensibilities in-formed by technological/communication infrastructures.

Movement along the automotive commercial strip, rather than on the pedestrian street, exemplifies the space of parataxis or non-linear association. Siegfried Gideon defined Cubism, as a simultaneous juxtaposition of separate perspective views aggregated in time (Gideon 1967, 262). By analogy, this adequately accounts for being mobile in a car. That is, driving requires environmental communication by means of a simultaneous juxtaposition of multiple views through time. The views include looking through the front, left and right windshields as well as the rear-view and side-view mirrors in an ongoing juxtaposition of varying perspectives. This is particularly interesting if we consider that, the mirrors may be of various degrees of magnification. By analogy, Gideon's concept of Cubism applies to the space of the automobile where transparency by means of a dynamic association of views through windshields and mirrors, defines relative space-time; what Slutsky and Rowe referred to as literal transparency. Literal space-time, a prejudice informed by interval in physical space, is a conception of the acoustic space bias and

represents a change in SCRs from the culture of the metropolis (absolute/static linear space and time) towards the relative/dynamic space-time of the commercial strip and the automobile suburbs.

A new emergent SCR, as exemplified by the notion of the 'global village' and experienced locally as a populist space, or the commercial street as simulacra, represents new forms of both architecture and urbanism. Today, the shopping street is increasingly dependent upon information movement facilitated by means of data processing, programming and information technology, and is a 'local' constituent of the currently emergent infrastructure of the global village. The denizens of this village community (globalization), as well as members of our town and university (glocalization), are mutually transformed by movement along electronic 'highways' constituting a network of networks, or the internet. Paradoxically, this material infrastructural hardware reality sustains an immaterial software reality, a virtual reality or intelligent interactive space of iconic commercial simulacra, which involves more than just moving data electronically at the speed of light, because communicating by telephone or tele-camera produces an unprecedented change in identity.

The message of instant, all-at-once, communication means being in two or more positions at the same time. This deconstructs the Cartesian materialist notion of space, as res extensa, which is only possible because we are not 'transported' materially but rather transcribed into pure information, virtual bits and bytes, in the manner of visual and/or acoustic virtual images. We are now transported via the resonant electromagnetic field that is cyberspace. Also, in this context the Cartesian '*res cogitan*' or embodied 'thinking subject' is being obsolesced as a physical entity for a metaphysical/discarnate or virtual identity. We increasingly identify with virtual images as self-images, sustained both by electronic communication and advertizing infrastructures, or as James Joyce quipped, we have learned to 'love our labels as ourselves'. That is, the message/massage of electronic networking is that users are sent (content is secondary) in digital sensory modalities in order to maintain 'real-time' (disembodied) communications, whereby space and time disappear at the speed of light (E. McLuhan 53-54, 1998). Today we send 'ourselves' as discarnate virtual icons in the context of the resonant field of designer icons and both comprise the phenomenologically interactive commercial street, a context where McLuhan humorously said we are "keeping upset with the Jones"(McLuhan 1964, 226).

Both iconic ads and our mediated virtual lifestyle images constitute the consciousness of phenomenological space-time (a variant of Slutsky and Rowe's notion of phenomenological transparency). This populist simulacrum involves real-time information processing by means of an automated three-phase system consisting of feedback, programming and feed-forward (commercial surveillance or transparency provided by information retrieval and programming that obsolesces privacy). This system begins with feedback, which involves collecting information regarding internet use that in turn generates individual profiles and group profiles (i.e. clusters). These market profiles constructed by specialist firms (e.g. PRIZM) by means of programming analytics,

which are then sold to various organizations such as public relations and advertizing companies, as well as producers and distributors of commodities. These consumer profiles represent, for example, members of typical college communities around the globe, which also reflect behavioral patterns in our community. The next stage of this recursive tri-partite information infrastructure involves feed forwarding individually tailored or bespoke ads to a 3G digital phone or ads strategically placed on screens and billboards, both in shops or along the street; i.e. customized 'podcasting' or clustered 'broadcasting' respectively. Because of discussions in and about the studio, we were beginning to notice that our instance of the commercial street, as simulacrum, is a glocalization or responsive node on the internet.

Iconic architecture and populist simulacrum are reflexive mirrors, or 'facings', re-presenting the student-consumer profiles as an interactive interpretive street-space. The street is recursively managed in real-time by constantly maintaining databases (through feedback from shops and other digital activities) which implicitly involves memory (storage of consumer habits) and 're-membering', or analytic programming of personal information embedded in design of populist facades, or 'facings'; the latter as feed-forward or updated modalities of bespoke and mass media. This interactive space, as an interpretive hermeneutic circle, is a space for generating heat (keeping upset with the Jones) by subconsciously provoking 'e-motions', and not light which appeals to the more conscious and rational faculties whereby the effects of overconsumption on the total environment could be conceived. In this regard, Douglas Rushkoff has written:

When you visit a Web site, the people running that site often have the opportunity to capture and store your e-mail address. They can also determine exactly which pages you look at, how long you look at them, and which buttons, links and pictures you click on…….But an internet run by commercial interests means more than just customized banner ads and spam. It is a world more contained and controllable than a theme park, where the techniques and influence can be embedded in every frame and button… the people turning media into an electronic marketplace aren't fully conscious of what they're doing. By using the internet to automate their business models, they have combined the force of the market with the power of the computer to amplify the blind effects of each. Commercial media seems to have taken on a life of its own, dedicated to selling more goods to more and more people in less and less time. Although human beings set the whole process in motion, it's as if once they built the engine, they abandoned the throttle and all controls to the machine itself. It has been running on automatic ever since [my italics]. (Rushkoff 1999, 255,257,260)

The internet exemplifies the extension of theme park, as urban simulacrum, but seems to be operating on automatic pilot. This involves a short-term awareness geared to gratifying immediate needs, by subliminally manipulating the individual and collective subconscious, in order to generate heat to increase consumption. Baudrillard referred to Disney as theme park, or simulacrum, and stated that this defers to the actual constructed theme parks that our city streets and cities have become (Baudrillard 1983, 24-25). Today, branding cities in order to attract tour-

ists subscribes to the same techniques applied by Disney, which they refer to as 'Imagineering'. Increasingly our social constructed realities function as automatons and consumers as *responsive* servomechanisms while both constitute a vicious cycle of *irresponsible* unsustainable consumption synonymous with behaviour in the commercial simulacrum.

Digital environments as unsustainable constructed realities involve a misunderstanding of the subliminal effects of these superhuman scales of activities in the global village. The village, as global extensions of the human nervous system and brain, intensifies the pace and scale of life, which amplifies dis-ease, as witnessed by the postmodern condition of increased levels of stress (e.g. information overload, loss of privacy, rapid change in all domains of our lives threatening security and stability) and dis-stress (e.g. alienation, anomie, nihilism). Increased stress results in mental as well as physical disabilities, the latter are not due to viral or bacterial causes but are environmental. The diseases, typhoid and cholera, prevalent in the emerging 19th century metropolis, were alleviated primarily by architects and urban designers and not by doctors alone, by providing hygienic accommodation and the necessary water, sewage and other infrastructures. Today, the design of the digital simulacrum and iconic architecture also requires intervention for well-being by educating imagination as an awareness of deep ecology. This implies design-by-research in terms of a critical awareness of the evolution of SCR's in terms of understanding not only the material but also psychological and sociological effects of incorporating infrastructure as the key element, or formal cause, constituting SCRs.

CRITICAL THINKING ABOUT SIMULACRA AND THE EDUCATION OF AN ARCHITECTURAL IMAGINATION

The Enlightenment period valorized logical reason, or analytic detachment and objectivity, as well as privacy, representational government and rule-by-law as inherent attributes of the phonetically literate Western worldview (SCR), which is becoming obsolete in the emergent context of electronic mass society (SCR). McLuhan provides a uniquely interesting definition for the meaning of the term 'mass' in digitally constructed realities. In this social context, a mass can be composed of simply two people if the distance between them disappears as for example, a phone call or credit card exchange in the simulacrum. Mass communication in this context is, by analogy, like a spider's web, whereby if one or more strands are plucked, the entire web vibrates simultaneously. This quality of resonance is a defining quality, an "organic unity", of the commercial space of populist simulacra, whereby McLuhan writes that:

Automation or cybernation deals with all units or components of the industrial and marketing process … The new kind of interrelation in both industry and entertainment is the result of the electric instant speed. Our new electric technology now extends the instant processing of knowledge by interrelation that has long occurred within our central nervous system. It is that same speed that constitutes "organic unity" and ends the mechanical age that had gone into high gear with Guttenberg. Automation brings in real "mass production," not in terms of size but of instant inclusive embrace. Such is also the character of "mass media." They are an indication,

not of the size of their audiences, but of the fact that everybody becomes involved in them at the same time. Thus, commodity industries under automation share the same structural character of the entertainment industries in the degree that both approximate the condition of instant information. Automation affects not just production, but every phase of consumption and marketing; for the consumer becomes a producer in an automation circuit… (my italics) (McLuhan 1964, 249).

The 'consumer as producer' exemplifies the notion whereby intentionality becomes a responsive chord in the manner of total instant response of the internet to a consumer's purchase. This response is manifold and dialogical. The consumer as producer engages the internet by means of a credit card, which is identical to a telephone call, providing vital information about the market. For example, each purchase in a shop induces resonance across many networks. The shopping data is collected, retrieved, analyzed and regenerated as ads and icons that transcribe the street graphically and interactively. In other words, we 'write' ourselves (lifestyle profiles) and in turn the street 'writes' us (iconic architecture and bespoke ads reflect trends). This street functions in the manner of theatre as simulacrum or a co-authored space of 'form follows fiction'.

The global theatre enfolds multiple narratives as simulacra, co-authored by consumers and marketers (the consumer as producer), which are places that deconstruct Enlightenment values. Reason and objectivity are obsolesced by means of instant participatory 'real-time' (meaning disembodied) communications. Consequently, 'immediate gratification', or the inability to act without reacting (i.e. detached objectivity as a virtue of the Age of Reason), is recursively massaged or 'educated' in the production of self-consciousness as branded self-images. This space insidiously involves engineering consciousness (i.e. Imagineering), because in this interactive space, as the poet T.S. Eliot has said, we 'are distracted from distractions by distractions'. However, educating objectivity or rational detachment in the context simulacra requires critical thinking, or detached involvement as a paradoxical ability to think about the way we are cognitively, but subliminally, predisposed to our constructed environments, such as the theatre of commercial simulacra.

SIMULATING THE COMMERCIAL SIMULACRUM AS A MODEL FOR ARCHITECTURAL EDUCATION

The street as interactive simulacrum is, in essence, a mode of education to keep consumers informed regarding the latest products and services in order to entice repetitive consumption. However, today the internet is reforming into what is termed the 'third' or 'next' net as it more intensely engages the commercial street by means of bespoke ads and information. The first net, as it evolved during the 1990's, provided read only web pages. The second net consists of more participatory and collaborative interactive sites such as social networking sites and wikis. Today the emergent third net refines communication in the simulacrum to the level of the individual, by means of providing bespoke ads and information (i.e. placing augmented reality software on mobile devices), and as a means of 'making-sense' of self and world consciousness in real-time, therefore becomes more engaging.

Regarding recent internet development, what can we learn from the space of an intelligent interactive street in terms of reforming architectural education and practice? The shift from modern to postmodern schooling can be elaborated upon in terms of Louis Kahn's poetics of architecture. Poetics refers to how meaning is produced, or what in-forms form in any discipline; i.e. literature, the arts or architecture and education. Regarding communication and education, Louis Kahn asks 'what does a school want to be'? He responds ontologically and in terms of a universal archetype, that schooling is essentially a relationship or process whereby one person with a question approaches another who might provide an answer (Brownlee 1991, 94). In the academies of pre-Socratic Antiquity the educational process was verbal and dialogical, not lectures. With the development of the phonetic script and portable media, such as papyrus and vellum, later during the Middle Ages the educational form involved Scriptoria in which students were engaged in copying and handcrafting texts. Eventually, with the invention of the printing press and the mass production of texts (i.e. the first mass produced commodity) education was progressively democratized by the time of the Industrial Revolution. The assembly line is an apt metaphor for modern schooling as factories that mass-produced uniform education under standardized curriculums and facilities. This was possible because the infrastructures of Industrialization foster a process whereby a million things can be produced all-the-same, very cheaply. Uniformity, which represses individual imagination, characterizes education as part of the hidden curriculum of the Modern Industrial age. In the Postmodern age automated assembly lines operate with information feed-back, so that now a million things can be produced, all different, but also very cheaply, i.e. a dialogical space of bespoke design whereby the consumer is producer. Therefore, historically, educational systems were in-formed by changing communication infrastructures and these shifting infrastructures provide the meaning for the new meanings in education; evolving media provide the ground or poetics of educational reform.

As described above, manipulating self-knowledge by mass media, or engineering consciousness, by means of subliminally massaging self-image, is the keystone for managing consumption successfully. Adapting this interactive space as a model for architectural education could become a more conscious means of self-development in terms of actualizing students' cognitive and imaginative potentials – bespoke education. The school as simulacra provides a space of enhanced collaboration and bespoke facilities in the service of developing a student's strengths and minimizing their weaknesses. Networked infrastructures and programming can be a significant educational aid for both student and faculty by, at first, establishing relational databases as feedback and thereafter recursively updating information regarding users' profiles. These profiles, applied transparently, assisted by programming can generate the most effective bespoke curriculums which in turn are evaluated with regard to feed forward, or the evolution of a student's portfolio, produced in classes and studios that are both online and offline. The student as producer increasingly takes on the role of educator in a highly interactive/participatory educational medium as the teachers increasingly become consultants and guides in this pedagogical SCR. The department of architecture as simulacrum becomes an instance or node of globalization as a space of education. This interactive space fosters ideas of life-long learning, individualized

learning and distance education as well as web-based learning. In this regard, bespoke and collaborative education as opposed to Modernist mechanical uniform education conforms better to the spirit of Kahn's humanist meaning of education as a dialogical form.

Louis Khan defined architecture in terms of "making rooms", which he stated "are spaces of the mind" and he referred to the street as a "room for the community" (Brownlee 1991, 126-127). This room, today, as commercial simulacra is literally and not metaphorically a space of the mind; an instance of nous in the noosphere. Adapting the intelligent interactive street's capacities, in the manner of bespoke education and collaborative research, would more effectively enhance self-development and therefore generate light, nous or mindfulness, which is culturally and therefore socially sustainable. The schools of architecture and urbanism as pedagogical simulacrum, as opposed to the modern factory schools constructed for uniform education and fragmented specialization, is a highly participatory or co-creative environment. Consequently, the poetics of the simulacrum, applied to a model for education, or as a conditioning 'room of the mind', fosters creativity. Adapting this model as a complex interactive space to educate architects structurally fosters imaginative development or as Eric McLuhan writes:

So why is it impossible to take one thing at a time in the world in which we live? The global village is not a place where one thing happens at a time. Everything happens there at once (multitasking). What we must have in order to survive, therefore, is a means of coping with an all-at-once world. The artist and philosopher can perhaps help here.…This means of course a shift to a completely new form of culture [SCR] and with it a new vital role for the arts, not as formerly a specialist activity but as basic survival training; not as ivory tower but as control tower. The arts provide the indispensible means of training navigators in the new environments precisely because they set aside concepts and focus on tuning ground and attuning sensibility. (McLuhan 1998, 2, 5)
By adapting the culture of simulacra to architectural education, we have constructed a world of multi-tasking, a structure that promotes the development of a more integrative/analogical as opposed to linear/logical sensibility. In this environment, co-creative participation fosters imaginative insight for training 'navigators in new environments' that can provide anticipatory design for a sustainable world and in the spirit of a deep-ecology.

There is also another important dimension regarding Kahn's reference to the street as a "room for the community". This implies that by adapting the street model, as simulacrum, to the educational form we should also enhance identity through community. Therefore, the educational form should be both a multi-tasking space in real-time (disembodied) digital communications and a multi-functional domain of 'real-space' (embodied) communications, that is, multi-functional in the manner of the Bauhaus School of Design and the Oxbridge colleges. These communities, unlike universities, were not designed to provide a fragmented pattern of facilities in specialized spaces. The colleges integrated classrooms and laboratories and tutors offices, with residences, dining, recreation, library and study facilities as an integrated form. The college as community would provide the vital dimension of preserving face-to-face communication (i.e.

real-space as embodied) and today could restore a human scale to the increasingly dehumanized context of the superhuman 'room' of the simulacra. Therefore, an educational environment providing both digital multi-tasking and embodied multi-functionalism subscribes to a poetics of the dialogical, thereby taking the best of both worlds to educate the architectural imagination.

CONCLUSION

We have learned from the street, as a mode of education, that it could be adapted to architectural education. The sub-theme of this paper is that our crisis regarding sustainability is a crisis of identity in the context of dis-embodiment or cyberspace. The return to a human or embodied scale is vital for our future survival. Understanding the order of constructed realities, or the imaginative ability to analyze formations in architectural and urban design, by means of critical thinking and as applied to constructed social realities, is an important role for architectural education today. The methodological studies of SCRs mentioned above and, in particular, McLuhan's communication theory of cultural change, are vital pedagogical aids towards developing a consciousness of the deep ecology of world making. Today in McLuhan's terms, media represents the bias of prejudices, in the shape of the human mind or nous, informed by electronically extended and therefore disembodied faculties of the noosphere – faculties of intellect, memory and will. A discriminative designer would engage in an understanding of the construction of reality today, in order to maintain a healthy balance between the material and immaterial, or the human and superhuman scales of existence. That is, 'design-by-research' would involve the recovery of embodied architecture in cyberspace. Dealing with this paradox, through understanding that 'form follows fiction' regarding electronically grounded SCR's, will require all the imagination we as architects can educate or, to paraphrase the postmodern poet Wallace Stevens, "Reality is a fiction we choose to believe in".

This model of education, as an integrated environment of both electronic simulacrum and the physical space of a college-as-community, fosters the study of communities (ontologically and not conceptually) as socially constructed realities. In other words, the education of a deep ecological consciousness, would involve designing a 'menu' (co-operatively by all members of the school), and enforcing a 'diet' of technological use; i.e. producing a curriculum not only in terms of content but also a managed bespoke use of traditional with digital technologies. Current education suffers because of environments that are mechanical and prosaic as opposed to a dialogical phenomenological space-time, or the more responsive pedagogical environment of multi-tasking and multi-functionalist cubist space, in-forming an anticipatory design ability. In this regard, acquiring a deep ecological consciousness, immersed in the 'exemplum of an educational form' (a transforming experience for developing human faculties and concomitant sensibilities) that sustains it, is synonymous with educating the architectural imagination. This manner of education was what Walter Gropius intended at the Bauhaus School of Design, as a school for designing designers (Conrad 1971, 49-53, 95-97). That is, design-by-research and design-by-practice for the purpose of "*Bildung* or 'self-transformation'" is a concept inherent in the German tradition as found, for example, in the work of Goethe (Zajonc 1992, 204). Hence,

educating a deep ecological consciousness is virtually synonymous with educating an architectural imagination; i.e. engaging human and superhuman dimensions of reality for the purpose of well-being in a school of architecture that extends C. W. Mill's concept of educating the 'sociological imagination'.

References

Anders,Peter. *Envisioning Cyberspace*, NY: McGraw Hill, 1998.

Anderson, W.T. *REALITY Isn't What it Used to Be*, San Francisco: Harper Books, 1990.

Berger P.L. and Luckman T. *The Social Construction of Reality*, NY: Anchor Books, 1967

Baudrillard, Jean. *Simulacra and Simulation*, Ann Arbor: The University of Michigan Press, 1994.

Beckman, John. *The Virtual Dimension*, NY: Princeton Architectural Press, 1998.

Brownlee, David B. et al. Louis I. Khan: *In the Realm of Architecture,* NY: Rizzoli Press, 1991.

Castells, M. *The Internet Galaxy,* Oxford: Oxford University Press,2002.

Chardin, P. T. de. *The Phenomenon of Man*, NY: Harper Perennial Classics, 2008.

Conrads, Ulrich. *Programs and Manifestoes on 20th Century Architecture*, Cambridge, USA: MIT Press, 1971.

Gasr, K.P. Louis I. Khan: *The Idea of Order,* Berlin: Birkhäuser, 1998.

Giedion, Sigfried. Space, *Time and Architecture* (fifth ed.). Cambridge, Massachusetts: Harvard University Press, 1967.

Innis, Harold A. *Empire and Communications.* Toronto: University of Toronto Press, 1972.

Innis, Harold A. *The Bias of Communications.* Toronto: University of Toronto Press, 1973.

Jencks, Charles. *The Iconic Building,* London: Frances Lincoln Ltd, 2005.

Klein, N. *No Logo*, NY: Picador Press, 2002.

Levy, Pierre. *Cyberculture*, Minneapolis:University of Minnesota Press, 2001.

McLuhan, Eric. *Electric Language: Understanding the Present*, Toronto: Stoddart Publishing Co. Ltd., 1998.

McLuhan, Marshall. *The Gutenberg Galaxy: The Making of Typographic Man*. Toronto: University of Toronto Press, 1962.

McLuhan, Marshall. Understanding Media: *The Extensions of Man.* London: Routledge & Kegan Paul Ltd., 1964.

McLuhan, Marshall and Quentin Fiore. *The Medium is the Massage.* Toronto: Bantam Books, 1967.

McLuhan, Marshall and Harley Parker. *Through the Vanishing Point: Space in Poetry and Painting*. New York: Harper & Row, 1968.

Mills, C.W. *The Sociological Imagination*. NY: Oxford University Press, 1959.

Mitchell, William J. *e-topia,* Cambridge, Massachusetts: MIT Press, 1999.

Perez-Gomez, Alberto. *Architecture and the Crisis of Modern Science*. Cambridge, Massachusetts: The MIT Press, 1985.

Rowe, Colin and Slutsky, Robert. *Transparency,* Basel: Birkhauser, 1997.

Rushkoff, D. Coercion: *Why We Listen to What They Say,* NY: Riverhead Books, 1999.

Urry, J. Sociology Beyond Societies: *Mobilities of the Twenty-First Century,* London: Routledge, 2000.

Venturi, R. *Learning From Las Vegas.* Boston: MIT Press, 1977.

Zajonc, A. *Catching the Light: The Entwined History of Light and Mind*, London: Transworld Publishers Ltd., 1993.

AEEA
Association Européenne pour l'Enseignement de l'Architecture
Les Cahiers de l'Enseignement de l'Architecture No 47

The EAAE is an international, non-profit-making organisation committed to the exchange of ideas and people within the field of architectural education and research. The aim is to improve our knowledge base and the quality of architectural and urban design education.

The EAAE Prize aims to stimulate original writings on the subject of architectural education in order to improve the quality of teaching architecture in Europe.

The EAAE PRIZE 2009-2010, sponsored by MONTANA, invited teachers from all membership schools and individual members of EAAE to participate in the competition

"Writings in Architectural Education – Climate change: Sustainability / Responsability."

The 4 selected papers is published in this report.