Evolving Settlements
Participation and Emergence in the Human Environment

How to Use This Module

This is the fourth e-learning module for a series of courses in urbanism, architecture and building crafts known as the "European School of Urbanism and Architecture." The programme was designed for new students to the study of urbanism and building, and for professionals and practitioners who wish to increase their level of understanding of important new topics in best practice. More information in this programme is available at www.esua.org.

If this is your first time learning about this subject, and you find this module interesting, you will have the option to take more modules on line in the future. But this on-line element is really only a part of the full course of study. This module is designed to be integrated with a hands-on learning programme that will allow you to learn in the most effective way known: "learning by doing." You will have the opportunity to participate in field studies of actual projects, working alongside leading practitioners, and using the latest tools and techniques.

This module is specifically designed as an introductory course for those coming to study in the programme, but may be taken by others as well. The full project-based curriculum is now in the pilot phase, and is planned to be launched as a full-time programme after several years of development. You can learn more at www.esua.org.

Each e-learning module begins with a short reading, and then gives you links to additional reading. The final examination includes a short multiple-choice section, and a written essay portion that you can enter through a form, or email to the course instructor as a text document.

Introduction

Are settlements planned, or do they evolve?

Of course the answer is that they do both. How they do so, and in what combination, is the subject of this e-learning course. In particular, we will examine how people work together to develop a settlement: not only the architects and urban designers, but the other participants in the planning, building and maintenance of the environment. And we will consider how this engagement has changed in recent years, with more involvement from members of the public, and the challenges and opportunities that this presents.

The Planned and the Unplanned: A Historical Fugue

Settlements have always involved a degree of planning, from the very beginning of agricultural civilization. Indeed, the origin of planned settlements can be dated at roughly ten thousand years ago, with the careful planning of the first irrigation systems. Much of what we think of as civilization followed from the needs generated by this planning: the requirement to serve a political authority (in this case a water bureaucracy), the definition of legal rights and administrative obligations, the duty to pay fees or taxes, and the need to establish and maintain infrastructure, streets and public spaces.

History since then has been full of diagrammatically planned settlements: the regimented, linear military encampments and city-states; the carefully solar-oriented complexes of Anasazi sites; even the huts of simple agricultural villages. But history has also exhibited emergent patterns of urbanism throughout – often starting with the emergent patterns of natural terrain, or the paths of animals, and including the evolutionary accretions of individual builders over time.

(Illustrations – Sparta; Chaco Canyon; African village)

Medieval settlements (seen in the cores of many older cities today) are particularly striking for their complex wending geometries. These often emerged from the additive accretions of successive builders, who did not necessarily follow the exact angle of their neighbor – but who did follow a logic in the layout (such as a minimum road width, a maintenance of sun, and other rules), and that logic became evident in the complex pattern.

Moreover, it is clear now that the deeper logic of the patterns was not always intentional. Some of the most efficient urban characteristics – such as an optimal distribution of shops and services – emerged from the natural distribution and behaviors of residents, which tended to reward some locations over others. Refinements over time often winnowed out all but the most visible, and therefore most successful, sites.

The complex connectivity of the street system also emerged in this way: owners tended to seek more global connectivity for their own local place, and hence were more willing to make through connections of local streets. Often half a lot on a busy through street was much better than a full lot on a dead-end street.

Self-Organization in Nature

What is significant is that all of these "bottom-up" processes tended to create an over-arching order throughout the urban system. We can see the same kinds of processes occurring in the natural world -- in the adaptive processes that create optimization in an ecosystem, for example, or in an evolving organism.

Often such over-arching order results from the application of very simple rules. For example, the birds within a bird flock can follow simple rules about spacing with

neighbors. But as the flock moves, it can form remarkable ripple-like patterns that extend across the entire flock. A simple local rule is creating a strong global pattern.

On the other hand, nature also certainly has its "top-down" processes – those that execute a single act that has the effect of ordering many other elements. A river cuts through a bank, and creates a long, serpentine line. A volcano builds up a large, symmetrical cone. Even a bird flock will have a single leader, whose movements are propagated through the matching movements of many other birds.

The bird flock is an example of a combination of top-down and bottom-up effects – and they are common in nature too. Along with the top-down effects of a river, the bottom-up effects of trees create a more varied pattern of green along the serpentine bank. The effects of rain create patterns of wending streams on the face of the volcano. And so on.

Top-down and Bottom-Up in the City

The same is true, certainly, in the City. Top-down authorities often create roads, or impose codes on citizens about how they may build, and where. But them bottom-up; forces arise to actually carry on the building, roughly conforming to the top-down structure, but with significant variations along the way.

The situation is a bit like that of a gardener, creating trellises, doing pruning, cutting paths through the growth. But then the growth occurs along the trellis or the pathway. The gardener, too, may facilitate this "bottom-up" growth, using seeds and fertilizer, doing a bit more pruning, weeding, and so on. In this way, the gardener is combining top-down and bottom-up, in a kind of iterative process. And the result is both more adaptive, and more orderly.

Many of the most loved cities employ this combination of top-down and bottom-up forces. Paris, for example, had a very intense medieval core, with many wending streets. In the time of Napoleon III, Baron Haussmann ordered new streets to be cut through the medieval core, but leaving much of it intact. The result is the highly regarded structure of Modern Paris, with its grand boulevards, and its quiet, charming medieval back streets. The combination itself is its strength.

Many other cities went in the other direction, adding bottom-up to a strong top-down form. The Roman Castra, for example, were fort cities made with simple, distinctive cross-street patterns. By our standards, we would think of them as highly regimented. But the areas between the streets tended to fill in with wending medieval streets – and this pattern can be seen in many historic European cities today.

(Illustration – Chichester?)

Top-down in the Age of Democracy

But there is one key difference in the forces of urbanization in the modern age: in many parts of the world, it's no longer so easy for a Baron Haussmann to command huge roads to be cut through the city. Citizens are deemed to have rights to shape their own environment, and to resist the planning authorities when they have grand schemes that might compromise the citizens' quality of life.

The establishment of rights in the built environment was a slow and painful process. In the USA, the legendary Parks Commissioner of New York, Robert Moses, was able to successfully force through several very large road projects, until he was finally stopped by a citizens' group led by the urban scholar Jane Jacobs and others in the early 1960s.

The problem for urbanists is that this recognition of rights creates the ability to stop bad projects – but it also creates the ability to stop good projects. One person, with a particular narrow interest, may block a much larger project that benefits many more people. For example, a new urban extension may benefit from high connectivity to the existing neighborhood – but a resident living along one of the existing streets may object to increased traffic in front of their home. Thus a small negative is allowed to block a larger positive.

There is a principle at work in such processes that is known as ***subsidiarity***. It means that decisions that affect only the homeowner and their immediate neighbors should be left for them to decide – but issues that affect the larger community, such as the road connection, should be decided at the level of the larger community. Care must be taken to minimize harm to those at a subsidiary level; but at the same time, their narrow interests must not be allowed to obstruct the pursuit of larger goals. An optimum balance must be achieved.

One of the largest goals is to secure the quality and safety of the public realm. This is in fact essential to the creation of a successful city or town. The problem is that "the public" is an abstract group, which can easily dissolve into a collection of individuals, all looking out for their own narrow interests. Therefore, some process needs to be established, where individuals with narrow interests can work together to balance those interests with larger interests they share.

Charrettes and Participatory Design Processes

One such process is the design charrette, or (as it is known in the UK) the Enquiry by Design. The goal of such a process is to bring together the stakeholders of an area (residents, businesses, NGOs, political leaders and so on) with the specialists who can create and implement a design (urban designers, architects, engineers, economists, and so on).

The aim is to develop very specific design concepts, through a cycle of inputs, hypotheses, testing and refinement. Charrettes are often completed in an intense period of one to two weeks, with a preparation period of research, and a follow-up period of

detailed execution. Often the smaller components that are identified in an initial charrette will become the subjects of their own more detailed charrette.

A distinguishing feature of charrettes and Enquiries by Design is that they are not only collections of intentions or aspirations. They are actual design processes, and their development of ideas is always grounded in specific design proposals. This has the important advantage of being able to solve the problems that often cause purely aspirational goals to fail.

If a community, say, wishes to have a pedestrian crossing in a certain area, and the street authority says that this is not possible, then the community can, on the spot, ask the street authority to show where such a crossing would be feasible – or perhaps, what design changes would make it feasible in the original location.

In this way, the actors who, in a more serial process, might gradually subtract from an aspiration and leave it as a minimal compromise, instead become collaborators in a real-time problem-solving process, which is able to explore many more alternatives to address the problems.

The process has been shown to be remarkably effective in producing good designs that are much more likely to proceed to implementation.

Of course, other unknown factors can arise that prevent a design from being completed, or that change the set of opportunities that were understood at the time of the design. For that reason, it is important to think of the charrette process as continuing through implementation, with the original participants able to convene by telephone or email, or in smaller groups in person. In rare instances, it may be desirable to re-convene the entire charrette team.

Other collaborative tools: the Urban Code

The master plans created by charrettes can be thought of as “top-down” methods of guiding a construction. But there are other, more flexible tools that can be created, either by a charrette process, or by other community processes. They serve to orchestrate, and in some cases to generate, the actions of many individual entities as they build houses, businesses and other elements of a neighborhood or city. One of these tools is the urban code.

A code is, very simply, a set of instructions that guide actions. One simple code might specify colors, or materials. Another might specify where one can build on a lot. Yet another might actually include a “menu” of design options, among which the builder can select their choices.

Urban codes have existed for millennia, and it’s clear that the qualities we love about many cities stem from the specifications of their codes. For example, the colors that most

people find so alluring about Siena, Italy, were specified very precisely in that city's code, along with other features of that city.

More recently, urban codes began to specify what uses could take place on given pieces of land. These so-called "segregated use" codes had a profound effect on urbanism, because they had the effect of fragmenting the City into functional zones. One worked in one part of the city, slept in another part, shopped in still another part. The result was that daily movement vastly increased – propelled by the automobile – and the scale of buildings and public spaces also increased. The resulting fragmentation is what we now know as "sprawl."

As a reform of this problem, a new generation of "form-based" codes has recently become prevalent. Like the earlier generation of codes, they specify density, volume, height, setbacks from streets and property lines, and other "parametric" requirements. But they do so in a much tighter configuration, with buildings re-oriented to the street and the pedestrian realm.

Moreover, unlike the earlier use-based codes, form-based codes do not specify use, and in fact they encourage mixed use. That means that residential, retail, office, civic and industrial uses can all be more optimally mixed and spaced, so that individuals on average do not have to travel very far, and can often do so on foot, or on transit.

Generative Codes

But some critics have noted that form-based codes still do not account for the variations that individual builders might make in their constructions. At best the form-based codes create a minimal coherence of building groupings, street walls, and building features like balconies and the like. At worst, say the critics, such codes can be overly regimented and mechanical.

The architect Christopher Alexander has proposed a "generative code" in response, which functions more as a set of rules for responding to a previous set of conditions. In such a code, each builder will have requirements for responding to previous builders in a much more contextual way.

The architect and urban code scholar Besim Hakim has described how medieval codes worked in a similar way. They provided rules for responding to previous acts, with ethical standards for avoiding harm – for example, avoiding the shading of an adjacent yard, or the placement of a window to violate privacy, and so on.

Such codes can offer big advantages in very dense urban environments, where the residents seek to avoid a high degree of regimentation. Such a generative code allows much more complex patterns of morphology, and can accommodate a complex inter-penetration of public and private spaces – for example, small pedestrian passages, bridges, overhead room extensions, and so on.

Generative Tools – Pattern Books, Pattern Languages

In addition to codes, we can also create other flexible design resources, that do not specify exact designs, but rather, specify the elements of a design, together with the way they go together. One such resource is the pattern book, which was developed and used successfully by builders for many decades, notably in the Nineteenth Century. The pattern book offers particular collections of designs, together with rules for their combination. A given pattern book might be configured for a given region, a given kind of building, or a combination.

Pattern books originally focused on individual buildings. More recently, urban pattern books (developed by Urban Design Associates in the USA, and others) have been used to guide the design of urban areas. They can specify characteristic street geometries, public spaces, building types and locations, colors, materials and other elements.

Pattern languages were developed by the architect Christopher Alexander, and are more configurational, usually less geometrically precise, specifications of design solutions. They have proven enormously effective in computer software design, and in other fields. Recent work in architecture and urban design has sought to broaden the subjects they cover, and enlist a wider set of collaborators in their development. The 1977 book by Alexander and his colleagues, *A Pattern Language*, has certainly proven highly influential to a generation of architects and new urban designers.

Conclusion: Adaptive evolutionary environments

In thinking about evolving settlements, it is important to note that not all structures are able to evolve to the same degree. Some structures are very rigid, and don't accommodate much change. Some others are so plastic that they seem to be in a continuous process of change. It seems that an optimum range is somewhere in between, such that buildings can evolve and adapt to new conditions, while at the same time retaining important problem-solving information when it remains useful.

Designers often err on one side of this balance or the other. Most common in contemporary practice, designers tend to exaggerate the need for novelty and so-called "creative solutions." But many problems in the built environment are not new, and do not change much over decades or even centuries. The essential biological and psychological needs of human beings are fairly constant. The essential cycles of the planet are certainly constant: the cycle of the day, the cycles of the seasons, the presence of sun at certain angles at different times, and so on.

Evolutionary processes in nature are very highly adapted to these patterns. Structures within animals change when these patterns change, but often do not change otherwise – and often this is true for many millions of years. Human beings, for example, evolved

rapidly over just a few million years, as the forests of Africa gave way to more open savannahs. (Of course the evolution of human technology has been much more rapid still.) By contrast, many sharks, turtles and crabs have barely changed over hundreds of millions of years.

It seems there is a range of rates of change that designers must understand, and try to respond to. Some things in the human environment will change very rapidly: clothing, for example, generally does not last longer than several years, and so can be made with new designs that change in style and fashion. At the other extreme, the natural setting of a settlement will likely not change for hundreds of years, perhaps longer, and so the human response to the natural conditions should remain adaptive to this stable condition.

The author Stewart Brand has described these rates of change in his book, How Buildings Learn. When we misunderstand the proper rates of change, he says, something like a "stripping of gears" occurs. Our buildings become too dependent on rapidly-changing fashions, and are in danger of becoming dated. This damages their adaptive ability and their ability to retain important problem-solving information. In effect, we induce a kind of amnesia in place of the problem-solving intelligence that has been built into the human environment through its evolutionary processes.

The psychologist Abraham Maslow made a related point when he described the "hierarchy of needs." Human beings need art, but before they need art, they need shelter. Before they need shelter, they need food and water. These more primary needs must be satisfied, or else the preconditions for the less primary ones will not be present.

The built environment must take this hierarchy into account. It must, in effect, do a job as a part of the natural world in which humans reside. It must contain artistic expression, because that is an important human need – but before that, it must provide for shelter, social contact and other needs.

Biophilia

The psychologist Erich Fromm has described the phenomenon of "biophilia," the love of natural characteristics – that is, the evolved instinctual preference by human beings for certain kinds of natural environments. The biologist E.O. Wilson has described these in more detail, and they include such qualities as access to vegetation, water and sunlight, sense of refuge combined with vista or prospect, and presence of certain kinds of geometric patterns that exist in nature (such as fractal patterns).

Designers of health care environments found strong evidence of the importance of these biophilic properties when the measured rates of patient recovery in different environments. In one widely-noted study by the environmental psychologist Roger Ulrich, patients on one side of a recovery ward with a view of trees recovered from

surgery more quickly, with measurably fewer drugs required, than patients in the same ward with a view only of a wall.

Evolutionary design: Retaining success, removing failure

All of the tools and methods described in this module have in common the ability to add useful information to a design, so as to evolve it in better adaptation to the needs of human beings. The charrette and other participatory designs give designers the ability to work with real users to uncover important local and human information that is needed. The pattern books and pattern languages offer ways of coding successful solutions and other useful information so that it can be retained and re-used in a coordinated way. The urban code is also a way of coding information, and its rigidity can be compensated for with the use of more generative methods.

Finally, we have seen that settlements are a weave of evolutionary processes, some of which are planned by human beings – that is, some of which are intentional and pre-meditated – and some of which are more "emergent". Perhaps the most useful new approach we can take now is to combine these two kinds of processes, in a larger, more transformative kind of process -- one in which we don't know the specific result, but we know that the process is likely to produce the intelligent characteristics that we seek. As we confront complex phenomena like climate change, it appears that this kind of approach offers us an important new opportunity. It broadens and deepens what it means for us to design.