

P2P URBANISM

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With the collaboration of Antonio Caperna, Michel Bauwens, David Brain, Andrés M. Duany, Michael W. Mehaffy, Geeta Mehta, Federico Mena-Quintero, Ernesto Philibert-Petit, Agatino Rizzo, Stefano Serafini & Emanuele Strano.

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“At the Peer to Peer Foundation, we have often argued that the ability to aggregate voluntary contributions around common projects would be at the core of value creation, creating commons of shared knowledge, code, and design. This process will benefit users and producers, amateurs and experts, public authorities and entrepreneurs, in a non-exclusionary embrace, and in every domain of social life. The school of thought and practice around bio-urbanism, inspired by the work of Christopher Alexander and Nikos Salingaros, is an example of a very important phase of society going through such a transformation, moving away from vertical and authoritarian starchitects who impose biopathic structures that are inimical to social life, to a new breed of urbanist facilitators. These new urban practitioners combine skills aimed at bringing in the participation of all stakeholders, and also bring to the table a set of scientifically validated choices, i.e. biophilic patterns that make for a livable environment. This book is one of the first records of such peer to peer architecture and urbanism, and exemplifies the start of a new era for the history of the human habitat.” — Michel Bauwens.

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CHAPTER 1.

A DEFINITION OF P2P (PEER-TO-PEER) URBANISM.

By the “Peer-to-peer Urbanism Task Force” consisting of Antonio Caperna, Michael Mehaffy, Geeta Mehta, Federico Mena-Quintero, Agatino Rizzo, Nikos A. Salingaros, Stefano Serafini, and Emanuele Strano.

Part A. Problems with existing urban implementations.

1. Centrally-planned urbanism doesn't address anything but a big-picture view, and misses all the local details that significantly affect the solution. This centralized approach invariably works through large-scale destruction of existing structures (either man-made or natural), followed by the construction of lifeless non-adaptive solutions.

2. Money-centric large-scale development occurs when developers buy up huge pieces of land, then build cookie-cutter buildings (e.g. houses, offices). Alexander, Duany, Krier, Salingaros, and many others explain why the present top-down approach is a terrible way of doing things. A new generation of urbanists has demonstrated that the solution involves user participation and Smart Codes. P2P-Urbanism is not centrally-planned: it is built on evidence and real science, and it channels the forces of money together with human-centered considerations so that the outcome turns out to be more economically sound in the long term.

3. Small-scale projects are ruled out. Developers owning most of the land make it hard or impossible for “normal people” to buy small lots and build their house; to fix the place they rent; or to have authority to fix a small part of their street. The accompanying loss of local crafts and knowledge about vernacular building leads to people hiring an architect or builder and letting him loose. Since those professionals don't know all the details of the local environment (and have in fact been trained to ignore locality), they usually create something that doesn't quite work, and is built

badly. The solution here relies upon the dissemination of knowledge, including building crafts.

4. Lots of people have big ideas that may not work (e.g. “they should make all of downtown pedestrian!”), yet everyone has small ideas that are almost certain to work (“that derelict sidewalk could very well be a tiny garden”; “that bus stop could really use a simple roof”). It is hard to find like-minded people who, once grouped together, may actually turn thought into action. It would then be useful to know about similar projects that have succeeded or failed. The dissemination of knowledge would tell everyone the current state of the practice of urbanism, where lots of central planning is invariably bad, academia is fixated on improvable philosophies, and money-oriented development rules without any controls.

Part B. Definition and solutions.

P2P (PEER-TO-PEER) URBANISM is an innovative way of conceiving, constructing, and repairing the city that rests upon five basic principles.

1) P2P-Urbanism defends the fundamental human right to choose the built environment in which to live. Individual choice selects from amongst diverse possibilities that generate a sustainable compact city those that best meet our needs.

2) All citizens must have access to information concerning their environment so that they can engage in the decision-making process. This is made possible and actively supported by ICT (Information and Communication Technology).

3) The users themselves should participate on all levels in co-designing and in some cases building their city. They should be stakeholders in any changes that are being contemplated in their environment by governments or developers.

4) Practitioners of P2P-Urbanism are committed to generating and disseminating open-source knowledge, theories, technologies, and implemented practices for human-scale urban fabric so that those are free for anyone to use and review.

5) Users of the built environment have the right to implement evolutionary repositories of knowledge, skills, and practices, which give them increasingly sophisticated and well-adapted urban tools.

DISCUSSION.

The demise of the “expert”.

A new generation of urban researchers has been deriving evidence-based rules for architecture and urbanism, using scientific methods and logic. These rules replace outdated working assumptions that have created dysfunctional urban regions following World-War II. A body of recently derived theoretical work underpins human-scale urbanism, and helps to link developing architectural movements such as the Network City, Biophilic Design, Biourbanism, Self-built Housing, Generative Codes, New Urbanism, and Sustainable Architecture. Open-

source urbanism allows active users to freely adapt and modify theories, research, and practices following proven experience and based upon their specific needs and intuitions. This collaborative scientific approach based on biological and social needs supersedes the twentieth-century practice where an “expert” urbanist determines the form of the built environment based upon improvable and “secret” rules, which are often nothing more than images and ideologies. Unfortunately, those improvable rules were claimed to be “scientific” since they maximized vehicular speed and building density, even at the expense of the residents’ quality of life.

Peer-to-peer urbanism is applicable across a wide range of implementation scenarios benefiting from various degrees and forms of user participation. The most “formal” instance assigns the responsibility of constructing urban fabric to professionals, who however apply open-source guidelines and work together with end-users to develop the design. Even in this instance, which is most congruent to existing practice in the wealthier industrialized nations, design is carried out jointly and collaboratively. We avoid the current practice where a centralized power concerned only with ensuring that each part is working according to a rules schedule eliminates all external input. The other end of the peer-to-peer spectrum occurs in “informal” building, where professionals who are trained in open-source urbanism act mostly in an advisory capacity to guide citizens primarily responsible for both design and construction.

Researchers working within New Urbanism have developed the Duany-Plater-Zyberk (DPZ) “Smart Code” and other versions of comprehensive, open, form-based urban codes that can be legally implemented and can replace the post-war modernist codes now legislated into practice in almost all the developed countries. These codes are free for downloading. The DPZ “Smart Code” is also open-source, since it requires “calibrating” locally, a task of adapting it to traditional (i.e. pre-war) urban dimensions for those who wish to implement it. Unfortunately, many regions refuse to revise their modernist urban codes that are the opposite of the “Smart Code”.

The Importance of Human Scale and the Problem of Gigantism: Patterns as Solutions.

Throughout history, human-scale urban fabric was always designed by people to fit their bodily dimensions, to accommodate their everyday movements, and to feed their sensory system and basic human need for socialization and interaction. With industrialization, architects and planners turned away from these geometrical mechanisms for building social structure to instead impose a visually empty, banal, and lifeless environment built with spaces and dimensions that are far larger than the human scale. The traditional ergonomic modules have been forgotten and the knowledge of how to build them lost. Since then, a visually sterile gigantism has become the goal of a false urban modernity.

P2P-Urbanism begins with spontaneous owner-built settlements. Rather than being a threat to formal urbanism, user participation contains an essential ingredient of human-scale urbanism. The architect and software visionary Christopher Alexander anticipated P2P-Urbanism in the book “A Pattern Language” in 1977. He and his co-authors launched the idea of the right of citizens to have a say in designing their own environment, and also gave an open-source methodology for doing so: the 253 “Patterns”. These Patterns were not offered as a final word on design, but as working documents that could be adjusted and supplemented as needed after further research. So far, the Patterns have helped in two ways. First, as a diagnostic tool for judging whether a design — proposed or built — is adaptive to human use by whether it satisfies or violates the relevant Patterns. Second, in providing an essential tool that, when combined with an adaptive method of design, will help to produce an adaptive end result. (The Patterns are not a design method *per se*, and their application is described in “Principles of Urban Structure”. Also, despite their original intention of being “open-source”, the Patterns have remained unchanged since their publication).

Participative Planning and its Foundations.

Similarly, communicative-action planners have sought to re-discuss rational, scientific urban planning by advocating the need for better and truly engaged democratic participation. Rather than being only a science — and one that was badly misapplied up until now — urban planning should be understood as a communicative, pragmatic social practice where planners need to get their “hands dirty” so as to facilitate intercultural dialogue and implementation.

Even in a large project such as a hospital, airport, or Art Museum, it is very often the case that the design is arbitrary and sculptural rather than functional. The users were not sufficiently involved in the design, nor were Patterns developed and applied towards the appropriate uses. This is the reason why some of these extremely expensive buildings range from being not optimally functional, to downright dysfunctional, and detract from instead of contributing to the urbanism of the region in which they are inserted.

A separate strand for reflection comes from urban activism and transdisciplinary urbanism. Here, innovative thinkers have sought to contest classic and market-led urban planning and policies. Moving beyond the purely physical form-oriented aspect of urbanism, we are beginning to emphasize the political and social interpretations of urban environments. Artists, designers, and activists have cooperated with local stakeholders to claim alternative forms of democratic participation (full citizen participation, etc.) and improve the human quality of urban living.

The Importance of P2P and Open Source.

Recent developments in information and communications technology are having an impact on P2P-Urbanism. The free software movement, thinkers who are establishing a new domain of open-source productions freed from the restrictions of copyright, and the peer-to-peer network emerge from the World-Wide Web and re-examine the basis of closed-source thinking. The Wiki format coupled to the idea of Patterns brings the approach to city building back to genuine human needs. The Internet has made possible an open-source environment, thus challenging the obscurantist wave of “experts” and copyrighters who drastically limit both choice and innovation.

P2P-Urbanism: A New Community of Practice.

In the XXI century, new architectural movements, socially-engaged urban planners, innovative urban theorists, and online/offline P2P communities are coming together to challenge the established post-modern professional and architectural academic environment — the latter dominated by the belief that a few single demiurge-architects can determine urban dynamics. The definition and ideals of P2P-Urbanism are constructed from the bottom-up. This process takes scientific results and theories on human biological and social needs and adds them to the on-the-ground experience of a myriad of actors and agencies (architects, urbanists, small firms, professional studios, NGOs, social workers, etc.) that are confronted daily with urban problems on the micro-scale. P2P-Urbanism is now in continuous development, and merges technology with practical experience in a way that is innovative, open, and modifiable.

Beyond its obvious socio-political implications, P2P-Urbanism means to establish a framework for sustainable built environment in the following sense. The ability to adaptively shape the urban fabric allows its residents to actively participate in its growth. This endows emotional ownership to the place, coupled with the responsibility to care for it and love it. A collective vision — whether generally shared or embodying a healthy diversity — makes it possible to connect to living local traditions and to better resist anti-urban forces imposed from the outside by systems of power uninterested in the inhabitants, the culture, or the unique specificities of the place. Often, the answer involves re-kindling the local building tradition that has been suppressed by outside developers implementing a generic industrial model.

Re-Establishing The Commons: Learning from Squatter Cities.

The world’s housing problem can only be solved by channeling those same forces that generate informal settlements. Bottom-up forces arise from a natural need to use available materials, to build the most physically and emotionally comfortable human-scale environments, and especially to weave the urban fabric so as to nurture ordinary life on the street and in urban spaces. P2P-Urbanism, therefore, is not just about design; it is about enhancing and supporting the energy in informal settlements by providing P2P services of all kinds. We will also develop the idea of

social credits as a possible way for governments to recognize and honor the social capital of informal settlements. A community that provides support to its own members and the rest of the city would earn “social credits”, which could be traded a bit like carbon credits for building materials, infrastructure, or anything else the community needs. This approach makes informal settlements not just recipients of what government needs to do for them, but it puts communities in a stronger position to negotiate what they want on their own terms.

A Biological Paradigm.

After the work of Edward O. Wilson on Biophilia, we now know that human beings react positively to the biological information in their environment and to specific types of complex mathematical structures such as fractals. Thus, the need for a certain type of structural complexity in our surroundings is not simply a matter of aesthetics but a key to our physiological wellbeing. Alexander, and other researchers following his lead, identified those precise structures that generate a healing environment. P2P-Urbanism is intrinsically biological, in the sense that it learns from nature and from living processes, and follows as an unintended complement to natural morphogenesis. It is impossible to follow this process without keeping in mind the problem of “objective science” and a critical envisioning of subjectivity, real human needs, goals, and meaning.

A new synthesis between consolidated architectural and urbanist thinking and peer-to-peer urbanists is arising from the failures of a political approach to urbanism, and this will allow us to plan for a better urban environment in our future.

Background on human-scale urbanism.

<http://zeta.math.utsa.edu/~yxk833/lifeandthegeometry.pdf>

Some publications on Peer-to-peer Urbanism.

<http://www.greekarchitects.gr/en/architectural-review/peer-to-peer-urbanism-id1973>

<http://blog.p2pfoundation.net/urban-seeding-and-the-city-as-computer/2008/09/08>

http://p2pfoundation.net/Peer-to-Peer_Themes_and_Urban_Priorities_for_the_Self-organizing_Society

The Smart Code.

<http://www.smartcodecentral.org/index.html>

US Gulf Coast neighborhood renaissance centers.

<http://www.tectics.com/NRCs.htm>

Reference Books.

Christopher Alexander, Sara Ishikawa, Murray Silverstein, Max Jacobson, Ingrid Fiksdahl-King, and Shlomo Angel (1977) *A Pattern Language*, Oxford University Press, New York.

Nikos A. Salingaros (2005) *Principles of Urban Structure*, Techne Press, Amsterdam, Holland.

CHAPTER 2

A BRIEF HISTORY OF P2P-URBANISM

By Nikos A. Salingaros & Federico Mena-Quintero

P2P (peer-to-peer) Urbanism joins ideas from the open-source software movement together with new thinking by urbanists, into a discipline oriented towards satisfying human needs. P2P-Urbanism is concerned with cooperative and creative efforts to define space for people's use. This essay explains P2P-Urbanism as the outcome of several historical processes, describes the cooperative participation schemes that P2P-Urbanism creates, and indicates the possible outcomes of applying P2P-Urbanism in different human environments.

Recent history of urbanism.

The general form of urbanism implemented during the 20th century and the beginning of our own 21st century was large-scale, centrally-planned development.

The most prominent “moral leaders” of architecture and urbanism have been the “starchitects”: widely-known designers whose buildings have notorious visual characteristics, and which are heavily marketed for the sake of novelty alone. Different methods of design have come into vogue during this time, which explicitly try to avoid traditional building forms and techniques that have been used for hundreds, if not thousands of years. This is done just for the sake of “not doing the same that we did in the past”.

Separately from the architecture of buildings, post World-War-II planners implemented formalist ideas regarding the “city as a machine”, setting a legal foundation in urban codes that guaranteed the Modernist transformation of cities. Mass industrialization during the 20th century led to car-centric development, where walking from one place to another is not feasible any more. Money-oriented development unrestrained by any controls produced building forms whose disadvantages have been widely discussed: skyscrapers with plenty of sellable floor space but whose form destroys the urban fabric, cookie-cutter housing that does not really fit anyone’s needs, office parks that are not close to where the workers actually live. Those environments have been amply criticized by scholars such as Jane Jacobs, Christopher Alexander, Léon Krier, and others.

New Urbanism in the USA started as a way to build better environments and better buildings; the official start was in 1993 with the founding of the *Congress for the New Urbanism* (1). The New Urbanist movement began as a human-scaled alternative to Modernist city planning: while the latter is based upon distances, spaces, and speeds that accommodate machines and the needs of industry, the former considers instead the very different needs of human beings. Among other things, New Urbanism promotes walkable communities (where people can live, work, and socialize without being totally dependent on cars), and non-rigid zoning that allows a mixture of work, industry, and housing, all done with well-proportioned buildings that borrow heavily from traditional forms and techniques.

In Europe a similar movement is known simply as “traditional urbanism”. Both groups of urban practitioners share a willingness to involve the community in the planning of their neighborhoods; in contrast with centrally-planned “hit and run” development that creates large complexes of buildings with little to no input from the final dwellers or users.

Nevertheless, New/Traditional Urbanism is still centrally planned and done on a large scale, instead of allowing the initiative for construction to be taken by the final users themselves. This is more or less an accident of the times, since existing practices for how construction is financed tend to favor large-scale development. A bias towards top-down implementation is also due to the very pragmatic wish of New Urbanists to “plug into” the existing system rather than to start everything from scratch.

As of 2010, New Urbanism has been successful in creating many new and regenerated environments fit for human needs. However, its reliance on central planning and financing is far from ideal. New Urbanists realize this and have tried to

promote decentralized development, mainly with the publication of the Duany-Plater-Zyberk (DPZ) “Smart Code” for free on the Internet in 2003 (2). The ties between the DPZ Smart Code and P2P-Urbanism will be discussed later in this article.

There is evidence that people in several places of the world want to end the domination of Modernist thinking. Political movements in Europe have finally stepped in to play an active role in urban renewal. Monstrous tower blocks have been demolished, replaced by human-scaled urban fabric designed by local groups, and we have such examples occurring all over the world. This has necessitated a sharp break from the Old Left power base that still clings to a top-down bureaucratic (and authoritarian) worldview. In many places, however, the law has been abused to classify inhuman buildings as “monuments” and thus to indefinitely prolong the symbols so beloved by professional architects and planners. (This will be further explored in the section “Potential detractors of P2P-Urbanism”).

Many of us working in the disciplines of urbanism and architecture feel that it is time to drastically change the way we design and build our environment. This resolution comes after a century of modernist top-down and energy-wasteful planning. We wish to give everyone the tools to design and even construct their own physical space.

Open-source software and P2P concepts.

Software by companies such as Microsoft, Apple, and Adobe is usually proprietary and commercial: you pay a fee to acquire a *license* to use the software (you don’t own the software *per se*), and the license states what you may and may not do with the software.

In particular, you are not allowed to make copies of the software you paid for; for example to give them to friends. You may sometimes not use the software for specific purposes, such as for commercial use. Moreover, you may not modify the software: you effectively cannot, as the software is distributed in binary form, not as the original *source code* written by human programmers for later execution by computers. Source code is a closely guarded secret. Software that *is* distributed with source code generally comes with substantial restrictions (e.g. “for educational purposes only”), so that people may not redistribute the source code itself, nor modified versions of it.

In 1983, a movement against this kind of restrictive licensing for software was started with the name of “Free software”, with *free* as in *freedom*, not as in *free beer*. Nowadays this is commonly called *open-source software*. Curiously enough, before the 1970s software was generally free in both senses: it came as a necessary component of the expensive computers that were sold (as they would be useless without software), and users were actually allowed to modify it. Software was shared freely among people, who mostly did research in those days, just like other kinds of science. Thus, the concept of “freely redistributable and modifiable software” is not new after all.

Free or open-source software allows you to make copies of the software and give them away, or even resell them. You are given the original human-written source code and are encouraged to study it, modify it, improve it, or to reuse portions of it in other software that you write. You are allowed to redistribute modified versions. Finally, you are not restricted in what you can use the software for, and you may use it for commercial or military purposes.

Since 1983, free or open-source software has greatly increased in availability and sophistication, mainly thanks to the Internet. When people can copy software and source code easily and at nearly zero cost (as opposed to the “old days” of copying bulky magnetic tapes and shipping them to their recipient!), it is natural for people to do so, and to actually embark upon modifying the software to adapt it to one’s individual needs.

The free or open-source software community, as it is called, has in turn created many tools for electronic communication and collaboration: blogs, wikis, mailing lists, shared live documents, and other tools that are doubtless familiar to people who spend a large part of their time online. The first wiki, created by Ward Cunningham, was in fact a repository of knowledge of computer programming topics (3). Later, Jimmy Wales thought that such a system would be suitable for creating an encyclopedia, and thus Wikipedia was born (4). Nowadays, of course, Wikipedia is a tremendously useful source of information for the whole world, and which has been created entirely by volunteers.

Peer-to-peer concepts.

Early systems for global communication saw the rise of groups of computer-technical people with other special interests. For example, a large part of Usenet (a mostly-defunct system of online newsgroups) was devoted to computer topics, but it also had a large section for movie fanatics, arts and crafts enthusiasts, etc. It was the first time in the history of the world where one could easily find other people with similar interests, potentially anywhere in the world.

Over time different systems for online collaboration and communication appeared, and these were used by people who were *not* mainly interested in computers. This opportunity greatly enriched the quantity and quality of information available, and different online communities have been formed as a result, each with different interests and conventions.

Scholars have studied the behavior of these online communities, and have found that they all have aspects in common. They share knowledge profusely, they tend to be meritocracies rather than rigid hierarchies, and they are geographically widely distributed. Peer-to-peer communities occur when people are able to share information quickly and easily. People start by “finding” each other on the Internet due to their common interests. What begins as a contact with some personal e-mails among strangers could end up in self-acknowledging groups of people with a common purpose. Subgroups of people in actual physical proximity may get together to work on “real-world” issues, not just to engage in virtual conversation.

The primary organizer of the wide variety of developing P2P concepts is the *P2P Foundation*, headed by Michel Bauwens (5).

Thus, P2P itself is a movement that began in spheres different from urbanism: the web, economy, free technologies, manufacturing, open-source materials, etc. These developments were and are driven by different impulses from architecture and urbanism, and which we are belatedly joining. There are some parallels we can draw from the history of adoption of free/open-source software, and which will be explored in the next section.

The combination of Peer-to-peer and Urbanism.

The P2P-Urbanism movement is quite recent, and it is drawing in urban designers and planners who have been working independently for years, mostly unaware of similar efforts being made in other regions of the world or even close by. (Some reasons for this isolation will be explored in the later section “Potential detractors of P2P-Urbanism”). People who join P2P-Urbanism represent a heterogeneous group consisting of individuals championing collaborative design and user participation in planning; New Urbanists tied to the commercial US movement of that name; followers of Christopher Alexander; urban activists; and others. Gradually, practitioners in other fields will learn about P2P-Urbanism and bring in their knowledge where appropriate. Candidates include Permaculturists (who design productive ecosystems that let humans live in harmony with plants and animals) with a deep practical understanding of Biophilia (6), advocates of vernacular and low-energy construction, and various independent or resilient communities that wish to sustain themselves “from the ground up”.

P2P-Urbanism is all about letting people design and build their own environments, using information and techniques that are shared freely. The implications of this have a broad scope. In parallel to the free/open-source software movement, designing a city and one’s own dwelling and working environment should be based upon freely-available design rules rather than some “secret” code decided upon by an appointed authority. Furthermore, open-source urban code must be open to modification and adaptation to local conditions and individual needs, which is the whole point of open-source. For example, the DPZ “Smart Code” not only allows but also requires calibration to local conditions, and for this reason it pertains to P2P-Urbanism despite the corporate parentage of many New Urbanist projects.

One implication of this new way of thinking about the city is to encourage reclaiming common open space in the urban environment. A significant phenomenon in 20th century urbanism has been the deliberate elimination of shared public space, since the open space surrounding stand-alone modernist buildings tends to be amorphous, hostile, and therefore useless. Attractive public space was recreated elsewhere under the guise of private, controlled space within commercial centers. In this way, common space that is essential for citizen interactions (and thus forms the basis of shared societal values) has been privatized, re-packaged, and

then sold back to the people. P2P-Urbanism reverses this tendency. In the next section we will explore how free participation changes the way in which urbanism is done.

Participation schemes for urbanism and architecture.

Centrally-planned environments or buildings are often designed strictly “on paper” and subsequently built to that specification, without any room for adaptation or for input from the final users. In fact, the worst examples are the results of speculative building with no adaptive purpose in mind. However, there has always been a small and underutilized intersection of P2P thinkers and urbanists/planners that have promoted participatory events outside the official planning system. Those urban interventions have tended to be temporary rather than permanent because of the difficulty of implementing changes in the built fabric.

Although the present group behind P2P-Urbanism was formed only in 2010, participatory planning and design go back decades, particularly in the work of J. F. C. Turner on self-built housing in South America (7). Christopher Alexander’s most relevant work is the book “A Pattern Language” from 1977 (8), followed by “The Nature of Order” from 2001-2005 (9). More recent P2P collaborative projects based upon the idea of the commons were developed and applied by Agatino Rizzo and many others (10). These projects rely explicitly upon defining common ownership of a physical or virtual region of urban space.

After decades of central planning that ignores local conditions and the complex needs of final users, and which tries to do away with the commons for monetary reasons, people have forgotten the principal geometrical patterns that generated our most successful human-scaled urban spaces throughout history. There *has* been an important loss of the shared knowledge that once let people build humane environments without much in the way of formal planning.

Successful urban design has everything to do with real quality of life and sustainability. With the modernist or post-modernist *status quo*, the main consideration for construction has been the visual impact of the finished product. In contrast to this, P2P-Urbanism has just as much to say about the process of planning as the final, adaptive, human-scale outcome. It represents a set of qualities and goals that are widely sharable, and which go far beyond architecture and urban design. Principles of good urbanism and architecture are widely shareable and acceptable by “everyday people”, but they are not entirely obvious. For example, it takes careful explaining to convince people that a pedestrian network can be woven into car-centric cities, and that rather than making traffic chaotic, this will in fact reduce traffic, which is something that everyone would appreciate. In terms of evolutionary design, a step-by-step design process that re-adjusts according to real-time constraints and human needs leads to the desired final result, something impossible to achieve from a pre-conceived or formal design.

Let us consider briefly the kinds of participation that can be open to different people. Architects of course deal with the design of buildings. An architect familiar

with the needs of a certain region may know, for example, that an 80cm eave is enough to protect three-meter tall storeys from rainfall, in a particular region with a certain average of wind and rain. A builder may be well versed in the actual craft of construction, that to build *this* kind of eave, with the traditional forms used in this region, requires such and such materials and techniques. The final dweller of a house will certainly be interested in protecting his windows and walls from rainfall, but he may want to have a say in what kind of window he wants: if he wants it to open to the outside, then it must not bump against the wide eave. Thus it is important to *establish communication* between users, builders, designers, and everyone who is involved with a particular environment.

Our hypothetical rainy region will doubtless have similar problems to other similar regions in different parts of the world. P2P-Urbanism lets these geographically separated people connect together to learn from each other's experience. Trial-and-error can be reduced by being able to ask, "who knows how to build windows and eaves that will stand this kind of rainfall?", and to get an answer backed by evidence.

Bigger problems can be attacked in a similar way. Instead of abstract, philosophical-sounding talk like "the shape of the city must reflect the spirit of the age", and "windows must be designed to mimic a curtain wall" (why?), we can look for evidence of cities that are humane and livable. We can then adapt their good ideas to local conditions, drawing upon the knowledge of all the people who participate in the P2P-Urbanism community.

Construction firms that embrace P2P-Urbanism may end up being well-liked in the communities where they work, for they will actually be in constant communication with the users of their "products", rather than just doing hit-and-run construction that is not loved or cared for by anyone.

Up to now, residents have not been able to make any changes on "signature" architecture projects, and not even on the unattractive housing blocks they happen to reside in for economic reasons. P2P-Urbanism instead advocates for people being allowed to modify their environment to suit their needs, instead of relying exclusively on a designer who does not even live there.

P2P-Urbanism is like an informally scientific way of building: take someone's published knowledge, improve it, and publish it again so that other people can do the same. Evidence-based design relies upon a growing stock of scientific experiments that document and interpret the positive or negative effects the built environment has on human psychology and wellbeing (11). People's instinctive preferences can be driven either by Biophilia (a preference for organic environments) or fashion (with sometimes disastrous consequences).

A central feature of New Urbanist projects is a "charrette" that involves user input beforehand, although sometimes applied in only a superficial manner. Nevertheless, in the best cases, a charrette process is not just an opinion poll; it is also a non-dogmatic educational process, a dialogue among stakeholders leading to

a final agreement. The result reaches a higher level of understanding compared to where the individual participants started from.

Consequences for marginalized people.

Some proponents of the movement view P2P-Urbanism as a way to give power to marginalized people, in terms of creating the environment in which they live. This point of view is true, but it is not the whole story. A P2P process will have to somehow channel and amalgamate pure individualist, spontaneous preferences and cravings within a practical common goal. There is a vast distinction between good and bad urban form: only the first type encourages socio-cultural relations to flourish; bad urban form leads, among other things, to neighbors who never even interact with each other.

A top-down way of thinking and urban implementation has always determined accessibility to public housing and facilities built by government, and has fixed the division of power in the urban arena. We want to facilitate integration of people now separated by differences of social status, using the built environment to help accomplish that.

Marginalized people or minorities will find tremendous power in being able to build their own environment inexpensively, and knowing that they are building something good. There exists a precedent for this in the various eco-villages in Mexico that do their own construction, with local materials, and where everything is hand-built. P2P-Urbanism provides the key to successfully integrating the two existing ways of doing things: *i*) large-scale planning that alone is capable of providing the necessary infrastructure of a healthy city; and *ii*) informal (and most often illegal) self-built settlements that are growing uncontrolled in the developing world.

For marginalized people, we can expect consequences similar to what has happened with the use of free/open-source software in third-world nations: local expertise is formed, a local economy follows, and the whole country is enriched by being able to take care of its own problems.

Potential detractors of P2P-Urbanism.

P2P-Urbanism is meant to transfer power and knowledge from established architectural practice to common people. This may not be in line with the short-term monetary interests of the current holders of that power.

We suggest an analogy with the use of free/open-source software. Even developing countries like Peru and Brazil, which have said that they don't like to use proprietary software (generally written in the USA) because they fear that espionage code is embedded within the software, enthusiastically commission architect buildings that are constructed according to a "secret" code. They don't realize the tremendous contradiction of this action. Those who do, and who start

doing their own design and construction, could save an enormous amount of money by refusing to commission signature architects to design their cities. Obviously those architects will not be happy with that prospect!

Despite superficial appearances (and a lot of self-serving propaganda), the threat from non-adaptive and energy-wasting urban forms and typologies is just as strong today as it was immediately after the Second World War. That was when historic city centers were gutted and people forced into prison-like high-rises, following a psychotic planning vision of “geometrical fundamentalism” (an ideology that aims to impose simple geometrical solids such as cubes, pyramids, and rectangular slabs on the built environment) (12). This event more than anything else defined urban alienation. The most fashionable architectural and urban projects (i.e. those that win commissions and prizes) completely avoid or destroy existing human-scale urbanism, to impose giant forms built in an extremely expensive high-tech style. Such outrageously costly projects are routinely awarded by centralized power without any genuine citizen participation.

Movements like “Landscape Urbanism” have even tried to re-dress the current practice with the addition of beautiful “green” space, which unfortunately only serves to mask the fundamentally anti-nature qualities of those high-tech buildings as betrayed by their geometry. The surrounding gardens are wonderful and the buildings blend very nicely with the gardens in magazine renderings and pictures, but the actual buildings are the same anti-urban industrial shapes. These projects’ attractiveness is again only a superficial image and corresponds neither to user participation nor to adaptation to the human scale. Moreover, by inserting huge but inaccessible wild gardens in the middle of cities, the common urban space that people can actually use is in fact restricted.

We cannot overemphasize the radical departure of what is essentially a local shareable knowledge base about adaptive design and building (i.e. P2P-Urbanism), from the generic industrial style known as the “International Style” widely adopted in the 20th century. That approach to building promotes centralized heavy industry at the expense of local construction groups and community self-help; it ignores local adaptation and traditional techniques, and excludes P2P-Urbanism from even being considered as an alternative to present-day building practice.

There has been a near-total and deliberate neglect in academia for the topics that make up P2P-Urbanism, and the same neglect holds true for the “official” means of disseminating information as represented by the glossy architecture magazines. Nevertheless, since P2P itself is founded upon sharing and a common effort on the Internet, the severe existing informational roadblock is finally bypassed thanks to the techniques developed for information and software sharing. More than being just a set of ideas, P2P-Urbanism depends critically upon a universal means of free dissemination and transmission, and ties into educational and informational channels that bypass those controlled by the elitist champions of the global consumerist society.

Perhaps the failure in Alexander's early project in Mexicali, Mexico turned New Urbanists away from the commons. Alexander's owner-built housing was very successful but had a common area that did not succeed for several reasons, as described in the book "The Production of Houses" (13). Nevertheless, the phenomenal success of the New Urbanists in building Neo-Traditional developments in the US was a direct result of following Alexander's advice of "plugging into the existing system". We (i.e. members of the group defining P2P-Urbanism today) feel that the tensions between the private/business focus of the New Urbanists, and the commons-oriented alternative approach of the P2P activists, will sort itself out into a practical scheme that is useful for humanity as a whole. Each faction can learn from the other. The important point is the commonality of design methods: in both approaches, the rules for human-centered architecture and urban design are open-source and are freely accessible to all.

Conclusion.

"Vitruvius famously opened the first treatise on architecture with the statement that architecture requires the interaction between practice (*fabric*) and reasoning (*ratio*)" (14). The *status quo* in the 20th and 21st centuries, so far, has been the domination of both practice and reasoning by established architectural firms and central planners. P2P-Urbanism tries to free up this knowledge and take it to the entire human population.

Re-aligning urbanism to involve the users has profound socio-political implications that are further developed by P2P thinkers beyond urban questions. These possibilities need to be investigated because it may very well occur that not only will fundamental societal changes eventually drive a revision in thinking about world urbanism, but also vice-versa.

We see P2P-Urbanism applied around the world as the only antidote to the continuing hegemony of anti-urban building schemes controlled by centralized authorities. The physical outcome for the city, which is a picture of the harmonious, partially pedestrian, and humanized community, is necessarily the product of a deep socio-cultural process; otherwise it is a fake.

Acknowledgments.

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CHAPTER 3

BEYOND LEFT AND RIGHT: PEER-TO-PEER THEMES AND URBAN PRIORITIES FOR THE SELF-ORGANIZING SOCIETY.

This essay presents desirable social functioning as basically a matter of free individual decision. I discuss two basic polarities: Left versus Right, and P2P (Peer-to-Peer) versus Global-mass-society. Each polarity takes certain distinctions and concerns as key to understanding political life. A self-organizing P2P society is driven by individuality, publicly-shared patterns, and common culture based on shared loves; whereas Global-mass-society is based upon groupthink, expertise, and glitzy consumerism, and is run by a small group of intertwined political, economic, and knowledge elites. These two polarities Left/Right, and P2P/Global-mass-society are split in their basic attitudes towards the past, towards authority, and towards religion. I argue that the concerns that have divided Left from Right are less important now than formerly, and that the P2P/Global-mass-society polarity is a better way to understand many important issues today. I then propose that the concerns that have motivated both Left and Right suggest the possibility of enlisting both on the side of P2P. We can overcome the traditional Left/Right distinctions in the name of a new political humanism.

Introduction.

I would like to respond to Michel Bauwens' recent articles, which examine the nature of a broad alliance that could be expected to adopt a new P2P (Peer-to-Peer) worldview (Bauwens, 2010). Bauwens correctly questions whether the old Left/Right divide is still valid. It probably is, but it is certainly neither the only nor the predominant divisor of society into groups with opposing worldviews. I have been exploring contrasting viewpoints from the perspective of art, architecture, and urbanism for some time, and would like to suggest a view of contemporary problems. This approach may hopefully yield insights that could be exploited in moving towards a more humanly-adaptive P2P society.

What I have learned from Bauwens is that the political/economic spectrum consists of a myriad of contrasting approaches, and that any simplistic interpretation is not only wrong but also dangerous. While a transparently simple interpretation and model is logically attractive, especially to the scientifically-

minded reader, such approaches have led to drastic errors in the past. Examples are numerous. Peer-to-peer orientations are being debated on both sides of the political spectrum, and any important advance has to emerge out of finding a commonality in a set of P2P priorities. A P2P infrastructure is a potentially emancipatory technology that allows the free aggregation of individuals, yet such cooperative and collective organization is distinct from the groupthink pathology.

A central theme of this essay is to distinguish between individuality and groupthink orientations. The P2P approach emerges as an essentially networked form of individuality. In the best cases, the socially-embedded human being is empowered by the P2P framework to create free communities based upon diversity. Nevertheless, the danger of falling into the groupthink mentality is also present in P2P practices and society, and very much so. We have to focus on the warning signs so as to be able to avoid groupthink when it happens, or catch it as it is about to happen. Groupthink oriented effects have occurred in collective practices of decision-making, and mainstreaming trends now appear on the Web.

Bauwens summarizes the difference that I discuss here in other terms (Bauwens, 2010). In his words, both Left and Right are divided by a centralist/decentralist dynamic, whereas P2P re-introduces this dynamic of localization in human history. This decentralist approach and movement runs contrary to previous decades of gigantism and centralization. By abandoning the visible hand of centralized planning, we move towards mutual coordination on a global scale, involving individual and collective endeavors. While wary of the invisible hand of greedy market forces that treat the individual only as something to be exploited, localization alone would be regressive and unable to survive centralist onslaughts that are already firmly in place. Mutual coordination through commonality and universality, however, assumes a large enough mass that can effectively counterbalance groupthink.

Partitioning society between individual and groupthink populations: the role of the expert.

Let me divide worldviews between personal validation, versus the blind following of groupthink. On the one side, the individual decides that he/she possesses enough biological capability to judge complex events and structures in the world; on the other side, an individual relegates the ability to judge to some expert. This second alternative is influenced by the method introduced by science, where people do not usually possess the scientific training that would enable them to make scientific judgments. Science requires specialization, and its applications in fields such as engineering, medicine, etc. also define domains of specialization. The ordinary citizen simply does not have the training to match experts in those fields. Even in economics, something as necessary as tax-return preparation divides individuals who can accomplish it on their own from those for whom the task is too complex, and requires paying a tax expert to do it for them.

The authority of the expert, however, is commandeered by those persons intent on building a power structure. With religion in its most oppressive forms, an individual is told what to think. In the field of art, architecture, and urbanism, with which I am involved, an expert class of enormous extent and power has grown and now dictates group opinion about what is right and wrong (Salingaros, 2006). Here we have a problem in that much of contemporary artistic endeavor is felt (i.e. perceived biologically, psychologically, and viscerally) to be noxious and damaging to our psyche. This direct impression contradicts what the experts are saying, as it contradicts what a vast economic infrastructure — consisting of contemporary art museums, heavy and expensive picture books, courses in our universities, publications by world-famous critics, international shows and competitions, prestigious awards and prizes — uniformly supports.

The other, equally negative face of this phenomenon involves condemnation of what the present artistic/architectural elite does not like (because it reminds us of the past). What naturally appeals to a person on the basis of evolved human physiology is very frequently dismissed as “kitsch” and is harshly condemned as a sign of moral degeneracy and backwardness. I’m sorry to say that much of the world’s traditional art, architecture, and urbanism falls into this category of forms condemned by an immensely powerful establishment. We therefore face a global phenomenon of cognitive dissonance: what we feel is right is supposed to be wrong according to authority, and what we feel is wrong is supposed to be right.

So who is justified, the expert supported by a trillion-dollar industry centered in the world’s Art Capitals, or the folks who buy gaudy souvenirs and paint their house interiors and exteriors with bright colors? Who can we safely believe? I claim that we should trust our own biological instincts above all else, not simply for any political reason that should automatically side with the common person out of egalitarianism, but as evidenced by our own evolution. Much of the research supporting my claims is very recent and is contained, but is not limited to, the new discipline of Biophilia (Kellert, Heerwagen & Mador, 2008). Science is coming to bear, not on the side of the expert established through hegemony, but on the side of the ordinary human being. The problem is that this clarification comes several decades too late, only after a monolithic power structure has built itself up. The power the establishment wields is enough to silence scientific results.

As is clear from medicine and technology, experts are absolutely necessary in our society, yet to be useful they must be guides and helpers. Experts have to be oriented towards the interests of the citizens and civil society to help make sure that society makes the right decisions. We need experts who are conversant with the pattern approach outlined below, to derive, document, and help society in implementing patterns. The problem is how to recognize an expert with society’s interest in mind, and to distinguish him/her from someone who offers either faulty advice or a deliberately biased point of view that promotes a special interest or ideology. This is an unanswered question, and has been so throughout our history.

Patterns check the validity of expert opinion.

I suggest a method of checking the credentials of any expert who offers advice on architecture and urbanism. Since the built environment touches human life in an immediate and visceral sense, we can apply the Pattern method (Alexander *et. al.*, 1977; Salingaros, 2000). A Pattern as derived by Christopher Alexander is a discovered solution that works, repeated throughout human society and in different ages and cultures, and found in totally distinct cultural contexts. For example, the Pattern “Light on two sides of every room” is found in the most pleasant rooms all over the world independently of any other factor. Alexander and his colleagues catalogued 253 such discovered patterns in 1977, and provided scientific explanations for about half of them. For the rest, they simply stated them based upon their phenomenological recurrence.

An architectural and urban pattern combines geometry with biological and social function: i.e. it combines human behavior, movement, health, subconscious physiological response, and life with a fairly general geometrical condition that encompasses an infinite number of specific situations. The patterns apply to create new configurations that share an essential basis but which can all be distinct in their details. In this way, a pattern is not a rigid template to copy every time, but rather an applicable template that generates new solutions every time. (The Appendix to this essay reprints a review of Alexander’s “A Pattern Language” that I wrote for *Amazon.com*).

While Alexander’s patterns are extremely useful in empowering groups of people to design and build their own living environment, the idea of pattern languages is more powerful still. It is possible to undertake a program of “pattern mining”, whereby a society works to discover socio-geometric patterns in architecture and urbanism, which it then documents for posterity (Salingaros, 2000). The patterns can be used whenever needed to partially guarantee a more human environment. We have already seen the patterns movement in software, where Alexander’s ideas have been applied to derive catalogues of software patterns; patterns of software development; patterns of information technology; etc. Just as in architecture and urbanism, software patterns are solutions that can be re-used indefinitely.

The value of what an expert is offering can be checked against evolved patterns documented by a society. If the expert’s proposals differ too radically from the patterns, then people should be extremely cautious in adopting guidelines that might totally change their societal structure. There is an inherent conservatism in the patterns, which can save a society from disastrous re-orientations that erase what was good in their past and present. Change for the good could come fairly quickly, but within a pattern language change has to be evolved, and it very rarely offers a complete break with the past. People are extremely eager to jettison old practices and embrace the promise of the new, with its utopian visions of solving all problems with one radical stroke. We know, however, that this never works as promised.

In implementing a complete break with architectural and urban patterns, our society (since the 1920s) has not succeeded in generating living environments and a human-scale urban fabric. We are now seeing a return to past typologies such as pedestrian city centers, a move away from gigantism, restricting exclusively high-speed traffic, abandoning monofunctional zoning in cities, encouraging mixed-use urbanism, implementing urban densification on the human scale, etc. All of these are very hopeful signs of progress towards a new type of living city that re-uses older traditional solutions in a contemporary context. We should encourage the many trends and initiatives that go in a positive direction of enhancing quality of life. Within this urban movement there are also anti-urban solutions that the ordinary citizen confuses with genuine solutions. Again, the method used to distinguish between a good and a harmful solution is by determining how far it connects to known patterns.

One last word on anti-patterns. Just because a typology has been used for some time does not make it a pattern. Some errors are seductive. We see examples of anti-patterns that were wrong to begin with, and remain wrong in every subsequent application. Anti-patterns are more often studied in software: they have been catalogued for the benefit of software engineers who can thus identify and avoid adopting an anti-pattern (and thus compromise their project). In architecture and urbanism, certain typologies on widely different scales have persisted since the 1920s even though they generate malaise in human users (Salingaros, 2006). One of these is the isolated glass-and-steel skyscraper sitting in a parking lot, lawn, or hard plaza. Any society that drives itself to extinction or self-destruction is following some form of tradition that has tragically incorporated anti-patterns. This shift is marked by the transition into a groupthink society.

P2P and pattern thinking.

P2P principles play a key role in two distinct stages of the pattern approach to society and architecture. First, a pattern is evolved through collective action by many individuals and over many generations. Building a useful and pleasant environment was the central aim of architecture for all generations previous to our own, thus typologies and innovations tended to evolve into the most life-enhancing solutions, limited only by the constraints of available technology and materials. A pattern is therefore the result of collective actions, with many people contributing to its development. Patterns were copied and adapted to different circumstances: the universally applicable ones were used unaltered, whereas patterns dependent upon specific situations were adapted to fit.

Second, using pattern languages to design and build our environment depends upon the P2P ethic. Design information is open to all, and patterns encourage collaborative design and building. Ever since Alexander's book appeared in 1977, architectural patterns have spread informally, primarily through peer-to-peer networks outside formal architecture practice and academia. Readers who have gone through architecture school know that Pattern Language is not taught as a

standard part of the curriculum. The reason is that the empowering aspect of pattern languages contradicts the central message of contemporary fashionable architecture: the architect as a lone genius who possesses secret (i.e. proprietary) knowledge about design, which can never be shared with ordinary people. Even the architect's clients are supposed to be ignorant, and have to pay exorbitant sums of money for an "original" architectural creation they themselves can never understand.

In sharp contrast to this "genius" mentality fostering artificial scarcity, people working with patterns begin with the assumption that anyone can understand how to design and build rooms, houses, urban spaces, and cities. All they need is some technical information, a few rules of what not to do, and those rules are derived from past practice (and learning from past mistakes). Design patterns are meant to be shared freely. The larger the project, the more we need technical assistance, but this has to do with technology and implementation, not with the design itself. Alexander has always emphasized that societies used their collective intelligence to build during every period of human history in the past, and only stopped doing so in the mid-20C.

Therefore, even as pattern thinking should be correctly interpreted as a continuation with older traditional design methods, it does not continue the system now in place in the wealthy countries. There exists a sharp distinction between the old (20C industrialized and globalized top-down urbanism) and the new (P2P design by empowered individuals helping each other). Informal settlements comprising a large percentage of what is built today will experience a smooth transition as P2P and pattern methods can drastically improve their quality. Unsustainable fantasies of high technology imposed upon a country by a global financial elite have found their natural and physical limits, however. There can be no continuation because those represent such a radical negation of human biology and sensibility that they are impervious to adaptation.

Business implementations of the model I am describing all define a commons with market value added on top of the free resource. Assuming that a pattern language for design is available (people use Alexander's patterns plus a repertoire of patterns that they have themselves developed), an individual or community can hire someone with experience in implementing the patterns to help save time and costly mistakes. The design information is mostly free, and the client pays for expert advice. The New Urbanist Smart Code, which grew out of patterns, is available free online (Duany, Wright & Sorlien, 2009). Many New Urbanists offer their services to calibrate (i.e. adjust the code to local circumstances) and to help in its implementation. That is how they make their money. Again, the design resource is free and the profit comes from the added market value. I should mention that the architectural establishment slanders New Urbanism by labeling it as only for the wealthy; however, my New Urbanist friends and I have already applied those ideas to help in building and upgrading informal settlements and social housing.

Distinction between individual/groupthink and Left/Right partitions.

The individual/groupthink partition defines a distinct political divide from the old Left/Right partition. I will look for overlaps and contradictions. Justifying the feelings of common people against an elitist society that manipulates the media is a classic responsibility of the political Left. But this same idea is just another side of the insistence of the political Right that the individual should have the ability to decide for him/herself, and not be bullied into accepting a generic world imposed by the majority society which could represent the lowest common denominator. In this crucial point of individualism, the Left and Right partially intersect.

It is also important to point out how both Right and Left have historically encouraged the partition as I have just defined it. The Right is often enamored with expensive things and the latest fashions, and this consumerist urge is precisely what drives inhuman art, architecture, and urbanism. Experts arise within, and are promoted by the unstoppable engine of global consumerism, initially very much a phenomenon of the Right. There is a lot of money to be made from promoting useless and even noxious products, whether they be art objects, fashionable-looking buildings, or entire new cities designed by a “star” architect (who may in fact have absolutely no grasp of the principles of urbanism). The media are controlled by the market, which itself exists in a self-feeding cycle within the global consumerist engine.

The Left is not blameless, however. For much of its history, it has fallen prey to an ideology that falsely couples liberation and progress to abstract images of a future modernity, even long after such images turn out to be inhuman and dysfunctional in application. Well-meaning progressives bought into the promise of mass-production, especially its more noxious (and unnecessary) aspect emphasizing the machine aesthetic. We are therefore still wedded to utopian architectural and urban typologies of the 1920s, promised at that time to be liberating for the oppressed working class, and since implemented by both democratic and totalitarian governments of both Left and Right. Every application has been a dismal failure, yet our universities continue to teach the “socially liberating” ideal of the Bauhaus aesthetic as it applies to lamps, windows, buildings, and entire cities.

The Left was initially complicit in the sins of modernity, with which it shared the same presuppositions. It blindly believed in abstract social progress and social engineering from above. Individuals on the Left, however, soon responded with strong critiques of this narrow image-based or ideology-based modernity as it led to a centralist dynamic that undid individual freedoms and made individual input redundant. As Bauwens cogently proposes, the healthy solution envisions the state as a mere vehicle for coexistence: a partner and servant of civil society, rather than the master of the strategy of social change. The problem is to influence the state itself to assume this role. Bauwens warns against the extreme anti-statist reaction of libertarians and instead encourages collaboration among the disparate threads that create a civil society.

Traditional architecture and urbanism tend to be condemned by some of the creators of the groupthink society, often in the harshest possible terms. Applying negative meme encapsulation, the globally-controlled media terrorize society with the warning that any traditional-looking major building such as a public building, theater, school, museum, or organization headquarters, and historical-looking urban fabric, are an immediate threat to liberty and even to technological progress. The majority of people buy that lie because of media conditioning (Salingaros, 2006). The Left has been unfortunately complicit in condemning traditional architecture and urbanism because of a tragic misinterpretation that conflates social forces with abstract images.

At the same time, however, unsustainable suburban sprawl that drove the recent financial collapse is based upon building great numbers of isolated houses and shopping malls that look very traditional. Here, the most superficial images of tradition are abused to sell a defective and shoddily-built product to the gullible masses who deep down yearn for some more traditional connection to their world. Urbanism that isolates people, destroys agricultural land, and wastes resources has become a corollary of the junk food industry, driven as it is by images and advertizing. Therefore, despite what seems to be a traditional movement in mass-produced residences, this is really an image covering up an unsustainable and energy-wasting despoliation of the natural environment.

P2P principles reinforce the self-organizing society.

P2P practices and ideas help to balance out the tension between the two parts in the individual/unthinking partition of society. Readers will immediately offer that improved education would prevent ordinary, intelligent people from following obviously restrictive and oppressive ideologies. People reason for themselves. And yet, we see the same phenomenon repeating throughout history, where pseudo-religious cults and extremist political movements drag entire nations along in a nihilistic frenzy. Many classic cases involved societies with a highly-educated citizenry. Clearly, education is not enough to combat the phenomenon of brainwashing, especially as today, a major sector of Western economy (e.g. advertising and political campaigns) is devoted to it.

P2P practices, on the other hand, have both the correct appeal and the right message to accomplish the job. Since its inception in the slightly subversive world of open software, P2P has caught on with those who wish to sidestep a monolithic power establishment. Education in the P2P arena offers the perception that its content lies outside, and is thus potentially far more valuable, than information pumped through the regular channels by an establishment interested primarily in controlling the minds of citizens. While this may be an extreme view, it nevertheless concords with the open-source movement that liberates the tools of Information and Communications Technologies so that the rest of the world outside the global elite can profit from them.

The basis for P2P philosophy requires INDIVIDUALS helping each other, and its idealization is achieved when this multiple connectivity finally creates a “collective intelligence”. I hold the view that this type of collective thinking process is very different from the psychology of crowds that occurs when masses of people are driven by an ideology and groupthink. As previously mentioned, the fierce individualism of conservative thought combines to generate a higher level of group intelligence that is participatory rather than simply blindly reinforcing a single message. This collective intelligence among peers hopefully possesses a vastly improved analytical skill, which permits it to analyze social manipulation such as that practiced by the mass media. P2P society keeps its components as individuals, whereas consumerist society converts them into one unthinking mass.

Patterns represent the workings of collective intelligence over several generations to evolve socio-geometrical solutions. Assuming that a pattern has been accurately documented (discovered and not invented), it stands for a far greater authority than current architectural fashion. A style that is the idea of a single architect, although it may be copied by others, is in fact popular because a powerful establishment usually supports it. When there is conflict between architectural patterns and an individual architect, paradoxically, the pattern is the one corresponding to free aggregate individual thought because it is validated in P2P terms. By contrast, the ideas of a famous architect lack collective validation, and are supported instead by groupthink abetted by the controlled global media.

Urbanism among the groupthink society.

Beginning in the 1920s, the sleek, mechanical images of a new future defined a built environment made of glass curtain walls, steel frames, reinforced concrete, and the isolated freestanding high-rise building (Salingaros, 2006). Neither the Left nor the Right questioned these typologies, as massive construction put up apartment blocks and office towers from Magnitogorsk, to Detroit, to Teheran. These stubbornly neat geometrical visions contrasted with owner-built housing that is more tailored to human sensibilities, though most often constructed with very poor materials. Self-built settlements are uniformly condemned as not conforming to the accepted image of progress (in truth that of reformist 1920's Europe). Governments of every political orientation make it their determined objective to bulldoze informal cities and replace them with neat-looking but inhuman tower blocks. This is one of the most serious actions against P2P urbanism, since participatory building occurs only when it is supported by local help and connectivity, and never by implementation from above.

The philosophical Right offers a bulwark against this propaganda, because it continues to value older, traditional forms. Perhaps valid for a subset of the right reasons, conservatives maintain an appreciation of traditional things, and do not rush to dispose of everything old just because a political ideology declares that such a sacrifice is necessary for progress. Conservatives are more immune to this urge to jettison all that has evolved in our past; they maintain the belief that the past is

connected to the living present and cannot simply be thrown away. Here, however, we run into the collusion of the economic Right with power (with identical results to the collusion of the Left with power): nothing is sacred if it poses an obstacle to making a vast profit.

It is not necessary to convince those on the Right of the sacred value of preserving the great human achievements of the past, but less easy to underscore the value of folk art and architecture and irregular urbanism. Those are too closely tied to the poor, and so do not often gain adequate support from the Right. And yet, the salvation of the built environment requires for the Right to accept and embrace the needs of human beings from all classes. “High” and “folk” art and architecture meet, interact, and reinforce each other, driven by bottom-up forces playing out in the framework of patterns, while all of this is driven by the upswell of human sentiment. When art is rooted in humanity rather than intellect, it can better resist the development of sick and sadistic expressions that have become fashionable and highly marketable in recent decades.

World production of vernacular art, architecture, and urbanism tends to come from those on the Left, simply because they are less well off. But the problem here is that these same people aspire to values instilled in their minds by the globally-controlled media, and thus refuse to value what they themselves produce. They are easily manipulated in a global game of unsustainable consumerism that profits only the multinationals. The goal of consumerism is to undervalue what can be produced easily in a P2P society, and to create a dependence upon a proprietary product. Therefore, the world today has almost entirely been taken over by an elite that is converting it into the groupthink society, driving global consumerism and the economic engine that supplies it. Most people have no qualms about the massive indoctrination that is necessary to maintain the global consumerist society. At the same time, however, we are wasting the earth’s resources.

The P2P cityscape utilizes our latest technology.

Lest a reader get the wrong impression that I am promoting a return to the 18C city and the abandonment of all technological progress, let me clear things up. World cities before the 20C were unhealthy places, and most remain so still. We delude ourselves by limiting our attention to small portions of wealthy cities in the Western World, yet a large portion of humanity lives under terrible sanitary conditions. Fortunately, we now possess the technological resources to make a tremendous advancement that would enhance the quality of life for a major part of the world’s urban population. For example, the Grameen Bank has lifted millions out of poverty by giving out a very large number of very small loans. Technological advances such as portable telephones and low-cost local power generation have solved problems that plagued humanity for millennia. The latest technological advances can be applied in a bottom-up fashion to benefit individuals. This small-scale approach helps much more than does technological gigantism, which normally ignores the individual.

What I am proposing is that we follow architectural and urban patterns, that we respect the geometry of the living city (i.e. traditional human-scaled urban geometry), and not try to replace living human fabric with utopian images of a shiny future. Instead, use a P2P approach to upgrade our cities, driven by crowdsourcing and freely-shared information on how human beings can live better. Useful expert advice does not come from the architecture critic who proposes replacing owner-built urban fabric by giant skyscrapers built out of imported glass and steel. We should instead accept advice on how to apply patterns and small-scale technology to fix what we have. “Official” information sources tend to be mouthpieces of very powerful political and economic interests, and those have the most to gain from the large-scale approach that ignores human scale.

The key aspect of P2P society is diffuse non-expert public involvement. P2P can play a crucial role to open people’s eyes, heretofore constrained (either by custom or by circumstance) to follow expert advice that may be destructive. Now as never before so many people have access to essential information, including patterns, that they can use to change their world into something better for all. While Alexander’s patterns are not yet available free online, all it takes is one person familiar with the Pattern Language to bring one copy of the book into a community and to help plan their future. A few volunteers can educate people around the globe on the value of thinking about patterns, using the internet as the distribution medium. The same is true for bottom-up help when an honest NGO comes to install local power sources and infrastructure using available labor and materials.

Protecting the natural resources of the world: love and ownership of the commons.

I would like to explore the foundations of a P2P approach connecting to and eventually protecting our world. First and foremost, the basic concept of the commons needs to be established by physicality, not ideology. In my experience with urban forms and spaces, people do not identify with a particular place unless they feel they own it in some way. For that to occur, they must take emotional ownership. I believe that this is possible only if there is a shared feeling of love for the physical object, and even then only when this feeling is quite intense. If we love something, we care to preserve it. We can love something that is not exclusively ours, and then it becomes a common good. Much of the time, we love something that we have participated personally in creating.

Consider the urban square of a village built by its inhabitants, the small church or temple in a village also built by its inhabitants, the great cathedral that was nevertheless the common endeavor of the people in a city for over a century. In all these cases, the users “own” the structure because they helped to create it, and they love it for the same reason. They will protect it against damage and destruction because they connect to it emotionally, psychologically, and viscerally.

We don’t love the modern church designed by a “name” architect because it is not part of us; it is alien. Its geometry and surfaces contradict its claim of being sacred

through an unmistakable visceral message that triggers a negative physiological response in our bodies. It has been sold to us by a corrupt media through indoctrination, in a political power game where a servile group is proud to execute the wishes of the dominant elite. In the same way, we don't love the hard alien plaza designed by another "name" architect, nor the giant and absurd abstract sculpture that occupies and spoils what could have been a very nice urban space. None of these objects can ever become part of the commons, despite the enormous media expense trying to convince us of their worth in ideological terms based upon an ephemeral fashion.

Shahed Khan poses the disturbing question of whether the society that collaborates to collectively build a Mosque or Cathedral is driven by ideology and groupthink. The people are definitely motivated by a shared belief, and the resulting structure is a common good to be enjoyed by members of the majority society. I believe that the end result is one of love: a worshipper loves his/her temple, and even more so if he/she has helped to build it. The glorious religious structures throughout our history give an incredibly intense biophilic feedback that nourishes the user. Someone from another religion experiences this positive biophilic effect (Christians visiting a 15C Mosque or Hindu temple are moved emotionally; Muslims and Hindus visiting a Medieval Cathedral are similarly moved; everyone visiting the Parthenon, etc.). Groupthink, by contrast, is most often associated with hate, not love. It polarizes one group of people against another, it denigrates and condemns the other's work by denying the love that went into producing it, and by denying the commonality all human beings have for the things they love even as those things may differ. Groupthink channels human forces towards destruction.

As Bauwens reminds us, the commons can also be virtual, such as an online community that shares a commonly-created commons of software or design depository. A prime candidate for such a commons would be an online Pattern Language. The incredible growth of social networks testifies to the human need to connect, and to the feeling of belonging to each other and to a "meeting place" that is easy to get to (and which enables the interpersonal meetings to take place). An online website/forum is an example of a successful and concrete collective infrastructure.

Another dimension of love and ownership develops over time, after several generations have experienced connection to a particular place or building. Our ancestors could have built it, so ownership and love of that place or building runs in our family. Traditional societies value the continuity of connection that establishes an indirect link with our ancestors, and the same link continues into the future to include our descendants. Conservatives place a high value on this continuity that links generations of people across time through the intermediary of particular shared places. Unfortunately, here the Left is less helpful because of its urge to undo past society so as to move forward towards real or imagined progress. When the past is seen as a barrier to emancipation and advancement, there is little to do to convince a society of the value of preserving at least some continuity.

The Left/Right divide dissolves in a dangerous manner when the groupthink society is brainwashed into a fanatical hatred of its own past. In a phenomenon that is now referred to as Ecophobia, both Left and Right have turned against their built heritage and unthinkingly embrace images of buildings that are totally inhuman. The simple necessity of demolition in historic city centers in order to erect these new structures has spawned a propaganda war against historical and traditional built form, with the aim of replacing them. All the techniques developed in the advertising industry are applied in a clever manner to promote alien images of new buildings, while at the same time the complementary techniques of negative meme encapsulation, developed in the military rather than in Madison Avenue, are applied to condemn historical and vernacular architecture and urbanism. An “outdated” geometry is marked for elimination, and the people are convinced by the media of the necessity of introducing as rapidly as possible the new “signs of progress” that are the products of the global architectural elite.

Religion, cults, and the Left/Right polarity.

Religion shapes our worldview, and it can be for the better or worse. Pretending that this doesn't occur only opens up society to be taken over by a substitute religion. In the past, traditional religions incorporated and supported groups of evolved patterns and thus provided positive reinforcement. Substitute religions impose their own ideology and images: for example, the sleek inhuman visions of machine modernity now almost universally worshipped by people around the world (Salingaros, 2006). The ubiquitous images of industrial progress have assumed the status of religious idols. Every other aspect of the establishment's power base is criticized — with a groundswell movement arising from the bottom up and fed by P2P information exchange — except for architecture and urbanism. Religious validation of inhuman architecture and urban spaces as dogma precludes a spontaneous reaction against them in our western-based networked society.

The developing world, where large sections of society are much more traditionally religious than in the wealthy western nations, reacts in the opposite manner. Here, the polarity between traditional/contemporary architecture and urbanism is interpreted in predominantly religious terms. The West still has not understood this phenomenon, dismissing it thus far simply as economic and political hostility. I believe that dramatic and sharply conflicting forces are acting out here: western industrial forms so eagerly accepted by the groupthink society are correctly interpreted by people rooted in a traditional religion as a threat to their traditional worldview. The people react against this western intrusion, sometimes violently. P2P society can recognize the forces behind this reaction, and offer more appropriate alternatives consistent with human-scale urbanism that respects traditional society.

The basis for P2P society is fundamentally sounder than what we have right now, yet we still require a rapprochement on the issue of religion (referring to both traditional beliefs and the cult of industrial images) as a prerequisite for adopting

patterns and rejecting propaganda. The Left wants emancipation, which includes emancipation from cultural patterns that are seen as impositions on the sovereignty of the individual and the enjoyment of the eternal present. Authoritative cultural patterns are of course at odds with the Enlightenment rationality. The establishment has used individualism, materialism, democracy, and progress through science and technology to destroy every human link to transcendence. These worthy ideals of the Enlightenment were abused by both Left and Right to create a power base for the benefit of the few.

To give cultural patterns the weight they need to stand up to opposition and perform their function, patterns have to be seen as backed by some principle that transcends particular and ephemeral human goals, and is at least as authoritative as experts and advertising images. Traditional societies validated their evolved and derived patterns by making them sacred, so that religion served this useful function of protecting patterns essential to a healthy emotional life. We will have to provide a novel, science-based mechanism for linking patterns to some order higher than the everyday. The inception of a P2P society based upon free thought resides in liberating access to useful information such as Alexander's patterns. Without some sort of commonly-accepted support, however, evolved patterns become prey to ideologies and images that degrade humanity. A society can fall under the spell of a substitute religion that uses brilliant slogans to recruit converts and to keep the faithful in line as unthinking consumers of material and ideological junk.

P2P self-organization is especially valuable as a form of resistance to the real root of political problems: egotism, hedonism, corruption, nihilism evolving into sadism in the arts and architecture, etc. Free individual decision instead of groupthink helps establish desirable social functioning and counters a tendency towards extreme centralization. Patterns that enable individuals to deal with their lives in satisfying ways without having some expert or merchandiser tell them what to do are not just external pieces of information they can get off the web. Cultural patterns define the reality of things for individuals and help them become the kind of person they are: socio-geometric patterns shape people's worldview and consequently their very place in the world.

Scales that transcend the nation state.

Some questions go far beyond the topic of this essay, and will have to be developed elsewhere. P2P society transcends the nation state, freely crossing national boundaries, since its members share more with like-minded citizens of another country than with the power establishment of their own country. P2P does not have a national border. The original dream of the Left in uniting the working classes of the world here takes on a different meaning, but one that could be equally threatening to notions of national sovereignty. Conservatives need not be alarmed, however, because P2P empowers individuals towards a better quality of life inside their own country and within their own society harmoniously, and is not directed

towards world revolution. The only revolution concerns itself with liberating access to useful information.

The basic idea of P2P and people helping themselves and each other encourages co-existence among different groups that would otherwise be competing for ideological reasons, and for resources made artificially scarce by central greed and mismanagement. A P2P worldview therefore helps the situation of minorities within a majority society. At the same time, if people choose to follow the conservative/progressive alliance that I'm proposing here, national identity becomes a positive factor. Getting away from the groupthink nationalism that drives countries to aggression against each other, recognizing national cultural achievements — the opposite of the homogenization promoted by the global media — is a sustaining source of national pride. Much of the fabric of national pride has been erased by globalization that replaces local achievements with nondescript and generic commercial products.

Shahed Khan and Agatino Rizzo raise the point that the individual/groupthink dichotomy fails to bring minority groups into the debate. It is true that a dominant group exercises hegemony over other groups in a society, and that dominance is exacerbated in a groupthink mentality. Nevertheless, I believe that a P2P approach, by trying to improve the quality of life through cooperation, offers much better prospects for a positive form of society that is inclusive and which can celebrate diversity. We see the successful comingling in multicultural societies all around the world whenever a society values all factors leading to improving the quality of life through biological feedback.

Conclusion: towards a new alliance.

I hope to have helped make clear part of what is required for a P2P society. Doubtless, we are only at the beginning of thinking about this effort, making plans for the first implementations, and there is much more that will need to evolve and develop. But we can summarize the first steps to take towards this goal. My discussion has been ranging between urbanism and politics, and certainly does not include the other significant components that are crucial for a P2P restructuring of institutions into a self-organizing society.

The conclusion is obvious: a consumerist frenzy driven by a massively global economic-political establishment is eating up the earth's resources. In order to function, it had to create a groupthink society, and it continues to do so through its absolute control of the global media. This much is immediately grasped by part of the Left, which eagerly embraces P2P ideas because it sees in them an alignment with its own anti-establishment ideals. Nevertheless, while these points are necessary they are not sufficient to develop a new P2P society.

The other component of P2P is the re-utilization of patterns of geometry, of socio-economic actions, of tradition, which have worked in the past. Most (though certainly not all) of these traditional patterns are intrinsically sustainable because they arose out of necessity, and apply on the human scale. Here we are in the

traditional domain of the Right. The Right preserves the essential respect of traditions by making them sacred. The cultural baggage of conservatives includes not only an essential understanding of what is worth saving, but also the worldview that gives an individual the strength of character to oppose the massive brainwashing that is converting the world into a groupthink population. The Left might be surprised to realize that it needs essential tools from the Right in order to complete the basic requirements for a P2P society.

We can profitably argue the viewpoint that the world has been divided according to a new partitioning, which is non-political. The old Left/Right partitioning is not very useful in implementing a new P2P society. Any component of either side of the old political divide that supports P2P can and should be incorporated into a new worldview. As soon as the world realizes this, it will become easier to cross over the old political divide in order to implement new ideas towards a sustainable society.

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APPENDIX: My review of Christopher Alexander’s “A Pattern Language” for Amazon.com was originally published online in 1998. It then mysteriously disappeared from the Amazon site (something I have never seen with other book reviews). I had to re-load it in 2007.

“One of the great books of the century. Alexander tried to show that architecture connects people to their surroundings in an infinite number of ways, most of which are subconscious. For this reason, it was important to discover what works; what feels pleasant; what is psychologically nourishing; what attracts rather than repels. These solutions, found in much of vernacular architecture, were abstracted and synthesized into the *Pattern Language* about 20 years ago. Unfortunately, although he did not say it then, it was obvious that contemporary architecture was pursuing design goals that are almost the opposite of what was discovered in the pattern language. For this reason, anyone could immediately see that Alexander’s findings invalidated most of what practicing architects were doing at that time. The *Pattern Language* was identified as a serious threat to the architectural community. It was consequently suppressed. Attacking it in public would only give it more publicity, so it was carefully and off-handedly dismissed as irrelevant in architecture schools, professional conferences and publications.

Now, 20 years later, computer scientists have discovered that the connections underlying the Pattern Language are indeed universal, as Alexander had originally claimed. His work has achieved the highest esteem in computer science. Alexander himself has spent the last twenty years in providing scientific support for his findings, in a way that silences all criticism. He published this in the four-volume work entitled *The Nature of Order*. His new results draw support from complexity theory, fractals, neural networks, and many other disciplines on the cutting edge of science. After the publication of this new work, our civilization has to seriously question why it has ignored the *Pattern Language* for so long, and to face the blame for the damage that it has done to our cities, neighborhoods, buildings, and psyche by doing so.”

CHAPTER 4

LIFE AND THE GEOMETRY OF THE ENVIRONMENT.

Moving towards sustainability and a greater understanding of how human life is connected to the earth's ecosystem goes beyond mechanistic notions. Totally consistent with the Greek concept of geometry underlying life, increasing evidence shows that the geometry of the natural and built environments is responsible, to a large extent, for the quality of human life. Certain geometrical characteristics of natural and living structures, such as fractal scaling, mathematical symmetries leading to complex coherence, and structural invariants (patterns) found in disparate forms seem to be responsible for a fundamental healing connection between the body and its environment. In what is known as the "biophilic effect", we draw emotional nourishment from structures that follow general biological rules of composition. It is perhaps not surprising that natural environments should nourish us, but what about artificial environments: the environments we build? Artificial environments that are the most healing emotionally and physiologically embody traditional design techniques that themselves arose from imitating nature. Superficial imitation does not provide the intended effect: a form (artifact, building, urban space, or city region) has to be built according to principles that derive from the organization of living matter. This discovery opens up two major topics of application: (1) validation of older design techniques as ultimately healing, and which should not be rejected in the interest of achieving novelty; and (2) applications of the biophilic effect on the urban scale to restructure alien urban environments. We are thus led to a re-appreciation of traditional-scale urban fabric, with the added benefit of energy sustainability, since traditional methods of design and planning necessarily had to be sustainable. Applying geometrical rules of design as derived from the latest scientific findings about biological structure promises a new beginning for architecture and urbanism.

Introduction.

How can people live in a way that is more fully human? Quality of human life comes in large part from contact with nature, and from processes that evolved from our intimate contact with nature. Industrialization and mass production have unfortunately led to dehumanization. Confusing humans with machines represents the negative side of the industrial worldview. In parallel with scientific and technological advances that raised the quality of life to unprecedented levels compared to what humankind had to accept before the industrial age, there

followed a concomitant loss of human qualities. The predominant worldview in the developed countries now neglects effects on quality of life that come from non-quantifiable sources.

The machine aesthetic is part and parcel of the machine society. A mechanistic worldview negates the complex mathematical properties of nature, and in so doing it reduces nature and detaches human beings from the biosphere. Increasing efficiency has to do with industrial production, but nothing to do with human wellbeing directly. Society by the 1950s had accepted the faulty equation linking the quality of life proportionally with energy expenditure. This relationship is false: it held true for a brief period in our history, but the effect is indirect and is misinterpreted. Governments the world over now promote social fulfillment through increasing energy use, which is catastrophic because it is unsustainable. Following Christopher Alexander (2001-2005) I will introduce different metrics to measure the quality of life through factors that do not destroy our natural environment.

Re-orienting our worldview means rediscovering the biological connection between humans and their sensory space. Certain very specific geometrical properties of the natural and built environments exert a positive, uplifting effect upon our organism (Alexander, 2001-2005). The mechanism depends upon the intimate informational connection between human beings and nature. Therefore, enhancing quality of life includes coding the geometry of the built environment to a considerable degree. This effect does not require the expenditure of energy: on the contrary, obtaining informational nourishment from the built environment could replace the present alarming consumption of fossil energy in the pursuit of a consumerist lifestyle.

The crux of the biophilic effect in the artificial environment is that science has discovered and demonstrated patterns in building that either objectively contribute to, or detract from our psychological and spiritual wellbeing. Current Western-inspired architecture not only lacks such patterns; it teaches architects and planners to build in such a way that the biophilic patterns aren't present. The irony is that we worship an image of science that is not scientifically credible. To make that point clear, we need to set the stage for a change in consciousness in the reader.

The new scientific discipline of Biophilia describes how we connect in an essential manner to living organisms. Introduced by the American biologist Edward O. Wilson, biophilic effects are increasingly well documented, and these include faster postoperative healing rates and lower use of pain-suppressing medicines when patients are in close contact with nature (Salingaros and Masden, 2008). Biophilia includes the therapeutic effect of contact with domestic animals. Explanations of the biophilic effect are still being developed, yet what is incontrovertible so far is that the very special geometry of natural and living structures exerts a positive effect on human wellbeing. It could be that Biophilia is a largely mathematical effect, in which our perceptual system recognizes and processes special types of structures more easily than others.

The most basic component of Biophilia is the human response to natural environments, and surroundings that contain a high degree of living matter. Since we evolved in living environments, we process that information in an especially easy manner, and even crave it whenever it is absent from artificial environments that we ourselves build. Hence the primordial human desire for a garden, or an excursion to the countryside to restore our internal equilibrium.

An information-theoretic approach to Biophilia would make sense out of our evolution as it occurred in very specific visual environments. Yannick Joye is working on this theory (Joye and Van Den Berg, 2010). Our neuro-perceptive system more easily processes a structural environment that embodies fractal properties and the organized complexity found in nature, than an environment whose geometrical order contradicts the spatial complexity of natural structures. Our instinctive ability to recognize unnatural objects through alarm lies deep within our neurological makeup and is responsible for our being here today due to evolutionary adaptation. Certain geometries that we perceive as “unnatural” generate anxiety and alarm, and thus degrade psychological and physiological comfort when we are exposed to them for too long.

In the thesis proposed here, a major component of human physiological and psychological wellbeing is directly attributable to biophilic effects from the environment. Therefore, quality of life depends upon the presence of those very special mathematical properties. Since a major factor of Biophilia requires having intimate contact with natural forms, then saving the natural environment becomes a priority that is distinct from the usual arguments for conservation. Up until now, Western conservationists have argued that saving the environment is necessary to maintain biodiversity, which is an explicit benefit for the biosphere and an implicit benefit for humankind. I am arguing that the natural environment has immediate benefits to our health, so that saving it provides not an implicit, but an EXPLICIT benefit for humankind.

What is Biophilia?

Human evolution occurring over the past several million years (from the era of a common ape ancestor not recognizably human who however possessed all of our sensory apparatus) determines how we interact with our environment. Living in nature predisposed us to process fractal information, color, and to interpret spatial experiences in a very precise manner to guarantee our survival. Our neurological imprinting then determined how we began to construct our built environment, mimicking and developing upon prototypical concepts of spatial experience, with interesting natural details becoming ornament, and color used to enhance and provide joy in the artificial environment. In this manner, the mathematical structure of the built environment evolved right along the lines defined earlier by human biological and social evolution. As in all evolutionary developments, subsequent adaptations had to rely upon previous elements in place. It is therefore essential to

re-discover archetypal qualities that generate human wellbeing directly from the built environment.

To apply Biophilia to the artificial environment, consider our sensory apparatus. We have evolved to process complex information that is of a very specific mathematical type: organized complexity where a lot of information is presented in terms of detail, contrast, pattern, color, and texture that mimics in an essential manner similar information already found in nature. At the same time, all of this information needs to be organized using mathematical techniques such as connections, symmetries, patterns, scaling symmetries, harmony among distinct colors, etc. (Salingaros, 2006). A delicate balance between the two complementary mechanisms of increasing information and increasing informational coherence generates an optimal state of biophilic information in the artificial environment.

There are significant implications of this thesis to the large scale. The original geometry of human settlements underlies a form of “urban genetic code”, and subsequent developments in the industrial and electronic ages develop on top of these original pieces of code. We can discover these early segments of urban code as “patterns”: buildings enclosing a central plaza, low-rise but high-density occupation and mixed-use buildings, a pedestrian network connecting distributed plazas, a vehicular network superimposed on the pedestrian network, etc. (Alexander *et. al.*, 1977). When cities are instead planned according to abstract and formal designs, then we have rejected the urban code that evolved along with us. Replacing genetic code in biological systems could lead to an unsustainable disaster because evolution has been violated. That is analogous to species extinction or even genocide, since the process is deliberate and is carried out by humans themselves upon a particular set of inherited “genetic” information.

In the urban case, building cities according to a code that is neither evolved nor tested generates one of three situations: a) a dysfunctional region that is abandoned by its original inhabitants and may later be occupied and transformed by squatters; b) a dysfunctional region that cannot be abandoned (e.g. social housing blocks) whose brutal geometry generates rage, crime, and self-destructive behavior; or c) an urban region that is kept functional only via a tremendous expenditure of energy. Cities with an urban geometry poorly adapted to human activities can indeed be propped up by extending the normally requisite energy and transport networks that drive a city to function, but their geometry requires wasteful energy expenditure. Most cities today suffer from the imposition of such non-evolved urban typologies, misleadingly labeled as “modern”. Someone pays for showcasing the sculptural geometry of such non-evolved urban fabric.

The first human settlements defined a connective geometry that enables people to interact on the pedestrian scale, and to coordinate the many distinct functions of simple human society within a very compact spatial region. That is the definition of a city built on the human scale. Contemporary cities are most successful in those regions where the original “genetic” material has been respected, and a hierarchy of subsequent developments has been added on top of the original code. By contrast, where the original code has been erased and substituted entirely by twentieth-

century urban typologies, the urban fabric is found to be dysfunctional, unsustainable, or dead. True, in large metropolises the population forces are so strong that even dead urban fabric can be kept artificially alive, but the energy cost is tremendous, and the cost to residents in terms of psychological stress is even greater.

Quality of life comes through the nurturing environment. Five points for regeneration.

Several factors contribute to a positive quality of life for human beings. I am going to focus on those factors that are related to the immediate environment (and thus relevant to architecture and urbanism) and ignore all the others. Let me list some of the necessary points here:

- 1) Access to clean air, water, shelter, and living space.
- 2) Access to biophilic information in the natural environment: plants, trees, and animals.
- 3) Access to biophilic information in the built environment: texture, color, ornament, and art.
- 4) Access to other human beings within an anxiety-free environment: public urban space, open-access residential and commercial spaces.
- 5) Protection from anxiety-inducing objects: high-speed traffic, large vehicles, threatening human beings, cantilevered and overhanging structures.

I clearly distinguish between nourishing and anxiety-inducing environmental information. Although this distinction is fundamental, events in the art world have confused our natural instincts with fashions (but discussing this issue generates controversy). It just so happens that much contemporary art avoids connecting positively to a viewer via visceral physiological responses. Regardless of how this type of Art may be valued in the art-gallery circuit, appraised on the art market, and promoted in the press, it is not healing. Any doubt is resolved by referring to Biophilia. Healing emotions include a set of physiological responses that reduce distress and empower the body's natural defenses to work so as to maintain a healthy steady state. Art that generates healing emotions uses our neurophysiology to induce positive neurological, hormonal, and other responses within our body, but Art is not healing if it generates the opposite feelings of alarm and anxiety.

From gallery-type art — objects, sculptures, installations, etc. — we move into public art such as urban installations in public places: large sculptures, fountains, monuments, benches, tree planters in plazas, etc. For the past several decades, such public art objects have also been representative of geometries that are not biophilic. Those objects tend to range from non-healing (neutral) to anxiety-inducing

(negative) provocations and therefore directly influence the quality of the urban space in which they are placed. For stylistic reasons, very little biophilic structure is now being erected in the public realm. And yet, our experience of a public space is determined to a large extent by its public art installations. Worst of all, architects are being commissioned to “upgrade” an older public space by inserting non-healing objects, and by so doing destroy the space’s useful biophilic function.

Every human being responds physiologically in the same manner, and thus is able to judge viscerally whether a work of art or architecture is providing emotional nourishment, or its opposite. This is really a key point. In my description above of what healing emotions entail I assume that psychological conditioning cannot alter our biology, and our instinctive reaction is the one we need to pay most attention to. It matters very little to the user’s physical experience if a non-biophilic object or building is praised in the press and by newspaper and magazine critics. Whenever persons face such a deep contradiction between emotions and bodily responses that are antithetical to the authority of experts, the individual goes into cognitive dissonance and is confused. A person can either remain in cognitive dissonance indefinitely (itself a state of high emotional and physical stress), or eventually come out of it by deciding to trust his/her own bodily responses. The anxiety-inducing objects are supported by an ideology or selfish agenda.

Let me now discuss the five points listed above for the quality of life. The first requirement, Point 1, concerns a person’s private domain, the inside of one’s dwelling. For a large portion of humanity basic housing itself still remains a problem, because there are not enough living quarters. People in the developing world have to build their own houses out of scrap material, often in unhealthy or dangerous terrain. The result is the slums and informal settlements of the world. Nevertheless, it should be noted that many slums are economically vibrant, and the quality of life there is enhanced by ornamentation by their owners, something that is forbidden in a state-sponsored social housing block (Turner, 1976). As outlined elsewhere (Salingaros *et. al.*, 2006), the forced move from informal settlements to government-built social housing blocks gains in health but loses in biophilic qualities.

Point 2 addresses our contact with nature. It is possible to achieve a balance with the natural environment such as occurs in traditional villages and cities that are not too poor. Even in slums, if vegetation is abundant, the residents profit by having intimate contact with nature. Nevertheless, there are examples of the degeneration of the natural environment in informal settlements that ranges from dwellings built among vegetation towards the other extreme of a city built from junk without any trace of plant life. The need to use wood for heating and cooking can soon destroy the biophilic component of an informal settlement. On the other hand, the wealthiest Western societies habitually cut down trees to build suburban sprawl, and replace the native vegetation with lawn. The grass that makes up a lawn is a monoculture plant that is non-native to the majority of sprawling suburbs. A lawn is thus a reduction of nature and a cruel joke on people who buy those suburban houses.

Urbanists after World War II created a city fit only for the car, applying a fundamentally reductive conception of nature. “Green” in the city or suburbs is substituted by its superficial appearance from afar, thus lawn glimpsed as one drives by is judged to be enough for a contact with nature. But this is a deception: the biophilic effect depends upon close and intimate contact with nature, and definitely increases as the complexity of the natural environment increases. Human beings experience its healing effects from having contact with a fairly complex natural ecosystem, even if that only means a tree with some bushes, but not from just looking at lawn. Biophilic interventions in hospitals create small complex gardens inside hospital public spaces, and interweave complex gardens with the fabric of the hospital wall so that patients can experience the plant life at an immediate distance.

Point 3 concerns architecture itself, and underlines a drastic schism between the architecture of the twentieth century and all architecture that occurred before then. Ornamentation was banned from the built environment after 1908 (minimalist environments becoming a fetish with architects thereafter), so that we progressively lost the healing effects of ornamentation in both interior and exterior built spaces. The intensity of the effect is not in question here: studies of Biophilia repeatedly demonstrate that ornament which is derived from natural structures induces the same healing effects as actual natural structures themselves, only to a lesser extent (Salingaros and Masden, 2008). Although some architects refer to this as mere “copying”, I do not believe this to be the case. Yannick Joye argues that the biophilic effect depends upon the brain’s ability to effortlessly process complex information, and thus it is irrelevant whether this biophilic information comes from a living or an artificial source (Joye and Van Den Berg, 2010).

Point 4 forces us to focus on the destruction of the public pedestrian realm in our cities following planning practices after World War II. Governments the world over engaged in a frenzy of rebuilding that replaced human-scaled city centers with environments fit only for fast-moving vehicles. The human pedestrian city was erased by forces linking the automotive industry and the steel industry with governments that satisfied every wish of those powerful political lobbies. Just as public space was erased from the built environment, however, private space was being offered in shopping centers outside cities, isolated within a car environment. People still crave personal contact in an urban space, but in many locations this is only possible in a commercial shopping center or mall. Governments now used to working with builders and real-estate developers who build such malls promote this model.

Point 5 focuses on certain environmental forces from which we have to protect ourselves, because they degrade our quality of life. The growth of the car city means that most outdoor environments are now threatening to humans unless they are protected inside their car. Automobile connectivity and the infrastructure it requires have been allowed to take over and replace the human-scale city. Therefore, the vast open spaces in the world’s cities are either psychologically unsafe, or are fast becoming so. Such spaces are not spaces to live in, because they

are threatening and anxiety-inducing. The actual living city of sheltered pedestrian experience has therefore been reduced to internal space, whether private living space, private commercial space inside restaurants or bars, or to equally private commercial space in shopping malls.

Another aspect of being protected from anxiety regards structures perceived as threatening, and this can occur for several different reasons. We cannot re-wire our perceptual apparatus to suppress neurological signals of alarm at buildings and structures that are twisted, unbalanced, or which protrude towards us. Such buildings generate feelings of alarm. Perhaps they are interesting to look at from afar, but having to be next to them, enter them, and use them generates psychological and physiological anxiety. The same is true for sheer impenetrable walls and glass floors: the former communicate exclusion and lack of escape, whereas the latter generate anxiety and vertigo. These anxiety-inducing features routinely appear in contemporary buildings, but that does not change their negative effect on our sense of wellbeing within the built environment.

Experienced space and socio-geometric connectivity.

The twentieth century's scientific and technological advances enabled a whole new level of living that brought quality of life in terms of vastly improved medical care, transport, energy availability, and communications. In our time we have come to take all of this for granted. Nevertheless, in parallel with these developments, humankind lost a timeless connection to the world that did not involve science, because this connection is not quantitative (Alexander, 2001-2005). We tend to forget and dismiss our inherited socio-geometric patterns whenever they cannot fit into the mentality created by advancing technology. This loss of patterns has caused the loss of essential aspects of human existence, and it has profound implications for energy use (Salingaros, 2000).

Talking about connecting viscerally to a building characteristically makes people in our contemporary culture uneasy. We have lost part of our sense of attachment to a place, even if we normally don't notice it consciously. We have grown accustomed to buildings that emphasize the look and feel of technology: buildings that are, in fact, little more than an image. How, really, do we connect with a building, with a space, with a place? How do the parts of a building connect with each other? Connectivity can be described in mathematical terms through processes occurring in space; it depends on how we perceive that space. For millennia, our ancestors built sacred places and buildings that connect us to something beyond everyday reality. For them, living in a pre-industrial age, it was easier to understand this connection than it is for many of us today.

We connect to our environment — as distinct from merely reacting to it — only through coherent complex structures. Coherence and symmetries of form make possible the continuation of the biophilic effect from living systems into artificial complex designs or structures. Twentieth-century and contemporary buildings that have either minimalist or disordered forms cannot connect with the user. The result

is an intentional lack of coherent complexity in the built environment (Salingaros, 2006).

A dramatic demonstration of the principles of Biophilia and human socio-geometric patterns can be seen when they are violated. Failing to respect evolved architectural and urban typologies, twentieth-century architects and urbanists went ahead and constructed block housing and high-rises with segregated functions as the solution to urban problems. These implementations were uniformly disastrous.

Firstly, architects and planners ignored evolved urban codes that had proved themselves through the centuries. Instead, they built monstrous blocks. These architects showed incredible arrogance in their approach to design, believing they could force their will on both people and urban functions and override forces that shape urban form and human use. For example, they designated the fourth storey and roof for specific commercial activities that never took place. Socio-geometric patterns of human use preclude such spaces and locations from ever being used in the imagined manner, just as the “playgrounds” and “plazas” designed according to some abstract geometry have remained despised, feared, and unused.

Secondly, architects and planners constructed dwellings and neighborhoods devoid of any intimate contact with nature. A family isolated inside an immense block housing project is detached from nature. Their quality of life drops. Even the fundamental pattern of “2 Meter Balcony”, which could at least be used to grow plants, is stubbornly ignored by architects of apartments in high rises (Alexander *et al.*, 1977). Having some trees in a vast windswept plain outside the block is totally useless. Most twentieth-century attempts at living environments have failed because they contradict all the rules for the traditional design of urban spaces and gardens in the interest of a “new style” that is image-based.

Thirdly, architects and planners created monofunctional urban segregation, which violates the most basic urban patterns that make a city grow in the first place. Cities exist in order to connect people with each other and to mix activities. Incredibly, twentieth-century urbanism took the anti-urban slogan of spatially separated uses as a starting point, and governments used it to reconstruct their cities after World War II. These anti-urban practices were legislated into zoning laws so that it became illegal to build living urban fabric. The problem is that self-proclaimed experts were offering toxic advice on architecture and planning, and some of these people held positions of great academic and media prestige. Politicians and decision makers followed their advice simply out of respect for authority.

Connecting beyond everyday experience.

I highlight here questions about connecting to place in a more complete manner. How far can we intensify our emotional connection and still explain it biologically? Emotional highs come from love, music, art, architecture, poetry, and literature. Mechanisms of response are all biological (sensory apparatus), although the most important elements are still incompletely understood. Connection is achieved

through dance, music, art, and architecture. The common properties among these creations include patterns, regularity, repetition, nesting, hierarchy, scaling, and fractal structure. They are demonstrable geometrical patterns, not mystical properties. Going further, the highest artistic expression is related to religion. Bach, Mozart, Botticelli, Michelangelo, generations of anonymous artists and architects of Islamic art and architecture, and mystics of the world achieved such profound connection. By seeking God through beauty, human beings have attained the highest level of connection to the universe (Alexander, 2001-2005).

For millennia, human beings have sought to connect to some sacred realm through architecture. Though we have as yet no scientific explanation for such a phenomenon, we cannot deny either its existence or its importance for the quality of human life. We experience this connection — a visceral feeling — in a great religious building or a place of great natural beauty. The Egyptian architect Hassan Fathy speaks about the sacred structure even in everyday environments (Fathy, 1973). Christopher Alexander (2001-2005) describes connecting to a larger coherence, and such a connection is in fact one of the principal factors in enhancing our quality of life. Nevertheless, we hardly even have the vocabulary to talk about it.

Without specifying any particular organized religion, spirituality grounded in physical experience can lead to connectivity. Is this connective mechanism by which we try to interact with our creator the same mechanism as Biophilia? Maybe it is, only possibly more advanced and thus a far more intense source of emotional nourishment than that obtained from strictly physical experience. Can we transcend biological connection so as to achieve an even higher spiritual connection? As opposed to religious experience or a religious attitude, religious belief itself is abstract, being resident in the mind. But the connection associated with religious experience can occur through geometry, the physical senses, music, rhythm, color, etc. Religious connection can be very physical, oftentimes intensely so. This physical connection gives us the materialization of sacred experience.

Dance, song, and music express temporal rhythm. Bharatnatyam, classical Indian dancing, African shamanic dance, Native American religious dance, whirling dervishes in Mevlana, Turkey, and Hassidic dances are all mystical dance forms that contain geometric qualities of periodicity and temporal scaling coherence. Greek culture historically interlaced mystical dance with musical experience giving birth to Classical Tragedy, features that evolved into the main emotional component in the celebration of Christianity. In the West the Masses of Bach, Haydn, and Mozart show fractal temporal structure — an inverse power-law scaling. Sacred chant in all religions connects human beings to a story, ritual, and precious cultural reference point. Holy days are marked by special song, such as the Byzantine Easter service, Passion Plays, Kol Nidre during Yom Kippur, Buddhist ceremonial chant, etc.

In architecture all over the world, the House of God displays the connective qualities we seek, often to their highest possible extent. Independent of the particular religion or style, this effect is found among all religious building types. Architects of the past instinctively built according to rules for generating scaling coherence. All the examples I have mentioned — whether music, dance, art, or

architecture — have common mathematical qualities: fractals, symmetries, rhythm, hierarchy, scaling distribution, etc. Deliberate creations by traditional humanity the world over were trying to connect to something beyond everyday experience.

Sponsored disconnection.

Within this biophilic framework, some religions have been more successful than others in fighting against the despoliation of nature and the dehumanization of human beings. The more conservative of the organized religions seem to have fared much better at saving their heritage in recent decades. Fearing the intrusion of foreign cultures and the exploitation by foreign commercial interests, they have tried to shield themselves from what are rightly perceived as consumerist and nihilistic currents in Western art and culture. Ironically, many established religions in the West have embraced those same artistic trends in an effort to remain “up-to-date” so as not to lose members. We have concrete examples in recent churches that, far from evoking the love and image of God, instead conjure the image either of secular neutrality (warehouse/garage) or an expression of evil (slaughterhouse/crematorium).

An established Church that sponsors and builds religious art and its own temples in a style that induces anxiety will likely be judged as an accomplice to a global nihilistic movement. Buildings that generate anxiety, consciously or unconsciously, compromise the very continuity of such a Church. Anxiety, alienation, and consumerism have little to do with love, charity, and compassion. Anxiety-inducing forms are instead associated with power, transgression, and sadism; therefore their attraction is that of a cult of power. Negative reaction by more traditional religious authorities against contemporary church buildings in the West is not usually reported because of its politically explosive implications, but it exists, and it is damning. New churches that are praised by the western press are condemned as anti-religious by Eastern religious authorities (who apparently have not lost as much of their sacred connection) on the basis of the fashionable churches’ geometry.

A State, too, can commission prominent public buildings that through their style objectively evoke anxiety. A hostile reaction to buildings in a nihilistic style that the government has sponsored turns into hostility against the government itself. This does not bode well for political stability in the coming decades, when citizens wake up to the fact that public money spent on anxiety-inducing buildings promoted by an ideological elite drove their country into debt. The past few decades have seen a building spree of inhuman structures (museums, art galleries, schools, hospitals, libraries, government buildings, monuments, etc.) and environments in an ill-conceived desire to conform to a “contemporary” architectural fashion.

We have already witnessed foreign reaction to inhuman buildings in the rich Western countries but we misinterpreted it as hostility towards the West’s economic wealth rather than a legitimate critique of the architecture proper. Nevertheless, similar buildings and urban regions built in developing countries by

those same “star” architects who build showcase buildings in the West arouse the same hostile sentiments among the local population. I believe that a correct interpretation of the negative reaction ordinary people experience around contemporary buildings in the fashionable style is based upon its rejection of Biophilia, but the soundness of this negative reaction is conveniently negated by a powerful architectural establishment that promotes such buildings all over the world. The accusations of nihilism from both within and without Western society are deflected onto “foreigners”, while critics of Western fashionable architecture are deemed not sufficiently “contemporary”.

Spatio-temporal rhythms in the city that attracts talent.

A living city works well because it encourages actions, interactions, and movements, all of which depend upon certain scales in space and time. Spatial scales are defined by physical structures from the size of a 3mm ornament on a park bench or public lamppost up to the size of a city’s region that can be identified as more-or-less coherent within itself. Biophilia requires the existence of the entire range of scales corresponding to the human body (1mm to 2m) extending into the range of scales of pedestrian movement (2m to 1km). With various forms of transport our spatial experience expands to scales of the entire city and beyond. Quality of life depends proportionally on how we can experience all scales in a non-threatening manner, with a priority placed upon the smaller scales corresponding to the human body.

Twentieth-century urbanists disdained the human scales, turning against them because smaller scales are a defining feature in traditional urbanism. The complex spatial rhythms of traditional environments are therefore missing by design from city regions constructed during the past century. Even when a new environment is labeled as being a “quality” environment, that label most often refers to how closely the built structure (building, cluster of buildings, urban plaza, public sculpture, etc.) follows a minimalist sculptural ideal that eschews complex spatial rhythms. In the built environment of the past several decades we find scales irrelevant to the range of human scales, except in those crucial exceptions (restaurants, shopping malls) where retail overrides design ideology.

An even more neglected aspect of urban life concerns its temporal rhythms (Drewe, 2005). Everyday life is defined as a complex coherent system of actions and movements on many different time scales. Some time phenomena are spatially independent, but many depend critically upon the urban geometry. Again, the shorter periods affect us most, as they have an immediate correlation with our own bodily rhythms. We are dependent upon events that occur over times of 1 sec to 24 hours. Quality of life can be positive or negative depending on whether our bodies interact harmoniously with the temporal events caused by a city and permitted by its geometry. The temporal dimension of urbanism is a poorly-explored topic.

Time is defined either in abstract intervals, or much more physically in terms of body movement. Motion could be a response to a physical need, yet any movement

is constrained by the physical space — furniture, room, corridor, urban space — we occupy at that moment (Schrader, 2005). The geometry and material quality of the physical environment impacts on our possible movement; we perceive spatial constraints from non-biophilic structures, which limit us from freely designing our own rhythms. Our daily routine involves a range of movements and any pattern in our daily activity defines a temporal rhythm. Periodic events could occur throughout the day, or as once-a-day longer-term rhythms. Some movements in daily routine are necessary, whereas we choose to perform others for our physical enjoyment. We try to establish such rhythms out of a natural need for temporal order.

A city wishing to attract new talent has to offer, among many other things, an urban morphology that accommodates both Biophilia and daily life on the human range of temporal scales. This is the “dance of life” (Hall, 1984), and like classical dance forms from all cultures, urban movement has its rhythm, complex fractal structure, and continuity (Whyte, 1988). People may not immediately perceive the effects of this dance upon their bodies, but our organism accumulates either the positive or negative effects of our daily routine, and will start giving us signals. Positive signals translate into wellbeing and being able to cope with unavoidable stress, whereas negative signals wear us out so that we become decreasingly able to handle normal stress in our daily environment. Our health suffers because a weakened body is prone to both external infection and to internal imbalances.

For example, a commuting trip of over 30 min generates stress, regardless of the means of transport. Research has discovered that people are willing to commute for up to one hour daily (round-trip), whether it is through walking, private car, public transport, bus, subway, or commuter train (Newman and Kenworthy, 1999). When this time is exceeded, however, quality of life diminishes. Therefore, the massive trade-off of enjoying a suburban front/back yard with lawn in exchange for two hours or more of round-trip commuting is actually not cost-effective as far as Biophilia is concerned.

Having access to a pedestrian environment (not necessarily strictly pedestrian; the traditional city with wide sidewalks lined with stores does very well) offers the possibility of excursions on foot that can be of any duration. A complex connected pedestrian geometry allows periodic actions of, say, 15 min (e.g. a trip to a coffee shop or park), which are unfeasible in a car city. Such trips do not need to be planned, just enjoyed if the visual stimulation and other factors are positive, and the duration of trips that are necessary for a specific function can be adjusted according to the occasion. This flexibility in time is not possible when driving to a destination, and the situation is only slightly better for public transport. In the Metropolitan transport of some central cities, a passenger can profit from the commerce located in and around the stations, but bus stops tend to be located in dreary places, with stations exposed or in hostile environments.

“Innovation” requires an environment that encourages a state of physical and emotional wellbeing (Ward and Holtham, 2000). The new dematerialized economy relies more and more on the material structure of the immediate surroundings.

Persons who are not dependent upon the physical city for their work still rely upon the physical city for their wellbeing, demanding an environment that permits spatio-temporal rhythms. They judge where to locate using spatio-temporal and biophilic criteria. People who work with ideas and who drive the knowledge economy are those most able to relocate, and they will do so if repelled by a city with an alien geometry, towards a city with spatio-temporal attractions on the human scale. Many knowledge workers nowadays occasionally base themselves in coffee shops with a wireless high-speed internet connection.

It is the wish of almost every city to position itself as a magnet for talent, for then it can attract knowledge industries such as Information and Communication Technologies, finance, advanced technology, arts industries, etc. to create a hub for the “Knowledge Society” (Tinagli, 2005). It is well known that a concentration of talent and educated workforce pushes a city’s economy up to international standards, with corresponding feedback that benefits the entire city. Ever since the West’s manufacturing base shifted to the developing world, industrial production became much less attractive. Even in the developing world that has now captured industrial production, however, key cities compete to attract knowledge-based industries.

What attracts the educated and the talented to a city? It is quality of life, measured in part by the criteria I have outlined here, not by an alien urban morphology that follows a modernist design ideology. Citizens wish, above all, to enjoy a stimulating and pleasant everyday life, in which normal tasks can be accomplished without too much stress. Their professional activities reside on top of this basis of wellbeing. Examples abound of intelligent professionals leaving a “magnet” city because everyday life has become too stressful or expensive. Much of this has to do with spatio-temporal scales: in the first case when working and living environments do not offer the biophilic range of scales; and in the second case when daily life is skewed towards uncomfortable time periods, as for example a long commute to work, getting children to school, food shopping, accomplishing regular out-of-house chores, etc.

I realize that the above thesis only presents a small part of a broader scenario, and, given human nature and human interactions, we may live in an earthly paradise and still be stressed from local crime, a corrupt government, or hostile colleagues at work. I do not deny any of that. What I wish to bring to attention is the component that comes directly from architecture and urbanism.

Myths around energy consumption.

We have been led to accept the myth that quality of life increases proportionally to energy consumption. While true for the onset of industrialization, this correlation is also responsible for an unsustainable global economy. The basic premise is a falsehood that has to be disputed before it can be reversed. Early technological advances permitted an improvement in the quality of life, but this does not mean that increased happiness comes from wasting energy and natural resources.

Unfortunately, major world industries have developed that work upon encouraging consumers to waste energy. The throwaway culture of shoddy consumer materials in the wealthy countries destroys the environment of the developing countries that produce all that stuff.

For example, we have developed an entire mythology (motion pictures, literature) around the pleasures of driving a car. There is undeniably a remarkable freedom in having a private vehicle that moves us fast on the surface of the earth, and this is a liberating notion in many ways, but it is a terribly expensive action as far as energy wastage is concerned. As much of the world's economy entails companies that extract, process, distribute, and sell petroleum products, it has made sense for them to create a car-oriented society through movies, media, and other components of manufactured culture. Just note that at the speed of a moving vehicle, biophilic effects from the environment diminish to the point of insignificance, except when one is actually driving through wooded countryside.

Put very simply, quality of life depends upon nourishment from the environment, and not upon energy consumption. The consumer society has done a very thorough job of convincing people the world over of an imaginary link between quality of life and energy wastage. That conjectured relation has only served the large part of our economy that runs upon energy production and consumption. Because of both the size of those related industries, and the present state of globalization, it is going to be very difficult to reverse the consumerist trend in the near future. Of course, the world will be forced into a totally distinct mode overnight after an energy catastrophe (due to shortages because of exhausted supplies, military action, or disruption in delivery channels), but past experience with transient energy shortages does not seem to have taught anyone a lesson about the future.

Placing this essay in the broader evolutionary context of humans and human technology, most of the things we once thought of as solely human — tool use, language, etc. — are now seen as more common to other animals. We distinguish ourselves, however, in being able to influence our environment on a massive scale. At the very heart of this process is the building of settlements, which uses up tremendous resources. The unsustainable system now in place in much of the world, supported by a consumerist philosophy and taken for granted, is that development and Gross Domestic Product depend upon increasing energy use. This system has a runaway positive feedback, and nature cannot possibly support it.

The discussion of geometry becomes central, because life that depends upon the geometry of the environment is an emergent system property, which is qualitative, not quantitative. Certainly, Biophilia is essentially structural — it arises out of complex structures involving fractals, networks, etc. — but it is not easily quantifiable. Hence what is basically a totally rational phenomenon requires very different tools for understanding and managing, and necessitates those who wish to stop the older, unsustainable paradigm to develop a different worldview. The profoundly simplistic limitations of our present thinking neglect and consequently help destroy the complex emergent properties that allow life to flourish in the built environment.

The threat from deceptive high-tech sustainability.

The global industrial system has learned the appeal of sustainability, and it is applying clever and deceptive techniques in order to perpetuate its world business. Perhaps the greatest threat faced by human-scale urbanism today lies in the nightmarish “sustainable” cities and urban projects proposed and built by fashionable architects. The global system has picked up the sustainable vocabulary and has used it to re-package their extraordinarily expensive and fundamentally unsustainable products (glass and steel towers, monstrous buildings, industrial-style cities in the middle of nowhere) as “sustainable”. The trick consists of using some technological gimmicks, and coming up with numbers for energy saved through having some solar panels and double glazing on the buildings’ glass façades. But this is a fundamental deception, since the city or country that buys one of these eco-monsters becomes totally dependent on the consumerist energy system.

As the companies selling such industrial products are the major multinationals tied into the power of Western states, it is extremely difficult to counter the publicity effort that is devoted to their promotion. Also, the selling occurs at the highest government levels, far above any decision-making that can be influenced by ordinary citizens. The client nation blindly trusts the giant Western-based multinationals to deliver a sustainable product because that is what the media promises. At the same time, the controlled media acting as a mouthpiece for the multinationals praise the client nation for its “great foresight” and its adoption of “progressive urbanism”. Since national pride is involved here, even the most blatant urban disaster will not be discussed openly. Maybe we will read of a new city that proved to be totally dysfunctional, or too expensive to run, after several decades have passed, but certainly not sooner.

Centralized governments have always been enamored of large-scale industrial solutions, industrial cities, massive five-year building plans, etc. Despite all good intentions, such projects proved to be totally dehumanizing in the past because they ignored human psychological needs and the human scale. Such initiatives are now reappearing as globalist urban applications, but with a newly-polished high-tech glamour. Many persons continue to support such projects, seeing them as proof that technology can solve every social problem. Old-style centralized industrialization is made toxic, however, by skewing everything towards the very largest scale.

By contrast, genuine sustainability uses small-scale technology linked in an essential manner to traditional socio-geometric patterns that connect a society to itself and to its place (Salingaros, 2010). A genuinely sustainable approach enjoys the natural kinship of bottom-up entrepreneurial initiatives such as the Grameen Bank. We begin from the smallest scale and move up through increasing scales. A peer-to-peer network empowers the individual to work and act within a society in a way that benefits that society (Bauwens, 2005). Just as in any stable complex system, different layers of functionality are added on increasingly larger scales, yet the working whole requires a balance of mechanisms acting on all scales, interacting

horizontally as well as vertically. The new techno-cities, tragically, are designed to work on only one scale — the largest scale designed as an abstract sculpture on a fashionable architect's drawing table — in which case they may not work at all.

I feel the need to raise an alarm against a group of fashionable architect/urbanists that are misusing science to advance their own agenda. Supported by our top schools and the media, this group embodies a superficial grasp of popular science, using words such as fractals, complexity, emergence, etc., and claims to offer a variety of sustainable urbanism. Ordinary people are attracted to these false promises, because they cannot tell the difference between true and bogus science. Nevertheless, the purpose of this movement is entirely self-serving.

In presentations that read very similarly to what could be one of my own texts, this group's discussions also introduce the keywords: "diversity", "unpredictability", "accidental", "indeterminacy", "optimism", and "opportunity"... Couched under a pseudo-scientific cover, however, the message says that there is no science of urbanism and no shared framework for effective design; therefore we have to build according to randomness. This assertion is as false as it is irresponsible. What this group proposes is the continuation of inhuman ego-based experiments on the lives of human beings begun by industrial urban typologies used as agents of social engineering. As if its theoretical statements were not alarming enough, this group's marketing ploy always concludes by recommending its handful of favorite "star" architects for large urban projects.

Conclusion.

It would be a tremendous move forward if people could be divested of their indoctrination that quality of life necessitates high energy expenditure. To replace the pleasures of daily living now provided through wasting energy resources, I propose a return to emotional nourishment from the built environment. This is very easy to accomplish, and only requires re-structuring our built environment to provide biophilic information. At the same time, the proposed restructuring necessitates a shift away from the energivorous car-oriented society towards a human-scaled urban fabric. Already in the past several decades, cities are embarking upon such a program of restructuring. Their motivation has been to save energy. What I am proposing is altogether different and goes much further towards improving the quality of life.

Biophilic nourishment is a positive experience that can substitute for giving up the thrills of riding around in cars at high speed. I believe that this is the crucial factor that can make a new sustainable society possible. The vast majority of people will not give up their present wasteful lifestyle out of an altruistic desire to save their planet. We know from history that populations would rather proceed towards their own extinction rather than engage in self-sacrifice for the common good. What I'm proposing is different: you simply get your pleasure from a different source. And it works: environmental nourishment from Biophilia has sustained and satisfied

people for hundreds of millennia up until the twentieth century. We are not talking about an untried experiment, but a return to something that we know works.

Lest critics raise objections about returning to the past, I would advise them not to worry. We are going to apply all our technological knowledge to solve problems that were present in urban living in previous times. Clean technology replaces dirty technology. There is no going back to a pre-industrial past of rampant disease unless it is brought on by economic collapse due to energy depletion. All we are recovering through Biophilia is the positive emotional experience, not the old problems in coping with everyday existence that we have now bypassed.

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CHAPTER 5

SOCIALLY-ORGANIZED HOUSING: A NEW APPROACH TO URBAN STRUCTURE.

By Nikos A. Salingaros, David Brain, Andrés M. Duany, Michael W. Mehaffy & Ernesto Philibert-Petit.

We offer here a set of evidence-based optimal practices for social housing, applicable in general situations. Varying examples are discussed in a Latin American context. Adaptive solutions work towards long-term sustainability and help to attach residents to their built environment. We draw upon new insights in complexity science, and in particular the work of Christopher Alexander on how to successfully evolve urban form. By applying the conceptual tools of “Pattern Languages” and “Generative Codes”, these principles support previous solutions derived by others, which were never taken forward in a viable form. New methodologies presented here offer a promising alternative to the failures of the standard social housing typologies favored by governments around the world, which have proven to be dehumanizing and ultimately unsustainable.

SECTIONS 1-4: BACKGROUND AND CRITICISM.

1. Introduction.

This paper outlines promising new solutions for the future of social housing. It has been prepared as a comprehensive report by one of the authors (NAS) for Brazil, and is generally applicable to all of Latin America. One of us (AMD) is designing social housing in Jamaica and elsewhere in the Caribbean. Two of the authors (AMD & MWM) are directly involved with the reconstruction after the hurricane Katrina devastation in the Southern United States, which faces similar, though not identical, realities. Another author (EPP) has researched the pedestrian connectivity of the urban fabric, and is involved in providing government-assisted housing solutions on a massive scale in Mexico. The remaining author (DB) has long studied the influence of urban form on social wellbeing and community sustainability, a crucial factor in our discussion.

The challenge of social housing is a major component of world urban growth, and we wish to present here a comprehensive methodology for radically improving its performance. Success will be measured in human terms: i.e., the physical and emotional wellbeing of the resident. We consider a project to be successful if it is maintained and loved by its residents, and also if the urban fabric joins in a healthy and interactive way to the rest of the city. On the other hand, we consider as unsuccessful (and hence unsustainable) a project that is hated by its residents for a number of different reasons, wastes resources in initial construction and upkeep, contributes to social degradation, isolates its residents from society, or decays physically in a short period of time.

The essence of the approach presented here is to apply a sustainable PROCESS rather than a specific IMAGE to design and building. The way it was done in the

recent past is to build according to a prepared image of what the buildings ought to look like, and how they should be arranged. By contrast, no image of our project exists at the beginning: it emerges from the process itself, and is clear only after everything is finished.

We can move toward a more thorough and satisfying solution by drawing upon Christopher Alexander's work — one of several pioneers who proposed that urban fabric should follow an organic paradigm — and can include theoretical and practical work that for various reasons is not widely applied. What we offer is supported by the evidence from many examples of traditional practice over centuries. Governments instead choose to impose schemes and typologies that ultimately generate hostility for the fabric of social housing from its occupants. We will analyze the reasons for this hostility in order to prevent it in the future. The relatively simple solutions presented here are generic. Therefore, though geared to Latin America, they can be adopted by the rest of the world with only minor modifications. This study outlines ideas that are general enough to apply to countries where local conditions that produce housing might be very different.

We can learn from innovative approaches to government-sponsored housing, developed by independent groups in many different settings and conditions. Out of many projects built over several decades, very few can be judged to be truly successful using our criteria of the residents' physical and emotional wellbeing. Those few excellent solutions tend to be neglected because they fail to satisfy certain iconic properties (which we discuss in detail later in this paper). Perhaps surprisingly, we also draw upon successful typologies developed for sustainable upper-income communities.

This paper combines two mutually complementary approaches (and will contrast these with existing methods). On the one hand, we will give some explicit practical rules for building social housing. Any group or agency wishing to get started immediately may implement these — with appropriate local modifications — on actual projects. On the other hand, we will present a general philosophical and scientific background for social housing and its cultural implications. The aim of this theoretical material is to “give permission” for common-sense arguments; to create the conditions that will safely allow and support what in effect comes naturally. People, acting as intelligent local agents, may then apply methods that evolved during millennia of successfully performing owner-built housing — as part of the production of healthy resident-built communities.

This methodology recognizes and incorporates the self-organizing features of the most robust human settlements throughout history, by utilizing a “complexity-managing” approach, rather than a linear, “top-down” approach. We propose channeling the design talent and building energy of the people themselves, acting as local agents, within a system that we manage only to help generate and guide its evolving complexity. In such an approach, “bottom-up” processes are allowed to develop organically, though within constraints based upon prior experience. On the other hand, “top-down” interventions must be done experimentally and carefully (i.e., with feedback), allowing more interaction with smaller-scale “bottom-up”

processes.

Our proposal goes beyond housing that is literally owner-built in the sense that owners hammer nails and pour concrete. It is important that they experience the process of design and building as THEIR process. It's all about establishing connection and engagement. The key point is a process that accommodates real engagement, that is agile enough to be responsive to adaptive processes, and that can engage without being driven by the social dynamics of inequality into unfortunate directions. Most important, the process can take advantages of both technology and expertise. We are proposing something far more than letting the poor fend for themselves — we wish to empower them with the latest tools and a highly sophisticated understanding of urban form.

As many authors have described previously (e.g. Alexander *et. al.* (1977), Jacobs (1961), Turner (1976)), established planning practice has tended to follow an outmoded early industrial model. That model arose in the 1920s, and was widely adopted in the period following World War II. It was based upon a hierarchical “top-down” command-and-control paradigm, leading to predict-and-provide planning. Research amply demonstrates that this model does not sufficiently reflect the kind of scientific problem a city poses, because the model ignores the tremendous physical and social complexity of successful urban fabric. Incredibly, it does not even address human interactions with the built environment. The resulting failures and unintended consequences are well documented. As science develops more fine-grained and more accurate research tools for the analytical study of such self-organizing phenomena (which include cities), it is necessary now to propose a radical new urbanism. We wish to empower people with the authority of a new methodology, grounded in recent urban research.

The problem isn't just the lack of physical complexity. The key to urban place making is really the relationship between the complexity of spatial form and the complexity of social process. If it were just a matter of physical complexity, one might imagine that a top-down process could be created to simulate that complexity — say, a computer algorithm. The crucial point is that this physical complexity embodies and expresses social life. It is, in certain respects, social relations by other means (e.g., artifacts and built spaces). To some extent, the answer begins by re-conceiving the built environment itself as social process, not just as product or container. This becomes important later when we talk about maintenance, since the processual character of this kind of ownership merely begins when residents move in.

This paper is very complex and deals with many issues, so we need to map out its exposition. The first four sections provide background and criticize current practices. Section 2 introduces the competition between owner-built settlements and government-built social housing. Section 3 reviews the standard practices and typologies of top-down social housing programs, and recommends replacing them (or at least complementing them) with a bottom-up procedure. Section 4 pinpoints how a “geometry of control” ruins even the best-intentioned schemes by making them inhuman.

The next six sections offer specific tools for design. Section 5 turns to mechanisms for establishing emotional connections with the built environment. Biophilia, or the need to connect directly to plant life, is a crucial component. We also discuss sacred spaces and their role towards establishing community. Section 6 reviews the work of Christopher Alexander, especially his recent work on generative codes. Section 7 argues against the fixed master plan approach, suggesting instead an iterative back-and-forth planning process. Section 8 reviews Alexandrine patterns and outlines their transition to generative codes. Section 9 gives, in the broadest possible terms, our methodology for planning a settlement. We suggest getting building permission for a process rather than for a design on paper. Section 10 contains an explicit set of codes describing the armature of services in a social housing project. Section 11 introduces the complementary design tools by describing the generative codes needed for such a project.

The next four sections continue with practical suggestions for making projects work. Section 12 suggests appointing a project manager to direct the application of generative codes. Section 13 argues for using appropriate materials: cheap but permanent; durable but flexible enough to shape; solid but friendly to sight and touch. We also discuss the proper use of industrial modules such as a plumbing box. Section 14 broaches the topic of funding a project, recommending the involvement of a non-governmental organization that focuses on the small scale. Section 15 is political, delving into how one can best cooperate with existing systems geared to producing social housing that follow very different, industrial typologies. Section 16 offers strategies for getting residents to maintain their settlements after they are built.

The final four sections identify some of the problems. Section 17 faces the difficult problem of retrofitting the favela to make it an acceptable part of urban fabric. Sometimes it cannot be done. We discuss a reinforcement strategy for when it is feasible to do so. Section 18 analyzes some failures to understand the life of a squatter, such as their economic need for proximity to the city. This makes new social housing built far outside the city unattractive. We also warn against grand schemes that can turn into economic disasters. Section 19 blames architects for imposing modernist forms on social housing. That geometry makes them hostile for residents. Section 20 blames the residents themselves for rejecting adaptive housing and urban typologies, wanting instead the sterile images of modernism. Section 21 reviews how conditions are different today from the past several decades, and offers optimism for a broad acceptance of adaptive housing.

The Appendix contains an explicit generative sequence for social housing on a greenfield or open brownfield.

2. The Ecosystem Analogy.

Here is a basic incompatibility: organic urban fabric is an extension of human biology, whereas planned construction is an artificial vision of the world imposed by the human mind on nature. The former is full of life but can be poor and unsanitary,

whereas the latter is often clean and efficient but sterile. One of these two contrasting urban morphologies can win out over the other, or they could both reach some sort of equilibrium coexistence (as has occurred in most of Latin America). In the movement for “self-construction”, the government accepts that owners will build their own houses, and provides materials and training to help establish the networks of electricity, water, and sewerage.

“Social housing” is usually understood as a project for housing the poor, built and financed by a government or non-governmental organization. Occupants could purchase their units, but a usual practice is to rent them at low subsidized rents, or even to provide them for free. In the latter instances, the residents live there by courtesy of (and are subject to varying degrees of control by) the owning entity. A “squatter settlement”, on the other hand, is a self-built development on land that is not owned by the residents, and which is frequently occupied without permission. Since squatter settlements are illegal, the government generally refuses to provide the means of legally purchasing individual plots of land. In most cases, it also refuses to connect those residences to the utility grid (electricity, water, and sewerage) of the rest of the city. As a result, living conditions there are the worst among peacetime settlements.

Social housing and squatter settlements are regions where more than one billion of the world’s very poor live. We are going to discuss these two urban phenomena side-by-side, and offer to resolve the ideological and spatial competition between the two. As a basic starting point, housing for the poor represents the lowest level of the world’s urban ecosystem. Different forces within human society generate both types of urban system: either government-sponsored social housing, or squatter settlements. Christopher Alexander (2005), Hassan Fathy (1973), N. J. Habraken (1972), John F. C. Turner (1976), and others recognized this competition before us, and proposed an accommodation of the two systems. Turner helped to build several projects in Peru and Mexico, and advised others on implementing such ideas worldwide.

The ecosystem analogy also explains and to a certain extent justifies the vigilance by which governments prevent squatter settlements from invading the rest of the city. If not restrained by law and direct intervention, squatters move into private and public land. We are describing a species competition for the same available space. Each species (urban typology) wants to displace all the others. Squatter settlements can take over the entire city if allowed to do so (for example, in Cairo, they have taken over the flat roofs of commercial buildings; in the USA people build temporary shelters in public parks and under highway overpasses). The government, in turn, would like to clear all squatter settlements. Governments the world over assume that they must construct planned housing to replace owner-built housing. That is too expensive to be feasible.

Like all truly organic systems, cities are better off without central control. Accommodating competing urban systems never became standard practice, however. Although the basic ideas about traditional settlements were in place, several key elements of understanding were previously missing. We are now

offering expertise in housing as a DYNAMIC process (by combining pattern languages with generative codes: see later sections). Interventions are needed, starting from scratch in new housing projects. The same dynamic process can also be applied to already built environments, in seeking to adapt a large number of informal unplanned housing projects (favelas or others) by bringing them up to acceptable living conditions.

Competition occurs among all economic strata (“species”) that either use urban land, or profit from it. In Latin American cities, urban land speculation leaves a large amount of undeveloped land with all the services already in place wasted. The poorest population then has to find plots on the outskirts, and pay steep prices for water and other services, without having the benefit of living close to their main source of income (the central city). This creates a severe problem for the government. Rather than characterizing the practice as “unfair” (which does not lead to any change), we point out its tremendous cumulative costs for the future.

Throughout all the various schemes for social housing tried over the years, it is widely accepted (with only a few exceptions) that the unplanned owner-built favela is embarrassing to the government, and has to be bulldozed as soon as possible. Yet that assumption is wrong. Very few in a position of authority seem to consider the urban and economic advantages of existing shantytowns. The geometry of buildings, lots, and street patterns has for the most part developed (evolved) organically, and we will argue here that this self-organization affords a number of very desirable features. With all its grave faults, the favela offers an instructive spontaneous demonstration of economic, efficient, and rapid processes of housing people.

The favelas’ disadvantages are not inherent in the urban system itself. Their organic geometry is perfectly sound, yet it is precisely that aspect which is vehemently rejected. It simply doesn’t fit into the stereotyped (and scientifically outmoded) image of what a progressive urban fabric ought to resemble — neat, smooth, rectangular, modular, and sterile. A favela’s organic geometry is linked with the illegal act of squatting, and with a pervasive lawlessness. The geometry itself represents “an enemy to progress” for an administration. We cannot build living urban fabric (or save existing portions) until we get past that prejudice. The favela has a self-healing mechanism absent from most top-down social housing schemes. Organic growth also repairs urban fabric in a natural process, something entirely absent from geometrically rigid housing projects.

Ironically, the organic geometry of the favela is typically at odds with the imperatives of both the Left and the Right in a modern state, given its interest in responding to social issues in a manner that is appropriately controlled. Some of that interest in control has to do with a literal interest in the kind of rational administrative order that is tied to social control. Nevertheless, much of it may reflect either the state’s need to legitimate its interventions by demonstrating its rationality, or its need to maintain the bureaucratic rituals of accountability when distributing public resources, or its respect for the conventions of private property. It could also be a sincere reformist concern for elevating the living standards of the poor in a way that is both efficient and procedurally fair, in a manner motivated by

democratic principles.

An ordered geometry gives the impression of control invested in the entity that builds. Whether this is intentional (to display the authority of the state) or subconscious (copying images from architecture books), governments and non-governmental organizations prefer to see such an expression of their own “rationality” through building. Departure from this set of typologies is felt to be a relaxation of authority; or it raises possible questions regarding the legitimacy of distributions of resources that aren’t subject to careful bureaucratic accounting procedures. Both of these are avoided because they tend to erode the authority of the state, particularly under regimes where the rights of private property are an important part of the legal and regulatory systems. Morphologically complex squatter settlements are usually outside the government’s control altogether. One way of asserting control is to move their residents to housing built by the government. In a sad and catastrophic confirmation of our ideas, various governments in Africa have periodically bulldozed owner-built dwellings, driving their residents to live out in the open.

3. Antipatterns of Social Housing.

Let us summarize some of the current beliefs and typologies that drive social housing today, so that we can replace them with an entirely different framework. We will suggest using solutions that we feel work best as the more enlightened alternative. Much of our criticism focuses on top-down control. That approach leads to simplification in the planning process. However, one cannot design and build complex urban fabric using top-down tools. There is more to criticize in the specific images people have of modernity. That concerns both architects, who carry with them a false set of desirable images; and residents, who are invariably influenced by those same images through the media.

1. Existing public housing projects are conceptualized and built as cheap dormitories, and thus follow a military/industrial planning philosophy: build as many units as possible, as cheaply and efficiently as possible. We should abandon this mindset and build urban quarters instead. Building an urban quarter is a much more complex undertaking, and one that requires complex engagement beyond the small circles of policy-making and professional elites.

2. To erect a housing project most efficiently, the directing entity wants to have maximal control over the geometry and building process. This practical requirement means that user participation is excluded.

3. The very name “social housing” implies that only a dormitory is built, and not an urban quarter. Following World War II, monofunctional zoning became the established criterion by which governmental interventions were carried out. Those ideas were in place before the War, but post-war reconstruction and expansion gave the opportunity to apply them on a much larger scale.

4. The industrial building typology relegates plants and the natural environment to a purely decorative role, or eliminates them altogether. Nevertheless, human health is possible only if we connect to plants and nature in our immediate surroundings: the “Biophilia Hypothesis” (Kellert, 2005).

5. An urban quarter is comprised of complex social networks, and requires the appropriate urban morphology of a network. It is never monofunctional, and it is not homogeneous. It cannot be built in a top-down fashion by central government. Individual villages (*Pueblos* in Latin America) have been evolving far longer than 500 years; they possess a rich inheritance of a mixture of many cultures that comes from the deep past, e.g. indigenous cultures such as Toltec, Mayan, Incan, Carib and incoming cultures such as Spanish, Portuguese, African, Islamic and so on. There are many lessons that we can learn from this evolution.

6. A conventional social housing project is seldom concerned about social accessibility to the urban network, since it is usually built in disconnected (many times rural) areas. All too often, the issue is understood only as a matter of “housing”, with measures of success typically in terms of quantities of “units” and immediate impact on individuals, rather than the quality (or sustainability) of the community life that results.

7. The typical location of social housing projects in rural areas has to do with a powerful economic reason: the land owners have managed to get a change of land use and have obtained for themselves an extraordinary surplus value. This is part of the sprawl-oriented development in our cities. Furthermore, the project itself, the government, and the users seldom benefit in any way from this surplus value.

8. A typical social housing project conceived as a disconnected “urban island” has an awful impact on the environment. It is disconnected from local and from global economic cycles.

9. The geometry of a conventional social housing project and the configuration of its constituent units give few or no ways to affect further development. They present a number of geometrical obstacles for its evolution over time. This impediment frustrates the inhabitants’ hopes, and suppresses their prospects for social and economic improvement.

10. Architects, government officials, and future residents all carry within their minds an “image of modernity”. This set of ingrained images generates a building typology that is hostile in actual use, and presents one of the greatest obstacles to adaptive social housing.

Governments are still stuck in the mindset of social housing serving jobs in a particular place. The reality is different: healthy urban quarters connect into an urban conglomeration, and people work wherever they can find jobs. By contrast, unhealthy urban regions are isolated, disconnecting people from each other and from employment opportunities. Despite strong social and economic forces leading to isolation, our aim is not to codify this isolation in the buildings and urban form. To do that is to compound the problem. We should instead use the urban geometry to counteract social isolation.

The above list of typologies and practices leads to unhealthy housing projects, creating unsustainable social conditions. To achieve a more adaptive approach, those typologies must be reversed, and the forces that lead us to repeat the same mistakes over and over again should be redirected. Some errors arise simply out of inertia: copying failed solutions because it has become a habit to do so, and not identifying viable alternatives. Those errors are very easy to resolve once the situation is better understood. There is another class of errors, however, which arise because the same forces lead to similar expressions in practical applications. Those conditions cannot be changed, and must instead be redirected. Failure to understand the difference between the two problems means that we will never be able to improve the current situation.

One principle becomes clear: there is no point of designing “social housing” as such. We need to design and build complex, mixed-use urban fabric, and to make sure it fits into existing complex mixed-use urban fabric. Social housing, and housing in general, need to be part of a healthy (and socially inclusive) process of urbanism. The very notion of monofunctional housing is obsolete, discredited because it never worked to connect residents to their environment. All of the planning measures we reject — originally well intentioned — were adopted as a means to improve efficiency in facing a serious urban challenge.

The underlying reasons for their failure have never been officially admitted, however. As a result, there has been a tendency for the debate to focus on problems with the design of social housing as buildings: as if it were merely a matter of coming up with a better design idea to be imposed with more or less the same apparatus of top-down control. Usually nowadays, an architect’s idea of a good design is impersonal and oppressive to the actual users. Some more recent public housing initiatives in the USA (such as the HOPE VI program) have made an effort to incorporate resident participation in the process, but relatively superficially and with very mixed success. Our key point is that the process of producing living places that incorporate social housing has to be changed at its root. It must accommodate more fundamental and meaningful engagement, grounding the generation of urban form in a process that adequately respects the organized complexity distinctive to the nature of cities.

There is a need to mix social classes for a healthier social fabric. The mix can occur naturally through the process of upgrading. It is also important that people who have a choice remain in the neighborhood. The comprehensive approach to creating a village would seem to make sense in places like Latin America where whole settlements of previously rural people create shanty towns and squatter settlements on the periphery of big cities. In that context, there may be no option but to catalyze the generation of whole urban quarters built by the residents, with help by us. Generally, we would want to be cautious about building urban quarters specifically for the poor. Healthy urban fabric is not monofunctional, and neither does it strictly contain one income level. We are aware of the tremendous social difficulties of encouraging mixed-income housing, because of the perception that no one would ever want to live next to people even slightly poorer than they are.

However, we can find encouraging examples of social mixture in historic towns and historic city centers all around Latin America (the *Centro Histórico* of Querétaro is a good example). The difference lies in the perception of community (which can overcome income differences) versus perceiving a house strictly as real estate. Mixed income communities are not only possible, but are more resilient.

It is not just a question here of physically separated urban quarters on the urban periphery. How does one create a unique pattern-generating process for these urban quarters, without creating enclaves that stand out dramatically from the rest of the city? In other words, how does one plan for low-income buildings without creating “projects”, barrios, and ghettos? It seems to us that it is crucial that this rethinking of “social housing” has to be a rethinking of everybody’s housing — i.e., of urbanism — such that “social housing” is subsumed by a more general process of creating a city of healthy networks (Salingaros, 2005). Connecting to the global networks of the city: major streets, the public transportation system, political and social networks, etc., is of the greatest importance.

Part of the mindset of government is that “social housing” has to follow a specific set of policies directed at a specific problem, and administered in and through specific sites. We have super block projects (which are dehumanizing but easy to administer), or we have something like the Section 8 voucher system in the USA, which subsidizes rent for low-income residents. In the case of the latter, social housing becomes an abstract category — defined only in terms of the pathologies of individuals who need assistance, and addressed in the form of payments to property owners. In the latter case, the “site” is a category of individuals, severed from community connections.

Typically, the poor already have complex social networks upon which they rely heavily for survival. At the same time, however, the relative isolation of these networks is a serious problem. Although often very densely connected in a “peer group society”, the poor tend to have limited connections outside those circles, and are isolated in their own villages. They are bound into small networks, but have no sense of themselves categorically as residents of a neighborhood. They also tend to distrust people from outside their networks. Essentially, they have no capacity to identify with or care about the neighborhood as a neighborhood. The problem from a network point of view becomes how to strengthen the pattern of weak ties in such a way that one can incorporate low-income populations into civic life. Moreover, this has to be done without disrupting the strong networks of mutual assistance on which those residents rely. The solution requires organizing these local networks into a network that works on a larger scale.

4. A Geometry of Control.

The psychological process of control influences urban form and the shape of social housing to a remarkable extent. Control may be manifested in architectural geometry and also in urban layout. A rigid, mechanical geometry dictates the shape of individual buildings and urban spaces, while the geometry of their layout

determines the relationship among separate buildings and the shape of the street network. There are many opportunities to express control in urban and architectural terms, and we find them all in government-built social housing.

Examples of organic/bottom-up *generated* urban structures are found along a universal timeline starting with the first cities registered in the Neolithic period, through modern times. The mechanical/top-down *fabricated* urban structure is found in our timeline ever since patterns of *colonization* first appeared in history. Thus, we have models of this mechanical structure dating from the imperial periods of Greece, Rome, or China until today. In the 20th Century, an exacerbated mechanical structure was imposed on cities by the machine culture of modernist thoughts and values. This last period has been decisive in configuring the structure of present day cities, and is set to dominate those of coming years. In the near future, spatial fragmentation could become the ultimate consequence of the recent past. Alternatively, we may enter the period when the emerging paradigm of networks could be wisely used to connect our spatial structures and patterns again, working instead against fragmentation.

There exists a clearly recognizable “geometry of power” (Alexander, 2005; Salinger, 2006). It is most clearly expressed in military and Fascist architecture of the Second World War (and long before that), but has been adopted by governments and institutions of all political persuasions (from the most progressive, to the most repressive). Such buildings are shaped as oversized rectangular blocks and are placed in strictly repetitive rectangular grids. High-rise blocks give the impression of control of their occupants, who are forced into a military/industrial typology that is obviously the opposite of the free urban geometry of the favela. We have two contrasting geometries: housing units massed into one or more blocks, versus having them spread out irregularly. The psychological impression of control follows the possibility of ACTUAL control, as the entrance to a high-rise housing block can be easily sealed off by the police, something that is impossible in a rambling cluster of individual houses.

Government officials and developers share these views about control, and this in turn tends to eliminate any other approach. The local government would prefer to have better access to the site through regularly shaped blocks. Administrators are fooled by the notion that simplistic geometric shapes are the only typology we can use to create efficient new dwellings.

An administration can build many smaller units rather than high-rise blocks, but rigidly fixed to a military/industrial grid on the ground. Individual housing units are exact copies of a single prototype. Control here is exercised by not allowing individual variations. One modular house is repeated to cover the entire region, with careful attention paid to strict rectangular alignment. Complexity and variation are perceived as losing overall control — not only of building typology, but also of the way decisions are made — and are thus avoided.

Several factors provide powerful motivations for standardization and relatively rigid regulations: administrative efficiency, accountability, maintenance of

standards on which the success of the administration will be assessed, and the requirements of both transparency and procedural fairness. The efficiency of modular production, falsely tied to economic progress, is used as an excuse for the military/industrial geometry. Building variability is perceived as a threat, and is countered by arguments about excessive production costs. Those arguments support the belief that central planning is an economic and social necessity. Yet, such arguments have been shown again and again to be invalid. It is once more the industrial, mechanical paradigm of linear production (and linear thinking) that does not allow developers of social housing to consider variability, heterogeneity, and complexity as essential features in their projects.

In a manner similar to the application of new technology to factory production, a justification is often presented in terms of cost and efficiency, but the underlying logic is a logic of control. In the context of the modern state, it is often more crucial to maintain standards, transparency, and accountability than to reduce cost in absolute terms. As a result, it has become all too common for the structures of bureaucratic administration (with the best of intentions, and regardless of ideological leanings of Left or Right) to impose standards that disrupt the very thing they hope to accomplish.

Adaptability to individual needs requires design freedom so that every unit could be different, with its shape and position decided in large part by its future residents. It is indeed possible to do that. Nevertheless, both sides of the political spectrum strongly oppose design freedom. The Right considers poor people not to deserve such attention, and that a custom-made house is the exclusive privilege of the wealthy class. The Left, on the other hand, stands firmly behind its belief of fundamental equality, which it misinterprets as forbidding houses in a social development from being in any way different from each other. Institutions such as banks, construction companies, and land surveyors get frightened by the prospect of having to deal with individual variations.

Control is exerted in other, more subtle ways as a result of standardization. A cheaply produced building module available in the marketplace, if it is large enough, replaces other, better alternatives. Modular components restrict design freedom, because they influence the final product resulting from their assembly (Alexander, 2005; Salinger, 2006). Governments that sponsor social housing do like to promote industrial modules and components, and to discourage construction that is shaped individually. Nevertheless, local production could be achieved more cheaply, and solves part of the unemployment problem. An industrial geometry embodied in architectural and urban typologies is eventually reflected in the built environment.

The natural environment becomes one more casualty of the geometry of control. Nature and life are visually “messy”. Topographical features such as rocks, hills, and streams; as well as trees and plant life, pose challenges to a flat, rectangular geometry, and are thus usually eliminated. Local governments put in effort to eradicate organic elements from the “ideal” sterile environment. Sometimes (but not always), this act of aggression against nature is mollified after the fact by planting a few non-native trees in strict geometrical alignment and making up a phony rock

landscape as a visual sculpture. Existing native plant species are regarded as unwelcome, and only an artificial-looking lawn is acceptable (because it is sleek and does not grow unevenly like other plants). In low-income housing, even that is considered an unaffordable luxury, so in the end, the project acquires an unnatural, lifeless character, totally lacking in connections to plant growth.

SECTIONS 5-11: SPECIFIC TOOLS FOR DESIGN THAT HELPS ESTABLISH INTELLECTUAL OWNERSHIP.

5. Biophilia, Connectivity, and Spirituality.

The notion of “biophilic architecture” establishes that human health and wellbeing strongly depend on the geometry of the environment, as expressed in particular configurations, surfaces, materials, details, light, and accessibility to plants and other forms of life (Kellert, 2005). All of these factors contribute to the success of any building, and to social housing in particular. Evidence-based design is based on knowing how a human being is affected by his/her environment.

The appropriate geometry that promotes human wellbeing is unsurprisingly the opposite of the geometry of power described in the preceding section. A living geometry is loose, complex, and highly interconnective. It is the geometry of the owner-built favela, and also the natural geometry of a river, a tree, or a lung. Without any imposed constraints, human beings will build according to this natural geometry (Alexander, 2005; Salingaros, 2006). Note that many self-built projects do not entirely follow this generative geometry, because the government defines a rectangular grid of plots before giving the land over to individual builders. Thus, it already imposes an industrial grid that is impossible to change. We will discuss later how this restrictive practice can be avoided.

Geometry and surface qualities either help or hinder an emotional connection with the human beings who use them. We should balance the study of structure with the study of form and pattern. In the study of structure, we measure and weigh things. Patterns of interaction cannot be measured or weighed, however: they must be mapped, and they have to do more with quality. To understand a pattern we must map a configuration of relationships. We believe in the concept of the city as an organism, not only in the sense that it tries to develop an *organic* structure, but also because of the complex relationship this structure establishes with the organizational patterns of its users. Here is a list of some key concepts that we need to work with:

1. People become psychologically sick and hostile in an environment devoid of nature. Biophilia is innate in our genes. Urban quarters need to blend with and not replace natural habitats.
2. We connect to plants through their geometrical structure, thus some geometries are more connective to the human spirit than others. We feel comfortable with a built environment that incorporates complex natural geometry

showing an ordered hierarchy of subdivisions.

3. Residents should love their homes and neighborhoods. That means that the form of the immediate built environment must be spiritual and not industrial.

4. Industrial materials and typologies generate hatred for the built environment. We grow hostile to surfaces and forms that do not nourish us spiritually, because we feel their rejection of our humanity. If not hatred, they often generate a kind of indifference that might actually be worse for human communities. The use of these materials and typologies has commonly been presented as dictated by the nature of building technology and the economic realities of the day. The result is that people often take for granted the unavoidable alien character of a built environment that delivers quantity without meaningful qualities.

5. The sacred character of traditional villages and urban quarters cannot be dismissed as outmoded nonsense (as is done nowadays). This is the only quality that connects a village on the large scale to people, hence indirectly to each other. We need to build it into the urban quarter.

It is not easy to identify the sacred structure of any settlement, let alone plan for it in a new one. We need to look at the patterns of human activity in traditional settlements, and ask which activity nodes are valued above all others. Usually, it is where local residents come together to interact. Those nodes (if they are present at all) could be interior, but very often they are elements of urban space (Gehl, 1996). People can connect to plants and to other people at the same time in properly designed (configured) urban spaces. Those places are then responsible for the societal cohesion of the neighborhood.

Something is “sacred” if we attribute to it a value above and beyond its material structure. A good rule is to ask if we are willing to fight to protect it from damage or destruction. Do many persons, some necessarily strangers, feel the same way about this? Do we consider a place to have meaning for the community as a whole so that a group of people will actually come together to protect this particular object or site? In ancient societies, an old tree, a large rock, prominent high ground, a particular stream or spring could be considered sacred (in the deepest religious sense), and thus protected from damage. Those societies built towns around sacred spaces, and endowed parts of what they built with a sacred meaning. Today, that quality is unfortunately dismissed as anachronistic.

For example, the oldest social nodes are a water source (community tap or well), place of worship (Church or Temple), gathering place (cafe/bar for men), children’s playground, etc. In the case of a Church, we do have a genuinely sacred structure, and it is most often built in the original geographic center of a settlement. It serves the cohesive function of community: “ecclesia” is the gathering together of common worshippers, which is just as much a cohesive social act as it is a purely religious act. It is no coincidence that the non-religious gathering place, the coffeehouse, is often situated in front of the Church in a traditional village. The coffeehouse substitutes as an alternative gathering place for those who do not subscribe to the sacred meaning of the local religion.

Another node of the sacred structure is the central plaza or open square, which, in temperate climates, accommodates social life in the evenings. The Latin tradition of the evening walk around the central square establishes a value for the plaza in the social cohesion of the community. What we refer to as “sacred structure” in this paper refers to ALL of these cohesive functions. We see cohesion as a natural device, and interpret its various manifestations as simply differing degrees of connectivity on overlapping channels. A central square is a place for social cohesion, whereas a church connects its worshippers to the highest level, which is their creator.

Non-religious societies in some cases successfully substituted secular “sacred spaces” to hold their societies together. For example, communist countries built the “House of the People” or “Workers Club”, which took the role of a gathering place for at least part of the community. In upper-income suburbs (for example, in gated communities) the same forces apply, but are unresolved because of total automobile dependence. There is no sacred space, no common meeting point and place of social interaction. Contrary to the intent of developers who build them, a clubhouse and community swimming pool in high-income suburban clusters do not serve this function. The urban geometry never establishes a common social value among the residents, hence leads to a serious lack of socialization.

The sacred place that we are describing is absent from contemporary urban construction (Duany *et. al.*, 2000). We see superficial copies created without any understanding of their deep cultural meaning. Consequently, a dramatic decline in the sense of community leads to a dramatic increase in social alienation. Certainly both the Right and the Left have never recognized the need for spirituality in the fabric of social housing. Nevertheless, a sense of the sacred is inherent in all traditional housing (in some places more, in some places less) independently of their origin. By contrast, military/industrial dormitories are not only rejected by their inhabitants, but are hated because no one can connect with their form and image. A human being cannot truly belong to those buildings, nor can the image of such a building belong emotionally to a human being, and thus people turn to hating them and eventually destroying them. Buildings of this type, built in the 1960s with the very best of intentions, abound around the world. They do not catalyze an emotional attachment to the large scale. Schemes to have “shopping streets” and kindergartens (as a substitute for sacred space) on the fifth floor of high-rise block housing proved ridiculous. Hard concrete plazas tend to be disconnecting and hostile, generating a feeling of anger instead of connectivity.

Christopher Alexander and his collaborators built social housing in Mexicali, Mexico (Alexander *et. al.*, 1985). A prototype house cluster was built around a builder’s yard that served the construction needs of the neighborhood. That could have served as the sacred space. Whereas the houses themselves were a tremendous success (and survive with their original owners years afterwards), the builder’s yard was not. The government failed to maintain it, yet did not give it over to another community or private use. It was abandoned, and its connections to the individual houses sealed off by the owners. The government never helped it to become a gathering place. No effort was made to endow a sacred value to the

builder's yard.

The category of "the sacred" is being defined broadly enough to encompass the normative order of civic spaces, and it is important to include the full spectrum of social relations from the private, to the communal (parochial), to the public (civic). Traditional villages rise to the level of the communal, but NOT to the level of civic culture. Gathering places are important, not simply because they encourage communal cohesion (which tends to be based on homogeneity), but because the range of different types of gathering places allows for a range of different kinds of social relations. Relations in public have as much to do with defining social distance as with cohesion. Often, the cohesion associated with urbanism is mediated only by the sharing of a common sense of place. Places are, in a sense, an embodiment of what we call "social capital". They ARE social relationships, not just containers or facilitators of social relationships.

There may be a problem with emphasizing the sacred in this discussion. In the third world even more than in places like the USA, the constituencies for social housing are often caught up in some form or another of democratization movement. Particularly in the global cities of the world, we don't wish to make it sound as if we are promoting a return to the condition of a kind of tribalism (which is the way traditional villages can seem). Places do require materialization of the "sacred", but not in the common usage of the word. Gathering places are important, but their structure (and their relationship to the social structure) is more complex than just acting as the containers or opportunities for people to bond. We need to look at the patterns of interaction in traditional cities as well as tribal villages and settlements that are homogeneous by class. Those patterns of interaction are structurally varied and are not simply about communal cohesion.

In conclusion, a settlement must, above all else, establish a sacred structure by some means, so as to connect emotionally with its residents. Sacred structure also helps people to connect to a higher order. This higher order encompasses three functional features: (a) it is *used* as a cohesive means to form community; (b) it is *constructed* upon the cooperation of the discourses of a group of people and is not the unilateral decision of an individual; and (c) it is loaded with a powerful *meaning* for the community. If most or all residents connect with the physical sacred structure, then they connect indirectly with each other. This simple principle establishes a sense of community, which survives the difficult conditions of life. It keeps forces oriented towards maintaining the physical structure of the community, instead of turning them against the physical structure in those cases when it is not valued.

6. Utilizing the Work of Christopher Alexander.

Many times during his long career as architect and urbanist, Christopher Alexander was asked to plan and construct social housing. In every case, and often in opposition to the brief provided by the government agency that hired him, he insisted on user participation. He clearly saw that this was the only way to produce

built forms that are “loved” by their occupants (Alexander, 2005; Alexander *et. al.*, 1985). Each of his projects began with the essential framework of involving future users in planning their living space, and shaping the configuration of streets and common areas. In some cases, this led to the support being withdrawn by the sponsoring government, which surmised that such a scheme would severely weaken its control over the geometry of the project.

We believe that Alexander was entirely right in insisting on participation as a basic principle. He correctly predicted that housing built by someone not involved in the world and daily realities of the resident would lack certain essential qualities. As a result, its inhabitants could never love the place. Even if the houses were all built following exactly the same modular typology, participation in the planning or building process guarantees that the eventual users have a personal stake in the final product. Most people could not care less about a design’s formal virtues: they just want something they can truly consider their own.

Alexander’s most recent work (Alexander, 2005) establishes a temporal ordering for any construction if it is to be adaptive to human needs. That is, it matters enormously what is designed and built before, and what comes after in the sequence of design/construction. This practice was followed since ancient times in the Near East and was codified in Byzantine and Islamic urbanism, which influenced all regions affected by these civilizations (Hakim, 2003). Its scientific foundation as part of the general processes by which a complex system is evolved is a new contribution, and has been theoretically shown to be crucial to the success of any project. It is now possible to outline the correct order in which components of a housing development can be built to ensure sustainability.

For example, Alexander reveals the steps in designing healthy urban fabric. These of course depend very much on scale. Since one priority is how a settlement connects to the rest of the city, an area of up to 1 km² will usually be tangent to one of the main streets, whereas areas larger than that will probably need a major street that goes through them.

1. Major circulation routes are determined as part of the integrative core of the city and the adjacent urban area.
2. Major public spaces are identified to tie in with topography, natural features, and major lines of movement.
3. Secondary street alignments are laid out making 60-150 meter intersections with major streets and spaces.
4. Pedestrian space is defined by the building fronts, and is accessed by, but physically protected from vehicles.
5. Buildings are situated so their front walls define the urban space as coherently as possible — no setbacks, and few gaps.
6. Roads arise as the consequence of linearizing and connecting segments of well-defined urban space. If the living form of the place is to be respected, roads CANNOT be built first, especially if their perceived functional requirements are then allowed

to dictate the form, scale, and quality of urban spaces.

Failure to follow this sequence inevitably leads to dead urban fabric. The correct application of this sequence can only come about after convincing the authorities to implement a different construction practice than is usual nowadays. Nevertheless, there are overwhelming theoretical reasons for insisting on this sequence. The steps were followed in countless traditional settlements, forming towns and urban quarters before the era of industrialization. When the main mode of transport is still pedestrian and low-speed traffic (animals, carts, only a few jitney buses and pick-up trucks, etc.) it is easy to give priority to space and buildings. Once the automobile takes over, however, it begins to dictate a new priority, which reverses the above sequence. The planner then sacrifices traditional urban fabric to fast transversal movement, and this ultimately leads to a dysfunctional and unsustainable design.

Alexander has applied these principles in several projects of social housing, including Santa Rosa de Cabal, Colombia (Alexander, 2005: Book 3, pages 398-408) and Guasare New Town, Venezuela (planned but not built) (Alexander, 2005: Book 3, pages 340-348). Another successful recent example is Poundbury, England, by Léon Krier (1998). Interestingly, the latter is an upper-income development, in which a significant fraction (over 20%) of subsidized residents are included; those are financed by the Guinness Trust, a non-governmental organization. We are going to extract working rules from those examples, and present them in this paper.

7. Iterative Design and the Emergence of Form.

A new community cannot simply be inserted into cleared land (it could, but then it is not adaptive, and does not form a community). We envision step-wise growth rather than building everything all at once. The design must be allowed to evolve, and cannot be decided at the beginning. A master plan — in the sense of deciding exactly where future construction is to be placed, and exactly what form it will take — is too restrictive and thus highly incomplete. Social housing that follows this mindset by being planned on paper, and then constructed according to plan fails to form a living environment. Following Alexander, we advocate a process in which every future step is influenced by what exists at that point.

Careful consideration of the topographic features, the existing vegetation, the entry points, etc. should indicate a loose morphology for the entire settlement at the beginning of the planning process. After getting a very rough idea of the placement of buildings and main access road, then individual lots can be envisioned along the roads, which are themselves still not completely specified. Nothing is yet built, and major decisions take place by using wooden stakes and other markers in the ground. In order to guarantee morphological coherence, what is built is influenced by its environment. This interaction is experimentally determined and cannot be worked out on paper or anticipated, due to the complexity of all the mechanisms involved. In a partially built development, the next house or street segment to be built has to adapt its geometry to what was built previously.

Any decisions made at the beginning of the project must be regarded as

recommendations, and not as rigid dictates (unlike those in a master plan). As the project develops in time, decisions made at the beginning for unbuilt areas will now seem incorrect, no longer relevant, so we need the possibility of changing the design continuously as more building takes place. This is exactly what occurred in historical communities built over a time span of centuries. This adaptive procedure (adapting to human sensibilities about the emerging forms and spaces) generated extremely coherent complex geometries in traditional villages and towns, and that coherence cannot mathematically be achieved all at once.

An iterative process goes back and forth between steps, improving each one in turn. That's what we are describing in adaptive planning and design: first form the conceptual idea on the ground, then introduce the position and size of future built elements without yet building them, then go back to refine the urban spaces, and so on. It is only in this way that the interaction of all the components with each other, and with their surroundings, can effectively take place. Once components begin to be built, then they become part of the surroundings, and in turn influence all future built elements.

Healthy urban fabric is an extremely complex system, and it cannot be designed and built in a strictly top-down fashion. Some components could be accomplished top down, by someone who understands the required complexity. The ordering has to be emergent from the process, and not simply an imagined outcome imposed by regulatory fiat. There has to be adaptive capacity that is distributed and pervasive in a process that is inclusive. Cities and neighborhoods are "things that people do together", where a community exercises its territoriality in a positive manner. Any top-down intervention has to be oriented to facilitating that collaboration, not dictating its terms or forcing it into an overly rationalized container.

8. Examples of Patterns and Generative Codes.

Patterns summarize discovered design solutions that make people most comfortable in experiencing and using built form. Their relative merit is that they were decided on a firm (in many cases scientifically valid) basis, rather than being just another opinion. The use of patterns and pattern languages is described in the readily available literature (Alexander *et. al.*, 1977). We now describe some patterns for those who may not have seen them before. Mainstream urbanism has neglected the tremendous potential offered by pattern-based design, chiefly for ideological reasons. Pattern-based design liberates the individual but restrains some of the most profitable (though inhuman) aspects of the building industry.

In building dense urban fabric, one pattern imposes a four-storey height limit for residences (Pattern 21: FOUR-STORY LIMIT). Above that height, a resident feels disconnected from the ground, and from any societal functions, which always take place on the ground. This pattern immediately invalidates high-rise apartment blocks, which are simply a failed social experiment on a vast scale, driven by iconic symbolism. Another pattern requires access to trees (Pattern 171: TREE PLACES). Trees are necessary for a human environment, and their planting has to be carefully

thought out to cooperate with nearby buildings and define a coherent urban space (Gehl, 1996; Salingeros, 2005). Alternatively, existing large trees must be saved, and buildings introduced in the same careful and flexible manner (and not according to some arbitrary grid), so that the buildings and trees cooperate to create an urban space. The trees combine with the path geometry and external walls to define a usable urban space, whose dimensions and path structure invite use.

The point we are making (summarized in this particular pattern) is to use trees and buildings together to define a sacred place. This is far removed philosophically from planting trees simply as visual “decoration”, which simply reinforces the geometry of power. There is a pragmatic reason for this. Unless a tree is protected by forming part of a sacred place, it will soon be cut down and used as building material, or as fuel for heating and cooking. This idea follows the same principle of protecting cows necessary for plowing by making them sacred animals. Then, the cows are not eaten during a famine, so they can be used for agriculture the following season.

In practice, one chooses several different patterns from Alexander’s “A Pattern Language” (Alexander *et. al.*, 1977), and begins to design the settlement. As work progresses, one has to go back and work with more patterns as different design needs arise. Another set of patterns helps to guide the street layout. Alexander originally used patterns in 1969 to design social housing in Peru (Alexander, 2005: Book 2, page 352). The way that different patterns have to combine together is outlined in (Salingeros, 2005: Chapters 8 & 9). Some architects characterized patterns as an incomplete method, because they could not successfully combine them. Nevertheless, patterns are only one component of a system of design, and their combination has to follow other principles not contained in the patterns themselves. Work by Alexander and others (including the authors) continues to develop the applicability of pattern languages in architecture. Particular insights are being gained from the dramatic success of pattern languages in computer software design.

A far more serious factor that has worked against the adoption of patterns for design is that architecture and urbanism have, for several decades, rested on a philosophical basis of qualitative relativism. This claims that all judgments in architecture are matters of opinion and taste, and architecture is therefore little more than an act of personal expression. Such relativism is in marked contrast to the insights of science, where discovered facts about the structure of reality are found to underlie matters of apparently individual opinion. Architects and urbanists inculcated in the relativist tradition disregard observable structural effects and evolved solutions. They consider patterns as just another opinion, and one that can be safely ignored (especially as patterns directly contradict the military/industrial typology). But patterns are observable clusters of recurrent configurations of response to recurrent design problems, which constitute a discoverable form of “collective intelligence” in human life and civilization. Note that this collective intelligence has to do with the way we operate in the context of the relationship between built form and our values, aspirations, social practices, etc.

In the age of professional specialization, the built environment has been increasingly subjected to a proliferating array of experts who each bring their discipline to particular kinds of problems. This is often at the expense of the ability to see (much less address) the overall challenge of creating living, beautiful, or sustainable places. The notion of a collective intelligence embodied in patterns should not be understood as a claim to have discovered a final truth, but rather as recognition of the importance of a living process. It re-establishes the cultural capacity to engage in place making as a collaborative social process. Success is not measured in abstract terms, but rather by the local experience of continuous improvement in the quality and sustainability of human settlements. The use of patterns in design provides a necessary foundation for a collaborative method that is adaptive and particular to a place (i.e., the constraints of the moment), yet is also capable of responding to human aspirations for something better.

Even when patterns are used for design, the designer must make sure that the project is worked out and built in the correct sequence. This new approach to planning is based on the realization that the emergence of an adaptive form has to follow a specific sequence of steps. Adaptive design requires a “generative process”. A living design is never imposed: it is generated by a sequence in which each step depends upon all the previous steps. The patterns themselves tell you nothing about the proper sequence, however. For this, one has to go to Alexander’s most recent work (Alexander, 2005). Others support the need for a generative process. Besim Hakim reached this conclusion through the overwhelming evidence available from his research on traditional towns (Hakim, 2003).

9. Construction Strategy.

Both pattern languages and generative processes and codes (either explicit or implicit) have been around for millennia. Pattern languages were codified into practical form thirty years ago. Codes have been used in traditional architecture, and fixed (non-generative) codes widely implemented by one of the authors (Duany & Plater-Zyberk, 2005). Fixed codes are form-based and tell you exactly how to structure the geometry of an urban environment. Generative codes are more recent, and have the additional capability of evolving the form with the project. They tell you the sequence of steps but leave the form of the end product unspecified. They also distinguish between an adaptive and a non-adaptive set of codes (i.e. those that either generate, or prevent living urban fabric).

Even though a particular project will require careful adjustment to local conditions, these two methods acting together will serve for most cases. We can begin their immediate application using published material, with on-site experience leading to further refinements in the process. In very broad terms, here is how one can follow our suggestions:

1. Use pattern languages to plan the transportation network long before any building takes place. This is essential for generating village and neighborhood centers. Rigid grids favored by central government do not create the necessary

nodal connectivity of the urban quarter.

2. Use pattern languages (and develop new ones appropriate to the locality) to construct a urban quarter for a complex society consisting of children, adults, seniors; and including housing, stores, retail, schools, informal spaces, transportation hubs, etc.

3. Existing simplistic (and consequently antihuman) monofunctional zoning must be rescinded by central government. Without that step, all planning schemes preclude urban life from the beginning, regardless of what they might look like.

4. Encourage construction systems (controlled from the top down) to work with local future residents (working from the bottom up) so as to generate low-cost, higher-quality dwellings.

5. Use pattern languages to rehabilitate existing low-income owner-occupied houses, and to convert current rental units to owner-occupied. This requires an infusion of money, but it also generates construction work.

6. Use pattern languages and the notion of the city as a network to orient interventions globally. Larger-scale and longer-term processes will insure that in addition to building housing, projects are conceived and implemented to complete a sustainable neighborhood, well connected in a larger urban setting.

The process starts with identifying the right land. A major problem is that much informal housing is pushed to marginal and problematic land, on which it can be impossible to upgrade. It is necessary that the architect/planner in charge of the project be knowledgeable in pattern languages and their application. Since most architect/planners today are not, we recommend that, at least for the next several years, governments rely on someone familiar with this material to oversee construction projects. A number of professionals are available with this knowledge, though not enough to satisfy the demand. Hopefully, enough young architects can be trained in the following decades to direct new projects.

One important point concerns building permissions. Because of the organic variability of different components of the project, it is prohibitive in both resources and time to prepare final drawings and get each one of them approved. Planning permission is nowadays usually given for an explicit documented plan specifying every detail of the design, instead of a general process that can produce similar but individual designs. Alexander solved this problem by getting government permission for a specific building process (a set of building operations, within clearly-defined parameters) that generates similar but distinct results. All products of that process were thus automatically approved without further need for individual permissions (Alexander *et. al.*, 1985). It is important to get approval from the authorities for the PROCESS rather than for a set of final drawings. If this is not possible, then it is best to get approval for a generally suitable structure that can then be modified under this process.

10. Layout Strategy I: Armature of Services.

Following is a rule-based layout strategy that one of us (AMD) has observed working in Santo Domingo, Dominican Republic. It offers a template that planners can work with: a simple but effective armature on which a sanitary and humane settlement may self-organize.

What follows are guidelines for the MINIMUM income favela. There are more rules for the next step up in income, including the accommodation of cars. But anything less than this set of rules tends not to work, so they form a core upon which other rules are added.

1. The government must plat lots and grant ownership with paper and recorded deeds. These can begin with “notional” lots that can be defined later through a “generative” process, and surveyed and recorded afterward.

2. Lots should be within blocks defined by a network of street reservations. Each block must have a pedestrian alley reservation at the rear of all the lots. Lots may vary in size and shape but should not be less than 6 m wide and 20 m deep.

3. The government must grade the land within the block so that it drains to the street. The streets must in turn be graded to drain away from the inhabited area.

4. The government must build concrete sidewalks on both sides of the street reservation (but not necessarily pave the streets). The channel formed between the sidewalks will contain the draining rainwater. The streets also provide firebreaks.

5. At a minimum of one place on the alley, there must be a tall pole with electrical supply from which the residents can connect themselves and freely use the electricity. Do the same with a couple of clean water spigots. There should be one large latrine (with gender separation) per block. One can start taxing collectively for these services once construction is well under way.

6. The lots, as they are built out, should retain a clear passage from alley to street. This encourages rooms with windows and also allows the lot and the block to drain to the street.

7. The residents will construct their buildings themselves, at their own rate; but they must build at the edge of the sidewalk first. The rear comes later. One can require that the frontage wall be concrete block. Their roofs must not drain to a neighboring lot.

8. Corner lots are reserved for shops. All lots can be live/work units.

9. Non-criminal commercial initiatives and private transit operations must not be prohibited (even better to actively encourage them).

10. The various government and resident responsibilities listed above are established by a simple contract: “The government will do this ... the resident will do this ...”

11. It is possible to ask the residents to pay for the lots, after construction is done, a small quantity at a time.

In addition, there are many social control issues that we are not going to deal

with here, but which need to be empirically observed. This is only a physical code, and thus only part of the whole solution that will make the project livable. The establishment of legal boundaries is a government function. But it should not be assumed that we propose to do this first, as a top-down act. Laying out the plots involves preliminary owner participation. The really remarkable thing about the morphology of owner-planned places is the power of their self-organization, which is the process that Alexander's generative codes are trying to exploit.

11. Layout Strategy II: Generative Code.

Alexander (2005: Book 3) has applied more advanced "generative codes" to projects, and we summarize here part of his procedure. This is a more incremental version of the "armature of services" layout methodology described previously.

Alexander observed the self-organizing processes that have created many informal settlements throughout human history, and sought to develop rule-based "generative codes" to exploit these processes. Their natural geometry is so strong that in looking at an aerial view of Querétaro, Mexico, for example (where one of us conducts research), the urban morphology of the informal settlements looks very much like widely admired villages of Provence in France or Tuscany in Italy. They all have subtleties of adaptation to terrain, view, differentiation of commercial functions, and other autopoietic (self-organizing) features.

The challenge is not to build on a *tabula rasa* (i.e., by first wiping everything clean) a structure based on a template in advance, but to get plumbing and other humane elements into these already-complex and sophisticated "medieval cities". We want the organic complexity and adaptive character of "bottom-up" activity, with some of the standards and conditions of social equity that have typically relied on "top-down" interventions. There is a way to lay these out sequentially, iteratively, according to a simple series of rules, as the generative codes propose to do. After that is accomplished, then the result is surveyed and the boundaries are recorded for legal purposes.

A generative layout, including streets, establishes the plots according to topography, existing natural features, and the psychological perception of optimal flow as determined by walking the ground. Then the platting process follows — not the reverse. That would be the Alexandrian approach to "medieval cities with plumbing". Although it could all occur in advance, as part of a "generative code" process by the community, it just has to be stepwise. Layout should not be template-based or designed to look nice from an airplane. To get the emergent complexity of a living neighborhood, it has to be iterative, and determined on-site. You have to really be sure the organic unfolding can happen, which is not easy in a rigidly codified world. We have the challenge of conjuring good processes out of circumstances that present many constraints and obstacles.

This of course reflects the medieval pattern of laying out streets and lots. It also follows Léon Krier's dictum that the buildings and social spaces come first, then the streets (Krier, 1998). In medieval cities, the process was highly regulated. A grid-

based city can also be well ordered: our point is to use the most adaptive grid for the location, which grows from the terrain. The practical implementation of even a radical generative process is not as difficult as one might think. One gets around the legal problems posed by conventional subdivision law by creating rough “plug” lots that are then laid out in detail according to the generative process; then the plat is made final with a series of lot-line adjustments and right-of-way dedications. There is usually some way to override the conventional processes to achieve this kind of thing, but the government must be supportive and not block the process because it departs from established practice.

Getting into more detail about the layout, the main street has to be laid out approximately based on the topography and connection to the outside. Next, decide on the urban spaces, envisioned as pedestrian nodes of activity connected by streets. Next, side streets that feed the main street are decided — even though streets are still only indicated using stakes in the ground. Next, define the house positions (not yet the lot; just the building) using stakes in the ground, so that the front wall reinforces the urban spaces. Each family now decides the total plan of its house so as to enclose a patio and garden in the back. This process is constrained by adjoining streets, alleys, neighbors, and is meant to make the eventual patio and garden spaces as coherent as possible — semi-open spaces that feel comfortable to be in and work in, and not just leftover space. This finally fixes the lot, which is then recorded. Plans are drawn from stakes in the ground.

As lot lines begin to be decided, then the streets can begin to form more definitely in plan (but not yet built). Streets are meant to connect and feed segments of urban space, which themselves are defined by house fronts. (Note that this is the opposite of positioning the houses to follow an existing street). Flexibility in the street design will be retained until houses are actually built. Clearly, you are not going to see many straight streets running across all the development (to the shock of government bureaucrats), because they have not been drawn on the plan at the beginning. Nor do streets need to have a uniform width: they open up to urban spaces. Streets evolve as the whole development evolves. Now begin construction. First build the sidewalks, then the houses, and pave the streets last — if at all.

A more detailed layout sequence is included in the Appendix.

SECTIONS 12-16: PRACTICAL SUGGESTIONS FOR MAKING PROJECTS WORK.

12. The Role of the Architect/Coordinator.

Our experience with construction projects leads us to propose an administrative rule. That is to make a single individual responsible for achieving the “humanity” of an individual project. The government or non-governmental agency funding the project will appoint this person, who will oversee the design and construction, and will coordinate user participation. We suggest that this task not be delegated to an existing employee of the government bureaucracy, or to an employee of a

construction company, for the simple reason that such persons don't have the necessary expertise in the design process we are advocating. Ideally, it should be a person who has a professional understanding of these issues, and who has an independent professional sense of responsibility to oversee their proper implementation.

This architect/project manager will be responsible for making the difference between creating a military/industrial appearance, versus a human, living feeling in the final project as built. Again, this is not a matter of aesthetics (which would be immediately dismissed by the funding agency as irrelevant to poor people) but of basic survival. A project perceived by its inhabitants as hostile will eventually be destroyed by them, and in the meantime destroys their own sense of self. As much as we believe in collaboration, it has been shown that people in need of social housing don't always have the organizational capacity to work together to get the project done. Their input is absolutely necessary in the planning stages, but here we are talking about someone on the "outside" who will be responsible to the residents, and who will carry the responsibility of insuring their wellbeing when pressured to cut costs and streamline the construction process.

A crucial part of the role of the project manager has to be defined in terms of multi-layered facilitation of the process. The project manager will often need not only to encourage engagement, but also to teach it to people who are not used to it, and who may lack the habits and skills of effective participatory action. Participants may come to the process with a deep distrust of any method that relies on the efforts of others. Part of the challenge in a new settlement, therefore, will be to create an orderly, reliable, and effective collaborative process that can engage a population — but such people may well be traumatized as the result of prior dislocations and social upheavals. One cannot assume that a pre-existing community will have already established the necessary norms and commitments required for such engagement. The project manager's role will inevitably involve a certain amount of what is commonly called "community building", organizing, and leadership training.

When the project is complete, the architect/project manager should get a fee for his/her job, adjusted to the degree that it is well done. Resident feedback rather than declarations by architectural critics should be used as a basis for judging this success. It is not unlikely that a project will prove to be sustainable and successful for decades to come, but will be condemned by narrow-minded ideologues as looking "old-fashioned", or as resembling a favela too closely for political comfort. Many people in power have fixed visual notions of what a "clean, industrial, modern" city ought to look like — based on outmoded and irrelevant scientific concepts — and refer back to those utopian images when judging a living environment.

We are in fact advocating a bottom-up social approach with a strictly top-down intermediate administrative level. Unless a clear responsibility and autonomous administrative system is laid down, what we wish to see accomplished will never get done. The impersonal government bureaucracy will never take the trouble to

make a place human and livable; it can more easily just follow uncreative rules of modularity and mechanical combination. The construction group is not responsible: it wants to finish its job in the minimum time and make the least number of adjustments. The residents are not politically powerful to guarantee a livable environment. Within the realities of construction, a project requires an advocate with the power to coordinate all of these forces.

13. The Need for Adaptable Materials.

A major though neglected factor behind the choice of materials is their emotional attractiveness to the user. Wealthy people pay a lot for “friendly” materials so that their surroundings give back emotional nourishment. Self-built housing follows the same unconscious principles, using inexpensive and discarded materials in imaginative ways to create an emotionally satisfying environment (arrogantly dismissed as merely “primitive” artistic expression). Contrast this with the hostile surfaces regularly chosen for social housing in an effort to make those structures more durable. Such “hard” materials and surfaces give the impression of dominance and rejection. It is possible to create durable yet friendly surfaces, even though planners have not thought it worthwhile to take the trouble to do that for social housing.

To complicate things further, the issue of desired building materials runs straight into hidden prejudices and images of self-esteem, often culturally specific and perhaps even locally particular. Controlling agencies in some cases ban what they consider to be “low status” building materials, such as Adobe (whose surface is both “friendly” and easily shaped, unlike concrete). But in many cases, it is the owner/builders themselves who shun those adaptable materials in regions where they are used in traditional construction. Hassan Fathy simply could not get poor people to accept living in traditional mud houses (Fathy, 1973). This is a major problem worldwide. It’s the image — representing the despised past instead of the promised utopian future.

The ultimate solution to this problem must be cultural. Citizens must rediscover pride in their own heritage and building traditions, and the great value and pleasure they afford. At the same time, the myth of a utopian technological approach must be exposed for what it is — a marketing image meant for the gullible public — while the real benefits of modernity are shown to be entirely compatible with traditional practices (e.g. plumbing, electricity, appliances, etc). In this way, we can regenerate the “collective intelligence” embodied in cultural traditions, and infuse it with the best new adaptations.

As the author Jorge Luis Borges put it: *“between the traditional and the new, or between order and adventure, there is no real opposition; and what we call tradition today is a knitwork of centuries of adventure”*.

When a government builds social housing, it wants to solve two problems at once: to house people who lack the means to house themselves, and to use up industrial materials so as to stimulate the economy. There is a very good reason for

the latter, as the government is plugged into the largest manufacturers of industrial building materials. It is in the interest of the economy to consume these materials in sponsored projects. Nevertheless, that may not be the best solution for the housing. There are two reasons for this: one having to do with economics, and the other with emotional connection.

An owner-built favela uses cheap, disposable materials such as wood, cardboard, corrugated metal sheets, rocks, plastic, left-over concrete blocks, etc. While there is an obvious deficiency with the impermanence of such materials (which turns catastrophic during storms or flooding), their tremendous advantage is their adaptability. Owner-builders have an enormous freedom of determining the shape and details of their dwellings. They utilize that design freedom to adapt the built structure to human sensibilities. That is not possible when a government builds house modules out of a much more durable material such as reinforced concrete. People must be able to make changes as a matter of principle. Here we have the opposition between permanence/rigidity and impermanence/freedom, which influences the form of buildings.

Social housing should be made of permanent materials, whereas cheap, fragile buildings are a disservice to people. Favelas built out of sticks and cardboard are unacceptable models to follow. Nevertheless, we wish to preserve as much as possible the DESIGN FREEDOM inherent in using more impermanent materials. That is essential to guarantee the design adjustments that will generate a living geometry. In the best self-built houses, every scrap of material is utilized in a very precise manner so as to create living urban fabric — a sophisticated process that compares with the greatest architectural achievements anywhere. The only solution we see to this conflict is for the government to provide appropriate materials (permanent, but also easy to arrange, cut, and shape) that the users can then employ in constructing or modifying their own homes.

We always come back to the competition between permanence and adaptability. Adaptive changes to form are akin to repair and self-healing in an organism, but are often misinterpreted as a degradation of the project. In fact, the geometry is trying to heal itself (through human action) after the imposition of unnatural, alien forms. This is a natural organic evolution, and should not be discouraged simply because it contradicts an architect's "pure" vision of how people SHOULD live. We most emphatically condemn as inhuman the present practice of forbidding any modifications to social housing by their residents. Tied in to our suggestions for ownership, we uphold the fundamental right for an owner/resident to modify his/her dwelling to any extent without impinging on the rights of neighbors or the public space.

While the original intent of legislation forbidding changes to one's dwelling was sound, it never achieved its goal. Its aim was to legally prevent the destruction of buildings that the government had invested money in. This has never worked, however. Buildings that are hated by their residents (because of their hostile geometry and surfaces) have been systematically vandalized and destroyed, and no legislation has been able to prevent this. The ever-escalating use of hard materials

only led to fortress-like housing units, but their residents hate them even more and eventually destroy them. Oppressive surfaces and spaces damage one's sense of wellbeing, thus provoking a hostile reaction. The solution lies in a different direction altogether: make housing units that are loved by their residents, who will then maintain them instead of destroying them.

In his project in Mexicali, Mexico, Alexander introduced an innovative method of creating bricks on site using a hand-operated press and local earth (Alexander *et. al.*, 1985). He emphasized this as a crucial aspect of the project, even though concrete blocks were readily available. One reason was to establish a local supply for all future residents. Concrete blocks are not expensive, but they still set up a financial threshold. Another reason is that they also narrow the design possibilities. Standard concrete blocks lead to standard structural configurations, ruling out some of the adaptive shapes and processes that Alexander wished to introduce.

There are opportunities for the building industry to participate through government directed efforts in these new social housing projects, by providing industrialized elements that can be included with versatility in many cases. One of the authors (EPP) has developed a model for self-construction using cheap and ubiquitously available materials such as rammed earth for the perimeters, together with the introduction of low-cost industrialized sanitary modules that include water storage, toilet, sink and shower along with a filter for gray-water treatment for recycling. The proposed modules may also have structural uses, and include solar cells for electricity and solar panels for water heating and even cooking. These industrialized modules can be massively produced, lowering costs and providing technology, while at the same time allowing the necessary flexibility and freedom of design and evolution of the units.

One of us (AMD) has investigated this concept more recently for a project in Kingston, Jamaica. This "wet appliance" cost-effectively delivers the sanitary and mechanical cores, the most expensive elements of a home, while combining the ability of homeowners to build their own well-adapted dwelling.

We should mention a case where such industrial modules were reduced in complexity so that the building could be initially more adaptive to social needs. Alexander in 1980 worked on building social housing in India, and considered using a prefabricated concrete box containing plumbing for bath, toilet, and kitchen (Alexander, 2005: Book 2, page 320). This solution followed successful earlier projects by Balkrishna V. Doshi. It soon became clear, however, that building a solid plinth (a platform representing a traditional pattern) for each house was actually more important in the building sequence (because it was a priority for the residents) than having the plumbing box. So Alexander decided to spend the limited available money on the terrace, leaving a groove for future plumbing additions. Residents were able to use communal water and toilets until they could build their own facilities. The platform was more vital to the family's life than the plumbing box.

14. Funding Strategy Concentrates on the Small Scale.

Social housing construction cannot be financed entirely by the residents, thus a government or non-governmental entity has to step in and shoulder the costs. In itself, this simple dependence raises issues that affect the shape of the construction. Involving future residents in building their own houses will reduce the initial monetary outlay. The more money invested by an external agency in social housing, however, the more control it will wish to exert over the final product. This natural consequence inevitably leads to the subconscious adoption of a geometry of control, as was outlined in a previous section.

We can offer a few alternatives:

1. Funding sources now determine social housing morphology. Central government, wanting to build in the most efficient manner, reverts to a highly prescriptive approach, and is willing to sacrifice complexity of form. That attitude cannot generate an urban quarter. We need to develop a flexible, performance-based standard for morphology. We also need to identify alternative sources of funding to break the prescriptive monopoly, and thereby to break out of this antipattern.

2. Raise funds from various sources in order to ensure that homes are affordable to neighborhood residents. A private-public partnership is the most effective way of using the market economy to generate an urban quarter, instead of a monolithic monster favored by government bureaucracy.

3. Involvement with non-governmental organizations will keep a suspicious central government from sabotaging the use of pattern languages in building an urban quarter, or in converting an existing dysfunctional project into an urban quarter.

We are sadly aware of numerous projects of social housing that do not serve the poor, but are simply investment opportunities for the builder or landowner to siphon money from the government. If the government subsidizes rents, then the opportunity does exist for speculative building that will recover initial construction investments (with interest) from rents alone. In such cases, the physical condition of the residents is of little importance. Moreover, the maintenance and future condition of the built fabric is not a part of the profit equation, since there is no expectation of recovering investment from the building structures themselves. It is usually expected that the buildings will decay, thus encouraging non-permanent construction from the very beginning. Clearly, subsidized rents can work against humane social housing, contradicting the intention of the original legislation.

Often, feasible, sustainable, and affordable solutions are rejected for reasons of excessive greed. Good affordable housing has the disadvantage that profit margins are always low (unless the market is manipulated to create an artificial scarcity). If the government or the developers fail to see opportunities to get rich in the process, they may decide to withdraw support from a project, even if they have pledged their support initially. You need a profit to encourage participation, but that has to be balanced with the payback from solving a serious societal problem.

Involvement with non-governmental organizations (NGOs) requires that housing authorities build not only public-private partnerships for redevelopment, but also elaborate networks of local partners. All of these benefit from the allocated money. However, one of the weaknesses here is that, while agencies have been good at getting the local social service providers and city agencies to cooperate, they have not been so good at engaging the support of the tenants. Most social service providers are still operating according to the old model of service provision, rather than the newer emerging models of “community based” solutions to a wide variety of problems. The old social service model engages people in networks based on their particular pathologies (and there is a whole service industry that depends on what people lack). The new model engages people based on their gifts and what they bring to the network (and not what they “need”). This new model, based on the idea of asset-based community development, has had wide application in public health, and more generally in community organizing.

We also face a problem with funding sources that wish to minimize the administrative burden by concentrating on the large scale. It is far easier to give out money in one large sum than to track the same amount divided and distributed out to many different borrowers. Reducing the number of transactions takes precedence over other systems based upon supply and demand. Nevertheless, it is crucial to have exactly this micro-funding flexibility for the people to be able to build their own houses. Repair of an existing neighborhood requires a vast number of small interventions. Promising work has been done in developing effective management systems to permit such micro-loans (e.g. the Grameen Bank). Again, this is actually a more sophisticated and more advanced financial model, as it is more highly differentiated.

Earlier in this paper, we mentioned the obstacle posed by ingrained geometrical images of control. Those are also tied to a deep prejudice against the small scale. A government project takes a certain overhead to administer, which is independent of the size of the project. Naturally, bureaucrats wish to minimize the total number of projects, which leads them to approve a few very large projects. For example, faced with building a new urban quarter, they wish to build it as large as possible, and all at the same time, so as to economize on the bureaucratic overhead. That approach contradicts our suggestions of building an urban quarter one small piece at a time, and iterating back and forth between the design steps.

15. Working Within the Existing System.

The planning and building system as it exists today creates and perpetuates a dependence that is difficult — and in most cases, impossible — to break. By raising building standards beyond the point that can be reasonably satisfied by self-builders, it shifts the whole housing industry from being local and small-scale, to being large-scale. Building-code standards have evolved in response to real and serious threats to health and safety. Like many such technological systems, however, their unintended consequences are not trivial, and can be disastrous. This is

happening today in the rebuilding of the American Gulf region after Hurricane Katrina.

The system in place works to benefit both government bureaucrats and larger contractors, who are often tied by mutual support. But what is seen as a benefit to a commercial/government system can spell disaster for another, major segment of society. One of us (AMD) has argued for a reconstruction of the Katrina devastation, using a strategy that allows the same social processes to flourish as before (Duany, 2007). That strategy faces daunting challenges because of the building, financing, and regulatory system now in place.

Many of the houses destroyed in the hurricane, particularly those in lower-income neighborhoods, were self-built and did not meet current code or financing standards. The urban fabric was the product of a relaxed process of self-building over generations, with the advantage that it was not based on debt. This was a society of debt-free homeowners, whose lives could be structured around activities of their choice (Duany, 2007). Those houses were outside the system, because their non-conforming construction made them impossible to mortgage. The system now requires a contract of debt, since the new building standards cannot be met without commercial intervention. In most cases, this means that the government has to step in and build social housing, solving a problem that it itself has created (Duany, 2007). The cycle of unintended consequences goes on.

To quote from Duany (2007): *“The hurdle of drawings, permitting, contractors, inspections — the professionalism of it all — eliminates self-building. Somehow there must be a process whereupon people can build simple, functional houses for themselves, either by themselves or by barter with professionals. There must be free house designs that can be built in small stages and that do not require an architect, complicated permits, or inspections; there must be common-sense technical standards. Without this there will be the pall of debt for everyone. And debt in the Caribbean doesn’t mean just owing money — it is the elimination of the culture that arises from leisure.”*

While this may be “leisure” by today’s middle-class standards, it represents a hard life for a thriving and vibrant cultural fabric that is simply neglected by (even though it is a direct part of) the conventional economy. Inhabitants of the modern middle-class the world over take a debt-driven system for granted: much of their working life is spent just to pay off the house mortgage. In fact, the system works to preclude other options for putting a roof over one’s head. The middle class attains liberation from the financial system only after retirement, when the 30-year mortgage has been finally paid off. Self-built housing erected by cash and barter is an escape from this system, and is viewed by the government and big contractors as a threat to their hegemony. It’s a structural problem, not one of malevolent intent. Debt is key, but is just one variable of an interlocking system.

It is not easy to implement such innovations, because most countries and regions already have a well-established system that produces rigidly inhuman social housing (but which it believes, on the contrary, to be an enlightened and progressive

solution). Many times in our projects, the first thing that we had to do is to begin studying the existing housing delivery systems so that we can override them. Those systems are created by interlocked bureaucracies, specialists, financial institutions, political entities, etc. You can build on the physical tangibles, but not on the systems. There is much that must be bypassed first — and they will resist their own dismissal.

We (the team of urbanists) cannot get directly involved in these strategies, which are the responsibility of the client and supporting organizations. The local entities have to solve procedural problems and forge alliances that will sustain the project, with us acting as a catalyst for change. One small section, or various independent units within the government could be promoting our project, while facing opposition from the rest of the bureaucracy. Most of the time, the problems with innovative social housing solutions are not technical, social, or even financial: they are almost always political.

You can try to force changes in design approach, and some good might come of it, but that only gets you so far. A project tends to become a power struggle, taking time and effort away from building. Alternatively, we can try to cooperate with the system, bringing stakeholders and facilitators together in unexpected ways. But this requires that we recognize working with an existing system as a different kind of problem — not linear, but multi-variable, and “cultural”. It is necessary to be more embedded into the local operating system (a strong existing culture) in order to solve those problems, to have any chance of seeing where the levers are (so we can pull them to affect changes), and to see how decisions are made at various levels.

In most cases, a successful strategy will combine aspects of “working within the system” and reforming the system from the outside. In making an assessment, the first crucial step is to lay out the critical limitations we find in an existing system of production. Then we should work to negotiate a “workaround” that addresses those limitations from the beginning, before attempting to dismantle the existing system entirely. It may indeed be necessary to radically transform the existing system, but that is a separate problem from the design and building of urban fabric, and we don’t want to spend all our energies on fighting the system. On the other hand, if workarounds are not possible, there may be little alternative but to press for systemic reform.

Alexander (2005: Volume 2, page 536) shares his own experience with this struggle. In generating projects over a thirty-year period, he realized that a major shortcoming was that their implementation demanded too much. *“In our early experiments, we often went to almost unbelievable lengths to get some new process to be implemented, and to get it to work. But the amount of effort we had to make to get it to work — the very source of our success — was also the weakness of what we achieved. In too many cases, the magnitude of special effort that had to be made to shore up a new process was massive — too great, to be easily or reasonably copied.”*

Alexander in each case succeeded by replacing an existing system combining procedure, process, attitude, and working rules with an entirely different system.

But the effort required to change the entire system, even in cases where it succeeded, was not easily repeatable. He concludes that here, like in a scientific experiment, it is the REPEATABILITY that is important, not the unique occurrence. If the process is not easily repeatable, then ultimately it is not as useful. Therefore, if a production method has too many components that are totally different from the previously working system, then it is not easily accommodated within the old method. It cannot be copied widely in regions where the old methodology still applies.

A genetic analogy, proposed by Alexander, suggests ways of achieving success in the long term. A process presented as a complete, complex system (like the genetic code for a whole organism), requires that its implementation must be either all or none. In that case, the existing system of implementation must change so as to allow the project to be built. If, on the other hand, our process is presented (and understood) as a collection of semi-independent pieces, each of which can be implemented rather easily, then there is a greater chance that one or more of those pieces will catch on. Small groups of practitioners, moreover, could apply each piece of the process, without requiring the support of the system. It is Alexander's hope that easily copied pieces of the methodology will spread independently, and that eventually this diffusion process will lead to an entire new "operating system" over time.

16. Maintenance Strategy Concentrates on the User.

Unless provisions are made at the beginning for the continued maintenance of the built environment, it will turn dysfunctional. Favelas and social housing projects can have very serious problems, but some are clearly less successful in a social sense than others, and their physical deterioration is seen to increase with time. This idea is in keeping with the organic conception of the urban fabric. All living entities require continual upkeep and repair: it is part of being alive. Here we may distinguish the two main components of life itself as separated into genetic and metabolic mechanisms. Genetic processes build the organism in the first place, whereas metabolic processes keep it running and also repair it continuously.

The same processes, or their close analogues, apply to the urban fabric as an organic entity. Once built, it has to incorporate within itself the mechanisms for its maintenance. Maintenance does not come from a top-down process. We are disappointed at the widespread neglect of the forces responsible for the temporal evolution of urban fabric, and what is required to maintain it in healthy order. Many people somehow have an unrealistic, static conception of urban form. The organic model leads to several recommendations:

1. Encourage and support tenants to maintain their dwellings, by ensuring an emotional connection from the very beginning. The traditional subsidized rental solution has been disastrous. It is unlikely for a tenant to value a faceless material structure owned by someone else. It is possible, however, to establish a sense of collective ownership and responsibility. In a rental situation, it is all the more

important to create conditions for effective and meaningful collective control and self-management. Literal ownership isn't always necessary. A stakeholder, in the usual sense, can also be somebody with a sense of ownership in the process.

2. Make it possible to own an affordable home, even if it is the most primitive type of dwelling. Encourage government financial underwriting, seen as a sound future investment that prevents social housing from being destroyed by its tenants.

3. Establish a strict legislated code of responsibility for the residents. The key to the success of such a code is that the residents must have a sense of ownership of the code. It is crucial that they participate in its formulation, and be part of its enforcement. Owners can be held accountable for maintaining their environment, whereas this is more difficult to achieve with renters. Since supply can never meet demand, owners can be made to care for their dwellings.

4. An observed rule of urbanism is that the level of provided services is proportional to the level of regulations and restrictions. Favelas get no services, and also have no regulations. At the other extreme, high-income gated communities get many services, but are also highly regulated.

The ability of tenants to maintain their dwellings cannot be achieved by requiring them to put in work time organized by a central authority (with the ability to evict them for noncompliance). "Maintenance" has to be connected to "governance." In the redevelopment of Columbia Point, Boston, the development company signed an agreement that split the management responsibilities with the residents — 50/50 control. The traditional problem with public housing has been that people would maintain the inside of their dwellings, but there was no collective capacity to take responsibility for the outside. The "defensible space" solution was to privatize or do away with public areas as much as possible — a step expressed in the project's geometry. That, however, led to increasing isolation and a fundamental change towards an introverted society.

The better solution is simply a pattern of well-defined distinctions between public and private realms, PLUS a collective capacity to take responsibility for the public space. Some of that capacity has to do with design that facilitates "eyes on the street" (front porches, windows, etc.) but the eyes on the street only matter if they are backed up by conditions of trust, reciprocity, and collective efficacy. People often forget that Jane Jacobs' neighborhood worked not only because people could watch the street, but also because people had a sense of obligation as members of a certain kind of community (Jacobs, 1961). She described a characteristic of social environments that is now talked about in terms of "social capital". This is how one creates an effective "code of responsibility". If you try to impose it (as the housing authorities often do), then you get widespread noncompliance in the face of which no enforcement mechanism (no matter how intrusive) will work.

Ownership of homes does seem to be a good thing to encourage, from all the evidence. However, it is not true that renters can't be held accountable for maintaining their environment. Owners can be held accountable in so far as they have equity in their house, which means that they are motivated by concern for the

exchange value embodied in their property. Renters can also have a stake in a place, but only if the social relationships involved are not reduced to the cold cash nexus — that is, a certain amount of square footage for a certain monthly fee. It is possible (and often happens) that renters can build up their “investment” in the use value of a place, depending on the extent to which they benefit from the specific networks of social relations that define the neighborhood. (Notice that Jane Jacobs’ neighborhood wasn’t a neighborhood of owners.)

It is also important to include a mix of rental and home ownership opportunities. Not everybody wants to encumber themselves with the responsibilities of home ownership, and not everybody can afford to maintain a house. One of the things accomplished in “social housing” should be that the everyday costs of housing are socialized, and not just the purchase price. Think about the way the co-housing movement has done the same thing. Some of the ideas from the co-housing movement might be incorporated in helping to insure maintenance.

(For those unfamiliar with this term, co-housing refers to a cluster of houses around shared common land, which usually includes a shared building for meetings and common meals — see Pattern 37: HOUSE CLUSTER in Alexander *et. al.* (1977). In our experience, the pattern works best when middle-class residents are strongly linked by common religious belief, as in Israeli Kibbutzim or some Christian sects. On the other hand, having poverty in common is not by itself a sufficient unifying factor!)

SECTIONS 17-21: SOME OF THE PROBLEMS FACING US.

17. Retrofitting and Sanitizing the Favela: Problems and Solutions.

Although this paper analyzes the process of constructing NEW social settlements, our approach could be adjusted to retrofit the favela. In ecological terms, we embrace and learn from our competition (the “species” in the lowest ecological stratum of urbanism) instead of trying to exterminate it. Governments wish that favelas would simply disappear (refusing even to draw them on city maps), and their residents spontaneously move to the countryside, but powerful global economic forces ensure that this is not going to happen. We, as urbanists concerned with housing the poor, must accept favelas as a social and urban phenomenon, and try to make the best of an existing situation.

It is not always possible or even desirable to accept an existing favela and make it into a better place to live. First, it is often the case that squatter settlements have grown on polluted or toxic ground, on unstable soil, on steep slopes, or in a flood area. Periodically, their inhabitants are killed by natural disasters, and there is little that can be done to retrofit a settlement on dangerous ground in order to make it safer. Second, squatter settlements invade natural preserves that are necessary for regenerating oxygen needed for the entire city. These are the “lungs” of an urban population, and they must be preserved from encroachment and destruction. Third,

squatter settlements produce pollution and human waste that damages the rest of the city. This problem cannot be ignored. Even if the government does not wish to legitimize a particular favela, helping it to treat its waste benefits the whole city.

Let us assume for the moment that social problems (which are particularly rampant in a favela) can be tackled independently of problems arising from urban and architectural form. One can easily go into an existing settlement and try to repair it, with the help of its current residents. John F. C. Turner (1976) did exactly that, setting a precedent for several successful interventions in Latin America, especially in Colombia. The only obstacle — and it is a profound one — is the philosophical conviction that the favela's geometry is out of place in a modern society. Under that mind set, any "repair" turns into annihilation and replacement. We need to truly understand the process of repair and self-healing of urban fabric, uninfluenced by current preconceptions.

Disagreeing with conventional planning beliefs, we accept the geometry of the favela, and point out its main deficiencies: a lack of services, sanitation, and natural features. In most cases the urban fabric is perfectly adapted to the topography and natural features of the landscape (simply because the owner-builders didn't have access to bulldozers and dynamite). What is usually lacking, however, is space for trees and green. The sad truth is that most trees are cut down and used as building materials. Vegetation competes with people for space. The poverty of the favela often includes poverty in plant life: it is a luxury here because of the extreme living conditions. Even so, many residents will try to maintain a little garden if that's at all possible.

Our method is highly flexible, and its principles remain valid even if the situation changes. A series of steps, taken a few at a time (and therefore very economical) can repair the favela's complex urban fabric. More than anything, we advocate a process of REINFORCEMENT, adopting much of the evolved geometry where it appears to work, and intervening to replace pathological structures. Plumbing and sanitary facilities are essential. Sidewalks are most important, and are sorely needed in a favela, which is primarily a pedestrian realm. Having real sidewalks raises the favela to a more permanent, "higher-class" urban typology. The existing building fronts determine exactly where the sidewalks should be built. Streets in a favela are usually of poor quality, if they are even paved, so electricity, sewerage, and water networks could be introduced under the streets. After many buildings are reinforced, one might finally pave the street.

Taking some straightforward sanitary measures can minimize filth and disease. One does not have to bulldoze a favela to get a healthier neighborhood. Doing that will certainly not raise the income level of its residents, nor improve their social condition. Putting the same people into concrete bunker apartments may look good in a photo, but actually cuts their societal connections, ultimately making their situation worse. We know that when poor people are forcibly moved from a human-scaled neighborhood into high-rise blocks, their social cohesion worsens catastrophically. On the other hand, many social problems are simply not solvable by urban morphology alone.

A favela is usually built of flimsy, impermanent materials. The government can help its residents to gradually rebuild their houses using more permanent materials. We don't imply here replacing the typology of their house, but replacing say, the unstable roof or the walls (taking this opportunity to insert plumbing and electricity). A house made of cardboard and corrugated tin can be reconstructed in a very similar form using bricks, concrete blocks, and more solid panels provided cheaply by the government. Sometimes, the residents are only waiting until they get a legal deed to the land they live on; then they rebuild their homes using more permanent materials and financed by their accumulated savings. Otherwise, they are reluctant to invest anything more than the barest minimum in the structure.

Some readers will object to our accepting the overcrowding that is usual in a slum, and may even be outraged that we suggest maintaining this high density. Here we need to study high-density upper-income settlements in the same society, to decide how much density can be easily tolerated. It's not the high density by itself that is objectionable; it is the difficult living conditions that result from such density. It turns out that portions of high-density urban fabric can be maintained when it is made more sanitary. Unfortunately, such suggestions have been planning anathema up until now.

In some places, accepting the favela and legalizing its plots has come under sharp criticism from social activists who see this as a facile solution for a government to take. The accusation is that by simply legitimizing an unhealthy slum, the government abnegates its responsibility of building more permanent social housing. In our opinion, the magnitude of the social housing problem is so vast as to be near insoluble. The simple economics put a comprehensive solution out of reach. Our approach proceeds with one step at a time, retrofitting those portions of favelas that can be made healthy, while at the same time building new housing following an organic paradigm. If these steps succeed, then they can be repeated indefinitely, progressing towards a long-term amelioration.

Banks, governments, and building companies are captivated by economies of scale, and are less sensitive to economies of place and of differentiation needed to repair a neighborhood. Wielding a blunt and relatively primitive economic instrument, they would prefer to wipe out the neighborhood and build it all over again. It is much less trouble, and less costly in crude monetary terms, to do this. But of course, the unsustainability of this lopsided economic model (and its terrible cost to society) is becoming painfully evident.

Governments are reluctant to bother with small-scale urban interventions, but instead sponsor only large-scale ones since it saves them accounting costs (Salingaros, 2005: Chapter 3). And yet, living urban fabric has to be maintained by an enormous number of small-scale interventions, which is an essential part of the process of organic repair. Institutions such as banks (with an exception noted earlier, micro-financing by the Grameen Bank) are generally unwilling to bother with small loans meant for small-scale building in poor neighborhoods. All banks, however, operate also on a small scale administering small accounts and loans. They possess the technical ability to service small loans, doing it routinely with credit

cards, car loans, and personal lines of credit. Technology has evolved in the direction of differentiation and customization, aided in part by revolutions in software technology. Those innovations have yet to be applied in the realm of social housing, which still tends to follow the inflexible old institutional formats.

On a more positive note, many groups have discovered small-scale solutions of tremendous value. For example, in recent years concepts such as micro-financing, micro energy generation, mother centers, technology centers, urban farming, composting toilets, and other ideas have been successfully implemented. These small-scale processes can eventually make a hugely positive difference to both favelas and social housing. They are all in keeping with our insistence on the small scale as a mechanism for self-help in such communities, and also in establishing a sense of community in a dysfunctional population (Habitatjam, 2006). These small-scale solutions, representing resource independence, offer a healthy alternative to the forces trying to impose central control.

18. Uncomfortable Realities: Soaring Land Prices, Grand Schemes, and National Destabilization.

We would like to foresee some of the problems that could arise in an imperfect system (such as the real estate environment), in order to handle the hard realities of the market. The decision on whether to destroy, help to reinforce, or just ignore a favela is up to the government. We are faced with uncomfortable decisions, which affect the lives of many people already in a desperate situation. There is no simple solution, and no universal method can be applied in all cases. The best we can suggest is a cautious approach, without ideological prejudice, that will benefit the entire population as a whole. So often, anonymous but meaningful settlements have been destroyed in the name of “rational” design, which is nothing more than a tool to preserve the *status quo*.

Squatters require proximity to the city, which is why they move there in the first place. Proximity is essential for them, more so than for the more mobile middle class. Presenting poor people with well-built residences far away from town is not an automatic gift. Transferring the poor to government-built social housing outside the city may plunge them even deeper into destitution, as they then have to spend a greater portion of their earnings for transportation. Our own recommendation of establishing ownership contributes to undo the envisioned solutions, since well-built housing is often re-sold to middle-class residents, while the poor return to squatter settlements (either to their original one, or they build a new one). They prefer to use the profit from selling their new government-sponsored dwelling. In the rental economy, a system of sub-renting substitutes middle-class residents for the very poor.

As soon as a piece of real estate is legally registered, the transferable land title becomes a tradable commodity, and enters the free market (which could be an illegal submarket). Even if a plot is located in the middle of a slum, or in a not-so-desirable social housing project, its price could soar. Opportunities for gain can

drive the consolidation of these land parcels into a few hands, not those of the original residents. This has in fact happened in many countries around the world, leading to a corrupt after-market in slum real estate. Ironically, adding infrastructure to a favela raises its value, which can drive its original settlers out. In anticipation of such a process, speculation can run wild on unbuilt land.

A pervasive system linking corrupt officials with criminal organizations finds ways of profiteering from both slums and social housing. Despite the apparently insoluble socio-legal nature of this problem, we believe that our method actually helps in the long term. Firstly, establishing a tighter ownership of the urban fabric (in both social and emotional terms) reduces the opportunities for exploitation by trading it away. Secondly, much of the exploitation centers on offering services that the government refuses to provide to slum dwellers — it is simply supplying to demand, although at exorbitant prices.

A very different concern comes with our recommendation for engaging Non-Governmental Organizations. While they may be a better choice than an inflexible government bureaucracy, we face a potential problem with grave consequences. The largest NGOs often promote technological “development” in the form of very large projects such as electrification, infrastructure, and building. They see the picture in large-scale terms, and would like to see major construction contracts awarded to foreign companies that have the necessary proven experience in undertaking complex projects of this type. The problem is that many countries cannot afford large-scale interventions.

Despite this reality, a government often gets seduced into entering such a contract, which it ultimately cannot repay. A developing country is counting upon its natural resources to pay the bill for rapid modernization. Nevertheless, economic fluctuations and unexpected events are usually enough to trip the fragile stability of such a deal. The result is that the country gets plunged into debt. By becoming a debtor nation, the nation can only be stabilized by help from the International Monetary Fund and the World Bank. Economic restructuring via Structural Adjustment Programs (SAPs) imposes harsh economic conditions that worsen the lives of the poorer sectors of society. Not only does the country lose part of its sovereignty, but also from that point on, it is in no position to help its poor in any way.

The lesson to be learned from this — a lesson that many nations have unfortunately failed to learn — is the need to work on the small scale. A vast and costly new project is feasible for the wealthy nations, but very risky for the developing nations. (Large-scale projects are most always based on unsustainable processes that waste vast amounts of energy and resources). Social housing should grow from the bottom up, applying local solutions to small-scale projects. If those solutions work, they can be repeated indefinitely. There are many independent NGOs who can help, and foreign experts who offer knowledge and expertise for free. It is better to rely as much as possible on local financial capital, know-how, and resources. A long-term solution, based on the adaptive evolution of housing patterns and construction, is more sustainable than a technological quick fix.

19. Architects Contribute to Make Existing Projects Alienating.

A number of projects built in Latin America have solved the myriad problems of how to deal with government bureaucracy, having come to terms with practical factors and with the existing political structure. Groups have involved private construction companies with non-governmental organizations and local government to construct and finance social housing. Nevertheless, there is still a distance between techniques for implementation, and how the final product actually feels. As noted before, the scientific evidence suggests this is not a matter of “mere personal taste”, but rather there are broad areas of consensus in human assessments, rooted in universal processes of perception and human biology. These areas of consensus can be established through “consensus methodologies”, of the sort that we use routinely in our collaborative design processes.

On this point we are less enthusiastic about what has been achieved so far in Latin America. Despite all the best intentions and an enormous amount of work invested, we see many projects having a qualitative character that is, in a widely shared assessment, impersonal and industrial. Of course, they don't all have the “deadly” feeling of totalitarian high-rise housing blocks, but the ambience of the built environment ranges from dreary to neutral. In our judgment, the form and layout fail to connect emotionally to the users. It's interesting to search for the reasons why these solutions were not carried through all the adaptive design steps.

Our explanation is as follows: those projects are directed by architects, who still carry their intellectual baggage of industrial design typologies and relativity of personal tastes, even as they try to help people in a personal way. The architect's language is influenced by his/her design ideology and is not universal. Very few architects have escaped from the modernist aesthetic that formed a pivotal part of their training (a tradition in architecture schools now going on for several decades). It is extremely difficult to rid oneself of those ingrained architectural images — to break out of the fundamentalist typologies of cubes, horizontal windows, modular blocks, etc., and the logic of abstracted functionalism that often serves as the ideological justification for self-aggrandizing aesthetic posturing (Alexander, 2005; Salingeros, 2006). Especially in Latin America, modernist architectural typologies are adopted as part of the national architectural style, popularly though erroneously linked to progressive political beliefs.

Making some of our criticisms explicit helps readers know what we are talking about. We find modest human-scaled buildings (which is good), but they are arranged on a strict rectangular grid that has no other purpose than to express the “clarity of the conception”. The plan looks perfectly regular from the air (being planned for such unperceivable symmetry), and expresses modularity instead of variation. The mathematically precise arrangement is arbitrary as far as human circulation and perception of space are concerned, hence it does not contribute to urban coherence. On the scale of individual buildings, we see the usual obsessively flat walls without surface articulation; strict rectangularity; flat roofs; doors and

windows without frames; slit windows; houses raised on pilotis; useless building setbacks; no curves in places where they would reinforce the tectonic structure but curved walls put in for aesthetic effect; fractured or oversized urban space; etc.

These are the identifying characteristics of the 1920s' modernist typology. An underlying assumption behind imposing this formal vocabulary on people's homes is that an ordinary person without training is incapable of shaping form and space, and only an architect (acting as the "expert") is capable of doing so. It all goes back to the arrogance openly expressed by modernist architects, who showed their contempt for organic urban fabric. Contrary to the habits of much of modernist design and planning, physical and psychological needs have to be understood not in terms of abstracted quantities, but in terms of a capacity for local, adaptive responses to needs and desires. Living individuals experience them as part of particular living communities. The alternative process proposed here can be applied generally to arrive at non-standardized and living design solutions — living because they are connected, locally rooted, and inhabited with the spirit as well as the body.

It is very easy to recognize the difference between organic and industrial morphologies, based on their perceived complexity. Here are three criteria that anyone can use: (a) Is the geometry on all scales, from the size of the entire project down to the size of 2 mm details, complex (unique, varied), or simplistic (empty, repetitive)? (b) Are there generally regular transitions from larger to smaller scales, with no abrupt gaps? Or, if there are abrupt transitions, are they terminated with even more complex geometries at the next scale? (c) If the geometry is visually complex, does the form grow out of and adapt to human physical and psychological needs, or is it an arbitrary imposed "high design" complexity? These three criteria distinguish living urban fabric from dead industrial forms (the third criterion is more difficult to apply without some experience).

Paradoxically, the segment of society (i.e., progressive intellectuals and activists promoting social causes) most interested in helping poor people is also that which, for political and ideological reasons, naively assumes that the solutions must conform to the technological "image of modernity". They cannot think outside the seductive images of the 20th century military/industrial paradigm. They sincerely believe the promises of liberation made by modernist ideologues, but fail to see that such forms and geometries are basically inhuman. By contrast, those privileged individuals who can afford to create a warm, responsive living environment (and know how to implement it) do so mainly for themselves, remaining in general unconcerned with the plight of the poor.

20. People's Unreal Image of a Desirable Home.

There is another point that we have yet to discuss, and which can sabotage the best intentions of humane social housing. That is the image a potential resident has of "the most wonderful home in the world". People carry within themselves images of desirability, often the opposite of what they truly require. Advertising works by convincing people to consume what they don't need; to spend their money on

frivolous or noxious things instead of healthy food, medicine, and education. In the same way, our culture propagates artificial images of “beautiful” houses in the minds of the urban poor and even the most isolated rural farmers. When an individual migrates to a town, he/she will work to achieve the housing that corresponds to the image in his/her dreams. It is certainly the case that this image will clash with adaptive housing typologies.

As architects and urbanists, we are constantly competing in a universe of images and ideas that are validated by iconic properties rather than any contribution to adaptive living environments (Alexander, 2005; Salingaros, 2006). Human perception of built space is governed by unstated values and subtleties. It is a frustrating battle, because people are distracted from consideration of what is good or healthy. Wonderfully adaptive vernacular architecture is identified with a heritage from which poor people are trying to escape. They are fleeing their past with its misery. People originally from the countryside shun traditional rural building typologies: they are abandoning symbols of the countryside with all its restrictions and fleeing to the “liberating” city. A new house in that style would trigger a deep disappointment. Providing humane housing therefore conflicts with maintaining the “image of modernity”.

A peasant who moves from the countryside into a favela, or someone born there will not wish to see it repaired: he/she desperately wants to move out as soon as possible to a middle-class apartment. The favela doesn’t represent the widely accepted “image of modernity”, but instead carries a social stigma. Escaping poverty, in the mind of the favela’s resident, means escaping from the favela’s geometry. That idea is reinforced by the drastic transformation in geometry that one sees in houses for the middle class. Middle class residences tend to be either dreary modernist apartment complexes, or isolated pseudo-traditional houses with a lawn and fence. Those insipid images of modernity dominate the thinking of poor people, who ingest them from television programs and other marketing outlets.

A new project of social housing that is successful in our terms will inevitably resemble traditional local urban and architectural typologies, simply because those have evolved to be the most adaptive to human needs. That resemblance, however, condemns its image as not progressive. Many residents expect to see their new houses built in the “image of modernity”, as defined by the homes of the rich and famous the world over. Houses and offices in a high-tech modernist style are constantly shown on films and television together with their rich residents. The poor aspire to this dream. On the other hand, wealthy aristocrats living and working in colonial mansions are no longer embraced as models to emulate, because of their association with the pre-modernist past and a conservative political order. That is a pity, because 19th Century building typologies often contain much of a country’s architectural heritage, and offer adaptive solutions that have nothing to do with any social or political class. (People forget that the technocratic style now represents global economic dominance by a powerful elite).

As noted previously, we believe the problem is inescapably cultural in nature. It seems to us that the crux of the issue is valuation — how the community values its

options, and then makes decisions accordingly. Or, more properly, it is a question of whether a truly intelligent (i.e. self-correcting and learning) system of collective decision making is in place. So our task is not just to offer choices, but also to offer a framework (or choice of frameworks) in which to make those choices over time.

If residents choose “wealth” as defined in reduced simple terms by monetary markets, then they will logically conclude that the optimal course is to scrape the site flat and put up a single high-rise building with a Big-Box-Mart next door. If they have a longer-term definition of “value” — which includes more subtle but no less vital notions of “quality of life” — then they have a basis for assessing and modifying their built environment in a way that is more complex, more inter-related, and more “organic”. This of course is what a traditional culture is and does, by definition.

That simple notion of “wealth” in reduced monetary market terms cannot distinguish between the subtle processes of life. For this reason, it cannot combine the “top-down” resources like bringing “wet appliances” (concrete boxes containing a bathroom and a kitchen counter with sink), or trucks full of building materials appearing at the edge of the site, with “bottom-up” resources like people working on their own houses, small-scale local economies, or following adaptable generative codes.

Combining top-down and bottom-up methods is the crux of the problem, which will require a complex integrative approach, rather than a linear application of resources and single-variable solutions. It is a complex, multi-variable problem of self-organization and of organized complexity, and requires a different set of tools from those people are used to working with.

How then do we take seriously people’s aspirations, without necessarily enabling what may be a manipulated desire of theirs, one that encourages the trading away of irreplaceable long-term value for perishable short-term gain? As we have seen, in a modern economic context, traditional cultures are unfortunately very vulnerable to this kind of bad-deal tradeoff. As professional advisers we have a duty to take their aspirations seriously, but also to take seriously their long-term needs, even if they are not really considering them. We should not act in their place — that would be arrogant — but instead have a kind of conversation with them, where we as professionals point out the options before them in a more complete and more connected kind of way.

What is obvious to us isn’t necessarily considered positively by the broader population. Such a thing would make sense, and avoids the dangers, if it came out of a collaborative process that was very much in the hands of the locals. It needs to be their vernacular tradition. Otherwise, there is a real danger of such an effort coming across as presumptuous and condescending. There is a very delicate balance in there between respect for the local culture that is very much a culture of poverty — the everyday urbanism, in a sense — and a recognition of the aspirations even within that culture (and in the individuals) for something they imagine to be better.

Often people need to learn to appreciate what they already have (i.e., the capacities, the wealth, and beauty of their particular cultural adaptations to

circumstances). This is all the more urgent since we have a global culture that is mostly dedicated to giving people a hunger for goods they don't have. For example, we are well aware of the tendencies for low-income communities to be big backers of Big-Box-Marts. If we try to expose all the serious problems created by Big-Box-Marts as a result of the building form and the business model, people may well accuse us of racism: "*So why don't you want us to have what the rest of you already have?*". It's a very delicate thing when one is working with people in poverty — how does one both give respect where respect is due, and yet recognize where things could be better without being insulting? It requires a process that will engage the creative energy and the self-reliance of the local culture.

21. Is a Changed World Ready to Accept Humane Social Housing?

Projects all over the world were built following the organic paradigm, using owner participation. We observe a cyclic phenomenon: both governments and non-governmental organizations support parts of what we (and others before us) propose, then it falls out of favor and is replaced with inhuman modernist typologies, then it sometimes makes a comeback as elected officials and agency directors change. This temporal fluctuation reflects the model of species competition, where one competing species displaces another (but does not drive it to extinction). When conditions change, that species makes a modest comeback.

The organic urban paradigm has always been only marginally accepted by the powers-that-be, even though it represents the vast majority of currently built urban fabric. In the ecological analogy, unplanned owner-built housing is actually the dominant species, whereas in the minds of most people (in blatant contradiction of fact), it is assumed to be the minority species. The world's urban population explosion has occurred in the poorest strata of society, one minor part housed by top-down mechanisms of social housing, while the other major part had to emerge as favelas (irregular settlements). It is this imbalance — between overwhelming forces generating the world's irregular urban morphology, and ineffective attempts to impose order — that we wish to correct with this paper. We depend upon three hopeful strategies: (a) Readers will see that some of the old prejudices against owner-built housing are outdated, and are economically and socially wasteful. (b) People will recognize the roots of this conflict as ideological, and not as exclusively legal. (c) We finally have very powerful tools for efficient design and repair, which were not available in the past.

The New Urbanism movement (spearheaded by one of the authors (AMD)) has helped to awaken the world to the value of traditional urbanism, and to the need of preserving existing portions of living urban fabric. Our approach tries to channel the natural human need for a nourishing and sustainable living environment, which has been the case during several millennia of human existence. Several extremely successful New Urbanist developments have been built in a traditional character, showing that it can be done today. Planning is no longer biased towards the modernist vision. There exists a new awareness, at least in the most economically

developed countries. Whereas in the 1960s healthy middle-class neighborhoods were destroyed with impunity (an act euphemistically labeled “urban renewal” (Jacobs, 1961)), such urban aggression is less likely to succeed today. Still, that does not prevent die-hard modernists from trying to publicly discredit the New Urbanism by labeling it as fit only for the very rich. The present paper is one of many proofs (if any were needed) that the same techniques apply to house the poor of the world.

People have always had an INSTINCTIVE knowledge of how to build, but all that was casually dismissed by modernist typologies falsely claiming an exclusively rational “scientific” validity. With the recent entry of trained scientists into architecture and urbanism, that misunderstanding has finally been dispelled, and we can separate genuine method from image-driven dogma. Our courageous predecessors who built living urban fabric were all stymied by an architectural establishment convinced of the absolute correctness of the early 20th Century industrial design paradigm. Again and again, projects and ideas were marginalized, and had to be re-invented elsewhere and at another time. We believe that our age is finally ready to accept living urban fabric as part of life itself, and that this idea can assume its proper central place in our consciousness.

22. Conclusion.

Twentieth-century practices in constructing social housing may have been well intentioned, but are ultimately misguided. They do not help to connect the residents to their environment. So much urban fabric all over the world could have been made healthy and sustaining for the same cost, but instead exerts a deadening effect on its residents, and ultimately becomes unsustainable. Unfortunately, government planners were determined to impose an ill-conceived social experiment as part of a utopian program of industrialization. We outline here, on the other hand, practical and sensitive solutions that can be applied immediately to any context, with only minor modifications to fit the local conditions.

The authors make these recommendations based upon considerable experience in practical projects. We will be the first to urge making compromises and needed adaptations in implementing our methodology to any particular project, in the spirit of incremental adaptation. It is far better to compromise and get something built, rather than to insist on following every component of our suggested process but have the project rejected. In this way, we can effect a steady transition to a more robust, more life-supporting, and more sustainable kind of housing for the future.

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APPENDIX: Generative Code for Social Housing on a Greenfield or Open Brownfield.

The body of this paper really outlines a method of methods, which can be used to format an infinite number of different approaches. All the approaches arising from our recommendations share a common adaptivity to human sensibilities. In this essential quality, however, they differ markedly from other methods currently in use. Evidently, a planner has to make up a new method that best suits local conditions and exigencies. For readers who wish to implement our method with the least delay, we outline here a procedure that can produce housing on vacant land. A slightly different approach is needed to work on a site that has existing buildings, and yet another to reconfigure an existing settlement. Please remember that this represents only ONE of an infinite number of related methods satisfying our criteria, and should not be adopted as a universal set of rules.

We assume that a team of planners will work with some or all of potential future residents in all steps of the layout. This is crucial to get a “reading” of the necessary human factors that must be addressed. Actual building is divided into two components: those that are the funding agency’s responsibility, and those that are to be done by the owner/resident. A rough division of labor is for the government to undertake all construction on public space, whereas the owner/resident builds his/her own house; but these responsibilities can overlap either way according to the specific situation. Even if the owners/residents are going to do all the building work on their house, the planning team is prepared to support them and guide them through the process. References below are to individual patterns in *A Pattern Language* (Alexander *et. al.*, 1977).

It is extremely important to make an initial statement that we have here a different type of approach to social housing, and planning in general. The novelty of this approach is evident in three of our procedures. First, we begin with laying out the ground and street network with active user participation, not as a pre-conceived plan drawn somewhere else. The second unusual element is to allow (in fact, actively encourage) the users to ornament the sidewalk in front of their house, before the house is even built. The third unusual element is to build the urban space before any of the houses have been completed. The urban space is going to define the character of the settlement as a whole — its spatial quality and identity on the large scale — more than any other built object. It is going to play a major role in whether the residents feel they own the place emotionally.

We recommend the following steps, where we have emphasized the unusual aspects of our method, while leaving more obvious construction details up to the local team:

1. Walk the land to diagnose its condition, strengths, weaknesses, exceptional opportunities, areas needing repair, etc. Identify any candidates for a sacred space: e.g., high ground, prominent rocks, large trees, etc. These are going to be protected and later incorporated into urban space.

2. In many cases, the settlement will have an existing boundary that determines street connections. Where this is not so (i.e. in the countryside) the neighborhood's outline must be fixed, as it will have an impact on the overall street pattern (Pattern 15: NEIGHBORHOOD BOUNDARY of Alexander *et. al.* (1977)).

3. Walk the land to determine the main street and the main cross street from the natural pedestrian flow according to the topography and features. These are going to represent the Roman *Cardo* and *Decumanus*, but will be neither necessarily straight, nor orthogonal to each other. Mark them with poles in the ground carrying red flags. Allow room for street plus sidewalks on both sides.

4. Walk the land once more to visualize where the urban spaces ought to lie (decided by the spots that feel the best to stand in; somehow focusing all the region's positive signals). These are going to be bulges in the main streets near the center, and ought to contain any sacred spaces, if possible. Apply the principle of tangential flow around an urban space (i.e., the street goes alongside an urban space, not through its middle). Urban spaces can be as long as necessary, but not much wider than 20 m (Pattern 61: SMALL PUBLIC SQUARES). Mark the boundaries of the urban spaces with red flags.

5. Decide on the footprint of houses to partially surround and reinforce the urban spaces. Front walls, with no setback, are going to define the urban space boundaries.

6. Now some major layout decisions must be taken. One possible typology is to use building blocks of two houses deep, not necessarily straight, each with dimension roughly 40-60 m wide and 110-150 m long. Building blocks begin at the edge of the urban space and main streets. The direction of each building block is determined by the flow of the land. Their boundaries will define the secondary roads, which are marked with red flags. Secondary streets form T-junctions (Pattern 50: T JUNCTIONS) at the intersections, and do not cross a main street. Secondary streets are narrower than the main streets.

7. At the same time, questions of water drainage are settled, because street direction has to accommodate water flow. Decide where runoff water will drain to outside the settlement so as to avoid flooding. Note if any street has to be graded.

8. Shaping the land begins only now, with the government grading the building ground so that it slopes towards the street on each side for drainage. The streets must be graded where necessary to facilitate wastewater flow as decided beforehand.

9. Participating future residents can lay out their house dimensions, using blue flags. Houses have to come up to the sidewalk, and occupy the full frontage. Other than this, there is complete freedom in the house plan. If a courtyard is included, define it by using the house volume to partially surround it (Pattern 115:

COURTYARDS WHICH LIVE). Individual variation is essential to guarantee southern exposure; otherwise the courtyard will not be used after it's built (Pattern 105: SOUTH FACING OUTDOORS). First, define the buildings around the main urban spaces and at the main entrances.

10. Once a sufficient number of house outlines have been marked, complete the lot boundaries by using yellow flags. Each plot should be not less than 20 m deep and 6 m wide. Plots are separated by an alley at the back and by a footpath on each side. Plots are recorded and deeds awarded. The remarkable thing is that this is the first time the settlement is drawn on paper (up until now, we have been working only with flags in the ground).

11. The government puts in any infrastructure it is going to provide: electrical utility poles in the alleys, either a water system or a regular distribution of public water spigots, sewerage pipes or a few common gender-separated latrines, etc.

12. The first act of actual building is putting down a concrete sidewalk along the position of all marked house fronts. The government does this along all deeded plots, but not in parts of the settlement that have not yet been planned. It is convenient to complete one housing block at a time. The sidewalk itself should be very wide, and raised from the street (1.5 m wide sidewalks are useless for forming a neighborhood; see Pattern 55: RAISED WALK).

13. The residents prepare designs using colored bits of scrap material not thicker than 1 cm (pebbles, tile fragments, etc.), and push them into the wet concrete as soon as the sidewalk is poured and smoothed. Anything can be used as long as it doesn't compromise the structural integrity of the concrete. Expansion joints are incorporated as part of the design. This act personalizes one's own bit of sidewalk, and establishes the priority of human expression over industrial forms.

14. House building can begin, carried out by the residents themselves, with the front façade going up first at the edge of the sidewalk. In this way, the urban spaces, rather than the houses themselves, are the first spatial elements to be physically constructed (Pattern 106: POSITIVE OUTDOOR SPACE).

15. The entrance (or entrances) to the settlement should be clearly defined by more prominent buildings so they are obvious points of transition (Pattern 53: MAIN GATEWAYS).

16. The government can solidify the urban space by building a large kiosk there — a roofed open room (Pattern 69: PUBLIC OUTDOOR ROOM). Make sure it has steps that are comfortable to sit on (Pattern 125: STAIR SEATS). This element can catalyze the use of the urban space, and enhances sacred elements such as a large tree.

17. Owners complete their individual houses, at their own pace. They have complete freedom in the floor plan within their original markings. If it is appropriate to the culture, build a low sitting wall or ledge integral with the front wall next to the entrance (Pattern 160: BUILDING EDGE and Pattern 242: FRONT DOOR BENCH). This, in turn, might influence the roof overhang.

18. The description of the building sequence depends on local materials availability, delivery systems, and the most economical alternatives. Decisions such as whether to pour a floor slab at the same time as the concrete sidewalk; if there is plumbing available that needs to go under the slab; whether to fill upright hollow drain pipes with concrete to make a house's corner columns; what material to use for the load-bearing walls; whether to drop in a prefabricated toilet module; the shape of the roof and how it is to be built, are all best taken by the local consultants.

19. The consultants can advise the owner/builders on how to form the house entrance and windows. A main entrance should have drastically thickened edges to represent the transition from outside to inside (Pattern 225: FRAMES AS THICKENED EDGES). Encourage people to build a transition space, however modest (Pattern 112: ENTRANCE TRANSITION). This emphasizes entry as a process, the opposite of a front door designed as an image of a minimal discontinuity in the flat wall.

20. The same principle also applies to windows: help the owner/builders to create windows with deep reveals and a very thick frame (Pattern 223: DEEP REVEALS).

21. Perhaps the single most important rule to creating rooms in a building is that they must have natural light from two sides (Pattern 159: LIGHT ON TWO SIDES OF EVERY ROOM).

22. As the house fronts near completion, the government offers a monetary prize for the most artistic ornamentation, preferably using traditional motifs chosen entirely by the owners, and supplies paints and materials for that purpose (Pattern 249: ORNAMENT). Ornamentation should be more detailed, and more intense, at eye level and at those places where a user can touch the building.

The above proposal may appear interesting, perhaps extraordinary to conventional planners. Some will doubtlessly criticize it, even though it is supported by the most important document of Latin American planning: the "Laws of the Indies". (*Las Leyes de Indias* explicitly direct that a settlement be planned around its central urban space, which has to be established first). We believe our suggestions to be applicable and we ought to try and implement them to any degree possible. It is not necessary for the builders to have access to the full description of each pattern mentioned here; a simple outline and diagram are sufficient. We list the patterns only for reference purposes. The goal of ornamentation is NOT to add something "pretty" so as to distract from the otherwise difficult living conditions. In fact, it serves to connect the residents in a deeper sense to their environment, by giving them intellectual ownership of the physical structure. For this reason, it is absolutely necessary that the residents themselves generate all the ornament and create it with their own hands.

CHAPTER 6

LET CHILDREN HELP DESIGN OUR CITIES.

Several distinct groups are now designing cities for human use rather than purely for occupation by machines. Thoughtful investigators are moving away from the disastrous modernist planning that erased tightly-knit urban fabric in order to replace it with images of an alien modernity. I would add my concern about designing cities for our children. The urban form should satisfy children's physical and psychological needs and encourage them to be eager participants in our built environment. There are very few isolated regions of our contemporary cities where a child feels "at home" outside. The organized small scale is missing. A child is assaulted by visual and other aggressions: the world has been designed to be a hostile environment, and it is perceived as such. Adults can put up with a great amount of such environmental unease, but children are far more sensitive. Children retreat inside their house and their parents' automobile, because these offer protection from the built environment.

Our society is suffering on many counts from a re-orientation away from living structure. The answer to choked cities is not sprawling suburbs, as was wrongly assumed after the Second World War. Suburban geometry has turned out to be fundamentally anti-life. It is stifling in practice, even as it looks superficially nice: clean air, in many cases green, spacious, etc. But there is an essential quality missing, and it has to do with the geometry itself. Without getting into theories of urban structure, here is a simple criterion for human design: "Shape a city around our children".

Assuming that the interior of a house is designed to be friendly to a child (which more often today is not so, but that is another story), look at the immediate exterior of the house or building. Can a child go out of a door and play safely in the environment? Can he/she explore without the parent fearing for its safety? Can a child go anywhere on their own?

No. A child is imprisoned within their house or fenced-in back yard. In our beloved suburbs, the fact that the geometry gives priority to highway-sized roads precludes any sense of safety for our children. So much for the annual upkeep of front lawns, bushes, curbs, speed bumps! Those elements are either fundamentally hostile to children, or they include band-aid solutions after the fact.

But planners still refuse to change the codes to allow a genuinely child-friendly built environment. In most cases, they have absolutely no idea of how to achieve that.

At the other extreme, the most inhuman environment for children is the skyscraper. Isolated from nature up in their upper-storey prisons, children lose all contact with nature and human reality.

In his excellent book *A Pattern Language*, Christopher Alexander already gave the criterion of a four-storey limit for apartment houses, based upon the distance children can successfully interact with their friends and parents. In fact, Alexander based many of his patterns upon children's sensibilities, but no one paid much attention.

Architecture and urbanism willfully embarked in the past several decades on designs that isolate and diminish the children's world to within one house or one room. Eastern Europe has several generations of persons who had their childhood wasted by living in monstrous high-rises.

What is to be done? This brief essay does not pretend to give the answer, but here is a starter. Grab a child (your child, or a nephew) by the hand and walk the project lot before even putting pencil to paper. Explain to your youngster that he/she needs to tell you exactly what is necessary to build there so that it is pleasant to play exactly where you two are now walking. (Also, try to imagine being that age yourself, if that is possible).

Where is a tree, a paved footpath, a low wall for playing alongside and for sitting on? How about a gazebo here, for climbing up? None of these "useless" urban pieces should be placed on a plan by the architect — they wouldn't know where to put them, and even if built, will remain unused.

A picture emerges that is totally distinct from the urban fabric we build nowadays. No wide roads, but lots of footpaths, densely packed. Low walls, little things, connections. We envision houses that are oriented very differently from those in today's suburbia.

Gone are the dangerous intersections, crossings, and gigantic urban visual objects so beloved of post-war planners. Gone are the prison-yard concrete playgrounds, as the entire urban space itself becomes a playground.

Even the useless expanses of lawn are questioned: ask the child where he/she wants to have lawn to run on. Certainly not everywhere — "No, we don't want lawn over there, we will never go over there to play" — but in very specific places, and it must go there and be protected by the surrounding structures.

The reader ready to quit reading this essay will say: "Nonsense; no one has ever built such a city". Well, I'm sorry, but much of the built urban fabric is built exactly in this manner. The developing world has cities, both traditional and informal, that exemplify what I'm talking about. Not that they are designed that way consciously, but simply because they have evolved in that direction.

If those poor people can do it, why can't we? Perhaps because we are too rich, too arrogant, too caught up with ridiculous and destructive ideas of modernity, too dependent upon mechanization, too proud to admit we have destroyed our cities, and too proud to learn from poor people who may be starving but have a better urban sense that we do!

Why are our societies so totally, obsessively, child-unfriendly, whereas the favelas of the world are great for playing in? Granted, we don't want the open running sewage or disease, but I'm talking about the geometry. They got it right.

Are we capable of learning? You would be surprised at the blockage to learning that very intelligent people manifest because their mind is full of geometrical images of modernity. It is a fanatical conviction, and you cannot fight dogma with reason.

The continued survival of the species depends upon our children. Surely, we need to build our world to optimize their experience, don't we? Not doing so goes against all religions as well as reason. Images of modernity compete (and have displaced) humanity's connection to the higher order of the universe.

CHAPTER 7

MICHEL BAUWENS INTERVIEWS NIKOS SALINGAROS ON PEER-TO-PEER URBANISM.

Introduction by Michael Bauwens.

The peer-to-peer relational dynamic represents the basic human freedom for humans to connect to each other and to engage in actions without permissions. It can flourish in global cyber-collectives, but also on a local scale, particularly in the interstices of the mainstream system, in places where control is the weakest. Because of this paradoxical effect, it is possible to consider slum dynamics as a peer-to-peer system, which is the point of view of new urbanists like Michael Mehaffy, Nikos Salingaros, and Prakash M. Apte. They are defending the collective intelligence and value creation that have been constructed organically by slum dwellers. Another aspect is worth mentioning. Modernist approaches are often characterized by a hatred of the past, which must be destroyed. But after the deconstructive period of postmodernism, in which "anything goes" pastiches were made possible,

now is the time for an intelligent neo-traditionalism, which takes into account the wisdom of the past, critically weaves it with our new sensibility, and uses the successful patterns to create an organically evolving present and future. Such attempts are worth supporting, because they combine the best of the past and present, and create a future that has been freely chosen, not imposed.

INTERVIEW.

MB: We've been covering some of your work on a new 'peer to peer' urbanism in our website. Perhaps we can explore this connection further. First of all, do you agree with that assessment of your approach being in line with the peer-to-peer ethos? Tell us a little bit about yourself and how you came to your current thinking and practice. Finally, could you also tell me what you think of my characterization of your work as neotraditional. What I mean is that pre-modern and what I would call 'trans'-modern thinking are both concerned with the primacy of value and the immaterial, and that freed from the modernist rejection of all things traditional, we can now have an open mind and freely draw from thousands of years of human experience.

NS: At the basis of my approach (and my team of collaborators on architectural and urban issues) is the empowerment of the individual. That is certainly at the heart of the peer-to-peer ethos. It is also a fundamental reversal of what has been the norm for close to a century; namely the rule of a self-appointed elite to dictate the tastes of the people as far as what living and built environments ought to be like. Generations have been told that they had to live in a certain type of house that was unpleasant to be in, to live in cities with an unpleasant, often inhuman form, and we can go further. Generations have been forced to go against their natural, instinctive responses to an inhuman environment, and to accept it as "modern" and "contemporary". This has been happening since the 1920s. The end result is massive cognitive dissonance, which confuses a person's instincts to the point that they are then very easy to manipulate.

Now there are two schools of thought as to how this happened. If you are going to be kind, you can say that well-meaning, nice people with good intentions wanted to build new types of buildings and cities so as to better humanity and create a more just society. If you are going to be harsh, you can claim that those very same people collaborated in a dangerous mass experiment in social engineering, with the goal of creating a submissive consumer class of people who are easily brainwashed. The end result is the same: an inhuman built environment founded upon energy wastage and a neurotic class of people who everyday have to put up with urban and architectural stress. The beneficiaries are the so-called experts who sold all the utopian ideas, and who were well-rewarded for their role, and of course, that section of society that created all this inhuman urban structure.

To get out of this disastrous mode of life — and it is really a philosophy and worldview, not an architectural choice — we need to go back to traditional values. Sure, the social revolutions around the First World War rejected tradition precisely at the time these new “experts” were selling their utopian ideas, but that was the key to the manipulation. People were ready to reject everything and adopt a new way of life, and were not paying attention to the possible dangers of being manipulated. If we look back to all the architecture and urbanism of the past 3,000 years, we find human-scale solutions that can be adapted for today’s society. For the moment, the constant attacks from those who accuse us of going back to the past have prevented people in general from appreciating the wealth of solutions available. I’m talking about small-scale, both low and high-technology solutions that break out of the stranglehold of the consumerist society. I’m also talking about satisfying basic human emotional needs, such as a human-scale environment, a healing environment, that we can create with very low cost once we jettison the fashionable or dogmatic architectural “statements”.

The modernists rejected all things traditional, as their basic cult dogma. Thus, they threw out solutions developed over millennia, which can never be substituted by any high-tech images. Some of my friends think this was simply an industry trick to sell all that steel and glass being produced in mass quantities from the new factories. In that view, the Bauhaus was simply a publicity outlet for industrial materials, which is ironic considering how Marxist most of the Bauhausler were. But then, the Left embraced industrialization wholeheartedly, just as fervently as did the consumerist society that was supposedly on the political right. Communist countries erected vast, inhuman buildings and cities, and the same typologies were applied in the capitalist countries. A curious ideological agreement between the two antagonists on the industrialization and dehumanization of human beings!

Peer-to-peer solutions represent the opposite of this dehumanization. I see an attempt to regain value for the individual, and hopefully to enable solutions to evolve outside the controlled industrial system. There is nothing wrong with industry, but I do not condone the massive manipulation of entire populations, and the forced consumption of inhuman building and urban typologies. People will buy industrial products, and will build their houses and cities: what I want to see is a vastly improved range of choices and the ability to make individual decisions. I expect the latest cutting-edge industrial techniques, such as just-in-time production, to play a major role in this revolution. We are now promoting a curious and unexpected combination of tradition with the latest technological possibilities made available by the Internet. I don’t believe that it was even possible to think about implementation before, even a decade ago, but now the whole process of information, coordination, distribution, linkage, and expertise, can take place on the Internet. That’s why I support an open publishing environment so strongly. Information that can change people’s lives, that can change the lives of entire population, must be freely available.

What we have not been able to break through, so far, is the brainwashing. The vast majority of the world’s population is suffering from an inhuman built

environment, from inhuman living spaces, from inhuman building surfaces, from inhuman furnishings, and it is putting up with it because of a basic terror. Psychological manipulation has convinced them from birth that to go against the “modern” iconography will mean economic collapse. Those images have become religious in their hold on people’s minds. Just try to suggest to someone that steel and glass may not be the best materials in a desert or polar climate (only to mention the heat losses). But they cannot envision a world without those iconic “glass and steel” qualities, because that image represents “progress” since the 1920s. Slum dwellers make do with waste materials to build their homes, but when they can afford to, they move out into an inhuman house built in “industrial” style, often in an inhumanly designed high-rise, or worse, in a socially dead suburb. That is their ultimate success: they have made it out of the favela and into the inhuman utopian environment, and now they can contribute as a pawn in the global economy.

MB: Here’s the next question, and I’d like to play advocate of the devil for a while. I hear your charge that modernists build inhuman cities and spaces, but I wonder if they were not just reacting to tradition, which was already gone in the 1920s and perhaps more against industrial dehumanization itself? I’m just assuming that there was an emancipatory charge to the work of many, but that the law of unintended consequences did not allow them to foresee all the results of their ideas and plans. Similarly concerning tradition, it is steeped not just in positive and communal ways of living, but also in authoritarian social structures. My question is therefore, if you look at tradition, by what method can you distinguish the wheat from chaff, what is the operating procedure or methodology you can use to do this kind of selection. Is it related to the patterning approach by Christopher Alexander? Tell us a little more about the latter, as not all of our readers may be familiar with that important work. In addition to him, who else has been of major inspiration to you and your colleagues. An additional question: how do you react to the fact that the new moderns in East Asia, seem hell bent on repeating the mistakes that you describe, on perhaps an even grander scale?

NS: Every generation has reacted in some form (positive or negative) to tradition, and different social classes react in different ways. It is wrong to conclude that only the oppressed react negatively to tradition, since we have seen ideas that destroyed a society emerge from those who were well off — they did it for the fun of it, as an intellectual exercise, because those persons were psychopaths, or just to “be different”. While changes after World War I might be attributed to a reaction against industrial dehumanization, they actually drove the world into a more complete industrial dehumanization, so I don’t know if this is ironic or tragic. Here we move from design into the minefield of politics.

There is a very simple criterion for how to judge the positive qualities of tradition, or specific pieces of tradition: if it empowers the individual to lead a healthier, more fulfilling life. Not necessarily happier, or more just, since all the right

conditions in the world cannot guarantee that, but a full life without affecting other human beings negatively. Rather than utopian promises that can only be fulfilled by a state revolution — and which invariably turn around an oppressive system into another oppressive system — I see the value of peer-to-peer ideas of a personal validation of human beings. By contrast, reaction to oppression channeled into a mass movement is often commandeered by another elite to construct its own power structure.

Clearly, one can write down a set of patterns that have been used successfully to manipulate or oppress people, so we must include a value system in evaluating patterns. In computer science, it's straightforward: patterns are those solutions that help a program run better, while antipatterns are those recurring pseudo-solutions that keep making things worse. I have classified patterns that manipulate the majority of people for the benefit of a small group, as "anti-patterns". Most of what we see as architecture and urbanism today, as taught in schools and shown in the media, consists of anti-patterns. I do not ascribe "oppressive" intention to them, however, since in many cases they were actually developed with the best of intentions, and are often linked tightly to an attractive ideology of political emancipation. Their result is oppressive despite all the good intentions. Both cynical and naive practitioners just apply them for fun and profit, and like to re-use the original claims of "liberation".

Christopher Alexander gave the Pattern Language to the world, and if people had read it, it would have liberated every individual from the tyrannical dictates of an architectural and urban machine (in the sense of an oppressive system). The patterns in that book are a true liberation, establishing people's own deep feelings about the built environment as sound and valid. The reason this is so important is that architecture schools, the media, and most architects have been implementing the very opposite for close to a century. And they have been justifying their inhuman product by a massive advertising campaign, exactly like soft drinks and junk food replacing genuinely nutritious food, because some people make a lot of money promoting them, and those same persons would make a lot less money selling and distributing wholesome foodstuff. We now have a significant percentage of the world's economy driven by the soft drinks and junk food industry, just as we have another major percentage of it driven by the construction of glass and steel skyscrapers and dehumanizing concrete buildings. The architectural/urban situation is "soft" oppression, where a vast power system geared to promoting an unhealthy and dehumanizing built environment is driven by subconscious suggestion. In only a few instances is brute power used, as in monofunctional zoning, and bulldozing owner-built houses so that someone can make a profit by building concrete high-rise blocks.

The situation with the new Asian states awakening from their competitive slumber is absolutely tragic. They are swallowing all the deceptions that originally sold city-destroying, soul-destroying, and culture-destroying architectural and urban typologies to the West. If this were the 1950s, then OK, we might excuse this error as a lack of experience. But we have several decades of mistakes, endlessly

documented, endlessly discussed and debated. Why are the new Asian states copying the worst that the West did to their own people and to their own cities? Probably, the reason is that the West itself is still promoting the same destructive typologies — only a minority of us are condemning them, whereas the system is still stuck in a heroic city-destroying mode. We have a bunch of western “experts” that have advised the new Asian states to do precisely what they are doing now. And those experts are making huge fortunes from the ensuing devastation... many people are profiting financially from all this construction, and it churns the country’s economy. But the product is toxic. Incidentally, many people don’t see this in this way; all they see is exciting new buildings and highways going up in the East. The devastating realization will occur when the energy costs are added up, and people realize that they have destroyed their own society.

Some additional explanation of the pattern concept, by Nikos Salingaros.

Identifying any type of pattern follows the same criteria in architecture as in hardware or software.

1. A repeating solution to the same or similar set of problems, discovered by independent researchers and users at different times.
2. More or less universal solution across distinct topical applications, rather than being heavily dependent upon local and specific conditions.
3. That makes a pattern a simple general statement that addresses only one of many aspects of a complex system. Part of the pattern methodology is to isolate factors of complex situations so as to solve each one in an independent manner if possible.
4. A pattern may be discovered or “mined” by “excavating” successful practices developed by trial-and-error already in use, but which are not consciously treated as a pattern by those who use it. A successful pattern is already in use somewhere, perhaps not everywhere, but it does not represent a utopian or untried situation. Nor does it represent someone’s opinion of what “should” occur.
5. A pattern must have a higher level of abstraction that makes it useful on a more general level, otherwise we are overwhelmed with solutions that are too specific, and thus useless for any other situation. A pattern will have an essential area of vagueness that guarantees its universality.

Michel Bauwens on the Peer-to-Peer Foundation.

Peer-to-Peer is mostly known to technologically-oriented people as P2P, the decentralized (or rather, distributed) format of putting computers together for different kinds of cooperative endeavor, such as file-sharing, in particular for the distribution of music or audiovisual material. But this is only a small example of what P2P is, it’s in fact a template of human relationships, a “relational dynamic” which is springing up throughout the social fields, more precisely where one finds

‘distributed networks’. It expresses itself in social processes such as peer production, peer governance, and universal common property regimes.

Such commons-based peer production has other important innovations, such as the capability of its taking place without the intervention of any manufacturer whatsoever. In fact the growing importance of ‘user innovation communities’, which are starting to surpass the role of corporate sponsored marketing and research divisions in their innovation capacities, show that this formula is poised for expansion even in the world of material production, provided the design phase is separated from the production phase (as well as other conditions which we will evaluate more closely). It is already producing major cultural and economic landmarks.

We also discuss the evolution of forms of cooperation and collective intelligence. It is also here that we are starting to address key analytical issues: what are the specific characteristics of the ideal-type of the P2P format, such as a certain amount of de-institutionalization (beyond fixed organizational formats and fixed formal rules), de-monopolization (avoiding the emergence of collective individuals who monopolize power, such as nation-states and corporations), and de-commodification (i.e. production for use-value, not exchange value). At the same time, this new mode is creating new institutions, new forms of monopoly, and new forms of monetization/commodification, as it is incorporated in the existing for-profit mode of production.

We in fact distinguish three emerging economic and business models arising from peer production. First, commons-oriented production, which creates relatively independent communities surrounded by an ecology of businesses that eventually help sustain the commons and the communities. Second, platforms oriented towards the sharing of individual expression, which are owned by corporations, this is the Web 2.0 model. Finally, a crowd-sourcing model in which the corporations themselves try to integrate participation in their own value chains, and under their control. An important issue is how direct peer governance co-exists, and perhaps, mutually enriches, the existing forms of representative democracy.

We finally turn our attention to the cultural sphere. We claim and explain that the various expressions of P2P are a symptom of a profound cultural shift in the spheres of epistemology (ways of knowing), of ontology (ways of feeling and being), and of axiology (new constellations of values), leading to a new articulation between the individual and the collective, which we call ‘cooperative individualism’, representing a true epochal shift. We then look at the spiritual field and examine how this affects the dialogue of civilizations and religions away from exclusionist views in culture and religions, as well as to a critique of spiritual authoritarianism and the emergence of cooperative inquiry groups and participatory spirituality conceptions.