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EMERGING INTELLIGENCE: SEEING WHOLENESS IN THE HUMAN HIVE

Every species has a niche — a strategy for making its living that is different from those of the other species in its habitat.

— Gould and Gould, 1988, p. 20

How can we fail to appreciate the magnificence of existence?

— Clare W. Graves

WHY SEE THE CITY AS A WHOLE SYSTEM?

This chapter presents highlights from a range of sciences that allow us to consider the city as a whole system. We examine wholeness through the lenses of aliveness, survival, adaptiveness, regeneration, sustainability and emergence. This chapter may seem overwhelming to some readers, and if that is the case, then read around it or sample it as you are inclined.

This chapter attempts to stick to the principles of whole-systems thinking that apply to all four aspects of the Integral City that are discussed in subsequent chapters — subjective, intersubjective, objective and interobjective. Thus it serves each of those chapters, without trying to duplicate what they have to say. Neither is it exhaustive about any of the sciences it references — books abound to do a thorough job of that.

I believe that to truly appreciate the complexity of the city we need to see it as if it were a whole system and have some language to talk about the city as a whole system. In fact we need some language to talk about the city as a system of

METAPHORS OF THE CITY

The city IS a whole. As Manuel De Landa (2006) says, the wholeness is not metaphorical, but it is hard to grasp. So, the images offered by metaphors are a way of holding the whole — and are inspired here by the excellent exploration of Gareth Morgan in his *Images of Organization* (1998).

Metaphors can help us to understand the city as a whole. When we can point to something else and say the city is "like" this, then we get a picture of how we are making meaning of the city. These metaphors are organized according to the quadrants discussed in chapter 3.

At traditional levels of thinking, it has been natural to think of the city in terms of a clockwork or machine. From the Lower Right quadrant, a machine is a mechanical device where all the parts work well when they are well oiled. It may have gears and levers. The machine reduces human labor and is under human control. The city as machine has also been reflected in our language about political machines. Thinking about the city as machine keeps people at a distance from the built structures. The city is outside of us. We live in it or on it. The advantage of this metaphor is that it seems especially helpful to grasping the mechanical, linear, sequential nature of much of the city structures that have been designed, installed and maintained by engineers — the streets, the water mains, the sewers, the telephone lines. The disadvantage of this metaphor is that it doesn't account for the living, non-linear unpredictable characteristics of the city.

A related metaphor for the city is a clock. (Again, related to the Lower Right quadrant.) The city runs like a clock. It has gears meshed together like buses connecting at their hub. It hums and ticks with movement and moves ever-forward with time. The clock metaphor conveys progress and precision. It is more than mechanical — once it is wound up or powered on, it is designed to operate on its own with little intervention. The controls are built in. The advantage of this metaphor is that it conveys the interconnections of the city that make it work well. This metaphor conveys the competence of its creators and the intelligence of its controllers. Like the machine metaphor it is linear but in terms of time rather than space. The disadvantage of this metaphor is that it doesn't leave room for the disconnects, the surprises or the breakdowns that are inevitably part of city life. It implies that citizens all march to the same regimented clockwork, which the vicissitudes of daily life in any individual household clearly contradicts.

From the Upper Right quadrant come metaphors for the city like cell, brain and body, clearly drawing on the living fractals embedded in the city. Such metaphors exist on a smaller scale, making the intricacy of the city more accessible and understandable. We can take what is not generally visible as a whole landscape and reduce the size of the container so that we can understand it. The advantage of these metaphors is that there is considerable truth and alignment to them. When we view cities as having extended human capacities, it

makes sense to relate their operations to smaller versions of those same capacities. The disadvantage of these metaphors is that the city is anthropomorphized and made too simple. They convey the impression that the city can be wholly understood, and they downshift the true complexity of hundreds of thousands of people living together.

The metaphor of the city as a garden comes close to conveying the city as a complex container of a living ecology. The garden has a relationship with the gardener(s) and is differentiated from the wild landscape. Gardens generally have zones or areas that interconnect with other parts of the garden. You can walk around a garden. The advantage of this metaphor is it conveys a city that is accessible, beautiful and grown with intention. By extension the gardeners could represent the mayor, council, city hall staff and citizens. However, the disadvantage of this metaphor is that it conveys more control and less complexity than exist in a real city. It also seems to omit the qualities of consciousness and the variety of beliefs that exist in a real city.

The metaphors of the city as a tree, plant or fruit such as "the Big Apple" focus the garden metaphor on a smaller scale than a full garden. They are similar to the cell or brain metaphors in relation to the body. While the tree and the apple make the city accessible as a whole, since we can easily visualize them, they conflate the true business (of enabling human capacity) and never-ending quest that is the city.

Few metaphors come to mind when we look at the city from the left-hand quadrants. Even Googling possibilities like "city as soul" or "city as family" produces negligible results. So we seem not to have associated city with an inner life of the individual or the collective. Perhaps we recognize that the city is a challenging place for reflection or contemplation. In fact the city gives us less opportunity to turn inward, to find quiet, to reflect. Simply to be or belong does not seem to have transferred into metaphors of the city. Sanctuaries, retreats and havens almost seem alien to cities. They are what we seek when we want to leave the intensity of the city.

Finally the last cluster of metaphors — the anthill, the termite colony and the beehive — are all metaphors for the city as a living system with individual and social beings working in cooperation to sustain life. These metaphors convey the complexity of the city as a whole more accurately than the others because they capture the dynamics, interconnections, complexities and even the built environments. The advantage is that they convey a whole system of non-linear, complex adaptive interactions that is visible, quantifiable, observable and even apparently understandable. The disadvantage is that, once again, they seem to omit the realities of the left-hand quadrants. Although we can ascribe intelligence to these social insects, we have yet to find evidence that they are conscious of their consciousness.

Thus it would seem that an adequate metaphor for the city as a whole has not yet been coined. It is a phenomenon for which we can find no equal on Earth and for which we can only imagine a parallel if we built a substitute in outer space that would inevitably have many of the same characteristics.

integral systems. Paradoxically, in order to truly appreciate the integral frameworks discussed in the following chapters, we need to appreciate the worldviews and mindsets that thinking about whole systems can afford us.

By looking at the city as if it were a whole system, we are able to make sense of the space frames in which the city's physical elements exist (both natural and human-made). We can see the time frames in which change happens to all the elements of existence in the city at varying degrees of speed. And we can see the people frames where the diversity of human life in the city evolves and develops across the life cycles of human existence at all levels of scale: individual, family, cultural and historical.

THE CITY HAS ALIVENESS

The city has the qualities of aliveness. It springs from the fact that each person in the city is alive, but also because all the people are alive together in the city. Scientists (Capra, 1996) tell us that the qualities of aliveness are very simple. To be alive means that a system survives, connects to its environment and regenerates.

Architect Christopher Alexander believes that everyone can differentiate spectrums of aliveness. He affirms that if you showed a person or group of people two different designs of common inanimate objects like salt shakers, they could choose the one with the most qualities of aliveness. Alexander proposes that aliveness arises around a center, and that centers are made up of other centers. Centers help one another, and "the existence and life of one center can intensify the life of another" (Alexander, 2002, p. 110). Moreover he suggests that structures, like cities, gain life according to the relationship of density and intensity of centers.

In studying the Phenomenon of Life, Alexander has identified the following 15 properties that help centers come to life. They are intimately connected to the qualities of wholeness and complex adaptive systems we have been discussing.

1. Levels of scale
2. Strong centers
3. Boundaries
4. Alternating repetition
5. Positive space
6. Good shape

7. Local symmetries
8. Deep interlock and ambiguity
9. Contrast
10. Gradients
11. Roughness
12. Echoes
13. The void
14. Simplicity and inner calm
15. Not-separateness (Alexander, 2002, p. 239)

Interestingly, even by embracing a biological definition of life, Alexander's tenets and properties seem to open up other aspects of the integral model — the invisible life of the beautiful (psycho) and the good (cultural) and the shared life (social) of collective support, order and strategy. We essentially come face to face with the ecology of our ancestors, friends, relations, strangers, authority figures, experts, caregivers, politicians, bureaucrats. We realize that not being an island means that we are indeed connected to the environment we have collectively created in the city.

HOLONS ARE WHOLES

Both the sciences of physics and biology have identified ways of describing whole systems. Physicist Arthur Koestler coined the term "holon" to describe a whole system. In the city, each person is a holon. In fact a holon can also be a system of whole systems. The whole systems in the individual person, which biologist James Grier Miller (1978) has documented so well, range from the organelle, to the cell, to the organ, to the functional system, to the person. We could say that holons develop ecologies of systems at different scales.

Moreover ecologies of systems can continue to evolve within the larger whole that contains them, thus further differentiating into subsystems. This is discussed in more detail in chapters 6 and 7. A simple example would be to compare the respiratory system of the whole person to the subsystem in the cell that enables it to exchange oxygen for carbon dioxide waste. The former has not only evolved from the latter, but still transcends and includes it in its overall functioning.

Thus we could create a lattice or matrix of the differentiations and integrations of holons and subsystems at different levels of scale, which is exactly what Miller and his team did (1978).

In examining the ecology of the city as a whole, we are developing a language that contributes to understanding the patterns of life in the city. If we think of the city as the human equivalent of the beehive, we have a useful metaphor for the city as a whole. The survival of the hive is dependent on each bee following the rules and roles that contribute to hive survival, adaptiveness and regeneration. Thus the collection of bee intelligence and behavior that makes up the hive seems to operate like a dynamic responsive hive-mind.

As we look at whole systems, using our microscopes and viewing instruments to zoom in and out, we are able to see the relationships that the various subsystems have developed with one another and appreciate that the ecological relationships are quite inextricably linked. The city is clearly a whole system that cannot be separated into parts without doing damage to the whole, any more than a hive can be cut into without damaging the whole.

THE CITY SURVIVES

So let us return to the three qualities of aliveness and see how survival contributes to the whole city. Let us discover the role of containers, boundaries, dissipative structures and complex adaptive systems.

On an individual basis we can see that the quality of life, or aliveness, determines the quality of survival that a person experiences. Without reference to the integral map (described in chapter 3), usually survival is circumscribed only by biological survival — does a person have the necessary food, clothing and shelter to stay alive? But with the integral map we will expand the meaning of survival beyond the biological external life to include the inner lives of the psychological (emotional–intellectual–spiritual) and the collective external life of the cultural and social aspects of city life. When we enlarge our framework for survival in this way, we can truly see that "no man is an island unto him/herself in the city." Each person is massively interdependent on a living collective system in which he or she is embedded.

Sustenance from this interdependence can take surprising and poignant forms. Barry Lopez (Lopez & Pearson, 1990) suggests that sometimes people

need stories more than food to stay alive. Stories lie at the roots of city cultural life. In *Systems of Survival* (1994), Jane Jacobs proposes that two kinds of collective systems are needed to meet the survival needs of the city: the moral system (cultural) and the commercial (social) system. These authors concur that individual survival is dependent on more than meeting basic biological needs. Lopez proposes that the intangible exchange of stories encourages life in people. Jacobs identifies the value of collectively working to create rules for moral behavior and rules for commercial exchange to enable survival.

But in order for us to grasp how an alive wholeness survives in the city, we need some basic understanding about how wholes are systems and how systems work. So let's look at the city as a container. Let's consider its boundaries. And let's see how the city's survival is foundational to its capacity to adapt.

THE CITY IS A CONTAINER WITH SHAPE-SHIFTING BOUNDARIES

It seems like a blinding flash of the obvious to say that the city has an identity. We can identify Montreal, Rio de Janeiro, Sydney and Mumbai as distinct entities. Moreover I propose that these identifiable entities are human systems. And although it is a *human* system, the city, like all systems, is a form of identifiable container with boundaries. However, the city is a very dynamic container with very special boundaries that not only separate it from its background, environment and context but enable it to shape-shift in biological, psychological, cultural and social ways.

The city's shape-shifting boundaries comprise other systems and subsystems that contribute to the city system as a whole. Sometimes these boundaries are obvious from the same plane of observation, like the view of a particular city block on Mapquest®. At other times the boundaries only become obvious when you click on a hyperlink that discloses cascades of subsystems at other planes, like with Google Earth. Exploring the qualities of these subsystems and their boundaries reveals the enormous entanglement of systems within the city. But when we zoom out to consider the city from a high-enough altitude (like we can see from an airplane at 10,000 meters), the boundaries disclose what is considered inside the city system and subsystems and how exchanges across those boundaries may occur.

From a philosophical and psychological perspective, boundaries are identified and interpreted through the lens of the person seeing them. Thus they are to some degree creations and functions of the interpreter. Therefore the boundaries

I have selected to embrace the Integral City are functions of my ways of seeing the world. To the extent that you share these ways of seeing the world, these boundaries will be visible to you too.

Glenda Eoyang classifies four kinds of boundaries in systems: rigid or fixed, fuzzy or indistinct, permeable or porous and impermeable or closed (1997, p. 110). In the city a rigid boundary might be a concrete retaining wall; a fuzzy boundary might be the differences of opinion between school board trustees; a permeable boundary might be the river's edge; and an impermeable boundary might be religious holidays. On careful reflection, we can all think of ways to negotiate, redefine and even reclassify these boundaries, and when we do so, we change the systems they serve and our relationship to them.

When we explore the Integral Model in chapter 3, we will see that these boundaries are not limited to the exterior observable kind from the objective and interobjective world of biology and physics, but they describe patterns of the interior kind in the subjective and intersubjective world of aesthetics and humanities as well. The patterns of our beliefs and worldviews disclose boundaries that grow and expand as we become ever more mindful and make meaning of our personal and interpersonal relationships.

Seeing the city as a whole helps us to realize the massive interconnections amongst its systems and subsystems, the dynamic but frequent stability of their relationships and the kinds of exchanges that can occur amongst them. These interconnections span the subjective and intersubjective along with the objective and interobjective realities of existence in the city. In fact, they reveal how the myriad systems in the city self-organize into stable and unstable patterns and relationships (see Metaphors of the City sidebar). And they also reveal the dynamics of exchange amongst multiple scales of human systems in the container of the city (see City Landscapes sidebar).

THE CITY IS A DISSIPATIVE STRUCTURE

It is always tempting to parse the city into its most visible parts or characteristics: the creative city, the green city, the medieval city, the garden city, the mile-high city. It is only natural with so many cities on Earth that we want to differentiate a city around its visibly different parts. However, the city is not a system of parts but a whole system of the human species that has characteristics as a whole that transcend

but include communities, organizations, groups, families and individuals and the built environment that we have created to contain us.

We get fixated on the behaviors and intentions of all these smaller-scale human systems because we interact with them on a daily basis. However, because more than 50 percent of the Earth's population now lives in cities, the functioning of the city creates major repercussions on the quality of life for all people regardless of where they live. That is because, as a whole system, the city functions like a dissipative structure with many characteristics of a complex adaptive system.

What is a dissipative structure? It is an open system where the structural pattern is maintained, even as energy, matter and information flow through it and are dissipated by it. As a dissipative structure, the city is constantly managing the flows through it but, at the same time, maintaining a recognizable pattern from day to day. Obviously cities change over time, as the flow-state of the energy, matter and information reform it, but at any given time, we can point at the city and say, "There it was, there it is and there we expect it to be."

As a dissipative structure, the city sucks in resources from its environment and spews out products, by-products and waste to its environment. That is why, when we take into consideration all the cities of the world, their functioning affects the lives of all people regardless of where they live, inside or outside the city.

THE CITY IS A COMPLEX ADAPTIVE SYSTEM

A complex adaptive system operates far from equilibrium, with non-linear behaviors, always adapting to its environmental context. Within the city, it is clear that each person is a complex adaptive system. When we look at the composite behaviors of clusters of individuals in the city, we see fractal-like patterns in the collective that seem to mirror the complex adaptive behaviors of the individuals.

That means that city subsystems, like neighborhoods, appear to adapt to external and internal life conditions as individuals within them do so, in order to survive. They exist in an ebb-and-flow state, with periods of instability. Thus the city as a whole with its composite of neighborhoods also appears to exhibit the characteristics of a complex adaptive system.

When we look at the city as a complex adaptive system (Stevenson and Hamilton, 2001), we see that many of these qualities are similar to the ones that Alexander relates to aliveness:

- **Scaleable**: Its characteristics derive from the individual human system and any collectives, such as couples, families, teams, organizations, neighborhoods and the whole city. As a container of a collection of individuals, it occurs at scales from 50,000 (approximately) to over 20 million.
- **Quasi-fractal**: The patterns that occur at one level of scale repeat themselves at other levels. Some argue that full fractalness cannot be ascribed because of the differences between social holons and individual holons. (See discussion in subsequent chapters.)
- **Dynamic**: The city is in perpetual motion because its basic elements — people — are living systems adapting to their surroundings.
- **Unpredictable:** The massive interconnections of individuals in the city create conditions where behaviors can be unpredictable because negative and positive feedback loops create interactions that may never have happened before or small differences in the system create entirely new results. For example, the people driving to work may not always make the same decision about what route to take every day of the week.
- **Interconnected:** The city is like a neural network where everything is connected to everything else on a micro, meso and macro scale.
- **Nested:** The relationships of human systems are such that they fully or partially nest within one another (therefore, the nests themselves overlap and interconnect). For example, an individual can be a member of a family, a sports team, a work group, an organization, a community, a city.
- **Uses simple rules:** People within any given city use simple rules of engagement, including forms of greeting, eye contact, respecting personal space and what side of the road to drive on. These vary from place to place but everywhere solve the problem of how large groups of people can live together in orderly ways.
- **Subject to phase shifts:** When people live and work together, they can develop a synchrony of action and/or thought that creates feedback loops that produce a tipping point, which opens the door to an entirely different phase. In short-term positive renditions, this can be recognized as waves of ecstasy at rock concerts or the release of seemingly miraculous community

coordination when people respond seamlessly to tragic events like fires, blizzards or accidents. In short-term negative renditions, this can be experienced as mindless crowd behaviors that produce everything from brutish rows at soccer games, to uncontrollable angry strikers at city hall. A long-term example of a phase shift occurred in northern England in the 1950s and '60s with the conversion of coal fires to clean fuels and the resulting improvement in respiratory health.

- **Potentially affected by weak signals:** Complex adaptive systems are so interconnected that a weak signal, like one person's crusade for a change, can create attractors and feedback support that result in change for the whole system. For example, a Vancouver activist's protest in the 1970s led to Vancouver's decision not to build freeways through the city center.
- **Field sensitive:** As a complex adaptive system, the city is a form of container that holds an energy field. That field is sensitive to energy changes from within the container and outside it. For example, it can be expressed as an esprit de corps, like the galvanizing effect in support of New York after September 11, 2001, or even a dissipation of energy, like the staccato chaos that ensued when New Orleans flooded in 2005.

THE CITY ADAPTS TO ITS ENVIRONMENT

Now that we have examined the process of survival in the city, let's move on to the second quality of aliveness: the role of adaptiveness. Let us see how differentiation, integration and resilience enable the city to adapt to its external and internal environments.

Differentiation and Integration

As we examine the patterns of evolution of all natural systems in the world, many scientists are finding that evolution emerges through discrete stages of differentiation and integration. Differentiation occurs when a holon takes on a different role than its predecessors or peers. It is like a division of labor amongst differing contributors.

Integration occurs when different holons come together under one umbrella to coordinate their processes. Integration is precedent to and necessary for the emergence of wholes from other wholes. Alexander might frame this as a

new center emerging from earlier centers. One of his most fascinating examples is the 400-year historical evolution of Saint Mark's Square in Venice (Alexander, 2002). In a series of diagrams, he illustrates how the centers in the square have shifted and changed as new structures have been added, but the square has continued to exist as an alive center of the city across the centuries.

While a single holon (whether bee or person) can exist as a separate entity, its capacities are limited to processing its individual inputs and outputs. When holons combine their efforts collectively with intention, they can create a subsystem. Thereby they leverage individual efforts and produce more output with less expenditure of energy. Life likes this equation!! It also builds on it as it evolves by integrating these differentiations.

This starts the basic cycle of complex evolution or the evolution of complexity, through successive waves of differentiation and integration. From atoms, to molecules, to organelles to cells and right on up to ever-greater complexity and consciousness, life differentiates and integrates. When we see the patterns from the scale of least complex to greatest complexity, we are struck by the undeniable evidence of hierarchical differentiation and integration.

Life has evolved through synthesizing holons, systems of cooperation and hierarchies of complexity. Any examination of a phylogenetic map (that any biologist can show you) will demonstrate that the origin and evolution of species has followed these basic precepts, which is why we have such a usable analogy with the beehive and the human city. The evolution of *homo sapiens sapiens* from small family units to cities is no different. Hierarchies of differentiation and integration have emerged in city landscapes, where disorganization has evolved into self-organization and eventually organization. We get hierarchies of emergence and cooperation because it is the natural pattern-making inclination of life to develop them.

Clare Graves (2005) calls this journey of differentiation and integration, for an individual, a "never-ending quest." We stand at this time with a new appreciation that the ecology of human systems we have created is calling forth yet another level of hierarchical synthesis. We need to synthesize our understanding of systems — to move beyond differentiating discrete systems into synthesizing systems of systems. This will enable us to see the impact of clusters of cities and/or ecologies of cities linked by trade, transport and telecommunication. We need to see the impact of city systems on ecoregion systems and evolve new hierarchies of interdependence.

We are living in the age of noetic emergence, as foreseen by paleontologist Teilhard de Chardin (1966; 1972). The inclusive perspectives of hive, holons, subsystems and complex hierarchies give us insights into city adaptiveness and resilience.

Stages of Development Create Resilience

Within the ecology of the city, people are at different stages of bio-psycho-cultural-social development. This gives them individually and collectively more or less capacity for resilience. Resilience in the ecology of the city is merely the capacity to survive under conditions of stress. Because each person has different bio-psycho-cultural-social capacities and because life is a dynamic experience, the quality of resilience varies from person to person (and, therefore, from group to group, as discussed in chapter 8 relating to social holons).

The variation in capacities of resilience was highly visible on CNN during the 2005 New Orleans hurricane and flood disaster. In the ecology of that city, those people with greater integral development had more resilience to survive. In other words, they literally had more assets and capacities, in all four quadrants, on which to draw. They had better strength to walk away from threats and had the health to withstand privations; more options to choose from for personal comfort; stronger shared belief systems to buoy their group morale; and access to transportation modes to move out of danger. The poorest and the most disenfranchised had the greatest difficulty surviving. And those who were on the margins of survival only did so because eventually organized private and government systems came to their aid — the collective with more assets and resources assisted those individuals with little or no resources.

The Value of the Collective for Resilience

The hive is dependent for its healthy functioning on the healthy functioning of its individual bees (holons). Likewise the city is dependent for its healthy functioning on the healthy functioning of individual holons in the city.

But at some stage of evolution, neither the hive nor the city is totally dependent on the healthy functioning of every member of the hive or city. One of the values of the collective is that it builds in resilience so that the injury or loss of single holons does not mean the loss of the whole hive. In our individual bodies, this is easy to see — we know that in our different subsystems we are constantly

replacing cells. The epithelial cells in our mouths only live a matter of hours. Other cells in our brain and nervous system live for years, but essentially the individual holons are in constant flows of life.

This staggered flow of cell replacement enables life to carry on, even as the cell holons "change guard" on a steady, measured schedule. Only when a minimum critical mass of those cells is destroyed or damaged at the same time do life conditions change. This can happen with injury, like massive burns to the body, or disease, where large numbers of cells suffer a microbial attack, as in cancer, SARS or flesh-eating disease.

It is ironic that, through the assault of stress, we are able to see the value of the collective. When individual holons create a relationship (i.e., a specialized organization or delivery system) to deliver more value to the hive or city, they create new subsystems that improve the quality of life that would not be attainable if each holon subsisted on its own. Frequently the new subsystems improve the quality of life because they create a capacity that is not available to individuals. This means that more resources can be used more effectively and efficiently because of the creation of such value-adding subsystems. (Any such collective subsystem in the city is necessarily a social holon — people working together with a shared intention of creating value for themselves and/or others, as we explore in more detail in chapter 8.) The big examples are infrastructure support systems (e.g., city hall's public works), education and health systems, workplaces and recreational organizations. In purely energetic terms, these subsystems process energy, information and matter with degrees of added efficiency that individuals are less likely to attain on their own (discussed in the following chapters in more detail).

ADAPTIVENESS ROLES: CONFORMITY ENFORCERS, DIVERSITY GENERATORS, INNER JUDGES, RESOURCE ALLOCATORS

Human systems are complex adaptive systems where, like the bees, the roles of conformity enforcers, diversity generators, resource allocators and inner judges seem to create a kind of group mind for survival and regeneration.

Let me explain what the bees have figured out. According to Bloom (2000), about 90 percent of the beehive are conformity enforcers (CE). They match their cues for behavior and use rules that the majority of their peers do. This means they all tend to fly to the same patch of flowers to collect pollen. The inner judges and resource

allocators of the hive reward them for successful behaviors in proportion to their contribution to the hive's survival goals, which in bee terms is defined as producing 40 pounds of honey per year. Meanwhile, it is the nature of diversity generator bees (DG) — only 5 percent of the hive — to literally fly to different flower patches than the CE bees. The DG job is to find alternative sources of pollen, and the inner judges and resource allocators of the hive reward them fully for achieving their goals.

Given that any patch of flowers has a limited amount of pollen, eventually the CE bees return with less and less of a full load. The inner judges recognize this lower production by instructing the resource allocators to withhold bee fuel, i.e., they shift resources. This changes the state of the CE bees, so that they become sensitive to the dance cues communicated by DG bees, and they are thus led to discover new sources of pollen.

Thus, in the bee community, both conformity enforcers and diversity generators are vital to survival. And it would appear, according to a composite picture of human systems that emerges from looking at the work of Holling, Adizes and Graves, that similar role allocations within human systems have actually evolved to enable regeneration and sustainability.

THE CITY REGENERATES

With some basic understanding of survival and adaptiveness in hand, we can now explore how the city regenerates as a whole. Through our collective connections, we realize that to regenerate ourselves, and thus the city, is not just a simple act of biological union, which is a collective act regardless of the technology used these days. More than this, regeneration occurs through inner renewal, shared learning and teaching and coaching others in roles, competencies and capacities, inevitably in collective groupings.

If life arises from the three simple acts of surviving, connecting with an environment and regenerating, then ecology necessarily has its roots there too. Ecology is merely the resultant entanglement of lives lived in proximity. It is the enmeshment of the bio-psycho-cultural-social existence with all its myriad demographic differences, life cycles, exchanges and symbiotic relationships.

The experiments that people occasionally try, such as dropping into a city with minimal resources and attempting survival, prove this. Such people quickly discover that the practices of connecting with the city environment culturally and socially are

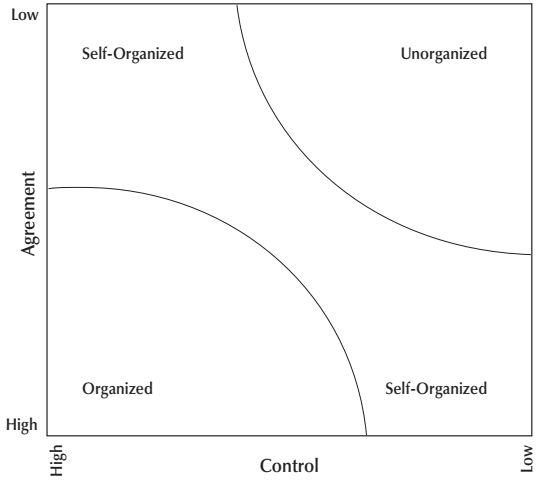
the fastest and truest ways to live in the city. Even those people who choose to sleep rough in the outdoors, in support of the homeless, tap into capacities beyond biological survival that enable them to live in more complex ways on the streets of the city (McQuade, 2005). They bring an intention of inner resolve, spirituality and belief that gives them capacities for connecting with their environment and regenerating hope. In the ecology of the city, like the DG bees, they act as catalysts for change.

CYCLES OF RENEWAL

Renewal in the city depends on many of the capacities people have developed for adaptiveness to their environment. Renewal becomes possible because adaptiveness in the city emerges from massive redundancy in the bio-psycho-cultural-social spheres. For its survival and success, the city does not depend on one ruler or superhero (compared to a castle or feudal manor that did). Instead the city depends on the relationships amongst key roles that have evolved out of a species' group-mind and its ability to shift and flex depending on the life conditions.

Renewal emerges because a city, like all living systems, develops cyclical habits that enable the accumulation, exploitation, distribution and redeployment of resources. Holling (and his colleagues), Bloom, Eoyang, Adizes and Graves all recognize that living systems have natural stages through which they cycle and sequences of super-cycles that result in the evolution of complexity over time. They have identified those stages at different levels of scale: for ecologies, species, systems, organizations and individuals respectively.

Figure 2.1. City fitness landscape.



Holling, Bloom and Graves essentially identify a trajectory of complex adaptive evolution for living systems. Holling (2001, 2003; Gunderson & Holling, 2002) suggests that wealth (potential), controllability (connectedness) and adaptive capacity (resilience) are the "properties that shape the responses of ecosystems, agencies and people to crisis" (2001, p. 394). Holling and his colleagues propose a four-stage cycle.

CITY LANDSCAPES: ORGANIZED, SELF-ORGANIZED, UNORGANIZED

As a complex adaptive system, the city is a container. The container exists in a landscape that is the city's ecoregion. Generally speaking, that landscape is relatively stable, unless forces of nature, like earthquakes, tidal waves or forest fires, change the general conditions, or unless forces of humans lead to water shortages, air pollution or climate change.

Inside the city, we can consider that there is also a landscape — not the type we think of as our front lawn, but a fitness landscape. Viewing the city through a fitness landscape, we quickly assess all the complex elements of the city at once.

A fitness landscape measures the city's degree of organization, self-organization and disorganization (Eoyang, 2007). It has two basic vectors: agreement and control, as shown in Figure 2.1.

City fitness landscapes give us readings on how coherently the city is operating as a whole. They can also be used for looking at the subsystems of the city to recognize how coherently they are operating. Fitness landscapes depend on the relationship between control and agreement in a group of people. If the situation is less controlled, it becomes ambiguous and difficult to understand or adapt to. The less we agree, the less we are able to make meaning together.

Where we have high control and high agreement, we can be organized. This is exemplified by driving on the same side of the road and stopping at street lights. When we have low control and low agreement, we can clearly see disorganization in the landscape. This is exemplified by a multi-car pileup on the freeway in a snowstorm, with no one in control and no agreement possible. When either of the control or agreement vectors is in its mid-ranges, we are more likely to behave in self-organizing ways. This is exemplified by traffic with cars moving easily in and out of lanes, keeping at a steady speed.

In the city, by becoming aware of how we can loosen or tighten control and agreement, we can take advantage of organizational rules of the road that give us predictability, standards and dependability. We can also take advantage of self-organization, like real estate market activity (which is not centrally controlled but emerges through individual action like the *Wisdom of Crowds*, that opens up innovation, surprise and flexibility.

While organization usually seems desirable, it can also lead to stagnation and resistance to change. And while disorganization usually seems undesirable, it is a natural state of changing systems. Disorganization comes from lack of control and lack of agreement. When we view the city as a whole system, we can shift the landscape by moving towards either agreement and/or control. This shifts into self-organization and eventually produces sufficient order to create a solution that serves the whole system. Physicist Stuart Kauffmann assures us that, with self-organizing systems, "we get order for free" (1993).

COMPLEX CITY: CONTAINER, DIFFERENCES, EXCHANGES

The fitness landscape of the city system can be better understood when we use a stronger lens to examine the behaviors in the system's container, in terms of differences and exchanges (Eoyang, 2007). As a complex adaptive system, the city's landscape is a container for people who are different from one another and who make exchanges with one another. Differences can arise from almost an infinite number or any combination of variables: levels of development, race, ethnicity, age, gender, birth order, genealogy, experience, cognitive development, training, belief systems or roles. Exchanges could occur with any transfer of energy and/or matter: a kiss, an idea, a contract, a rule, a sale, a song or monetary exchange. If we use the integral map, we can locate differences and exchanges in both of the collective quadrants and at every level of complexity.

Systems theory tells us that we do not have a system unless we have a boundary. So the boundaries of the city define containers in which we can notice differences and exchanges. The city as a container holds individual holons and groups. The uniqueness of each individual holon contributes to the differences in the groups.

The city is obviously a multiplicity of containers that are massively interconnected. It is a complex adaptive system of systems. The enmeshment of these containers means that differences and exchanges from one container can affect the differences and exchanges in many other containers. As we explore in chapter 8, it is obvious that the individual who is part of a family, a sports team, a work group, a community association, a neighborhood and the city as a whole brings their differences and makes their exchanges in all of these containers.

Moreover, the boundaries of those containers (Eoyang, 1997) can be rigid (like a building), porous (like a friendship group), open (like a walk-in recreation center) or closed (like a professional association). Some subsystems in the city will have boundaries with more than one of these characteristics, thus creating an even more complex container (like a government ministry that has aspects of all these qualities).

The dynamics of human systems within city containers can be measured through the volatility of differences and the frequency of exchanges. Those dynamics will tell us the general state of change in any given container and how resilient the system is (as seen in Figure 2.2).

In Figure 2.2, we can define the four states of change by the degree of difference (low or high) and the frequency of exchange (low or high). When we recognize and locate the state of change in the system based on these parameters, we can identify the following options we have for changing the system:

- **Expand (open or make more porous) or contract (close or make more rigid) the size** of the container by changing its boundaries. This can lessen or increase the pressure on the people and their exchanges in the container. An example of the former is increasing the size of a voting constituency to include more people. An example of the latter

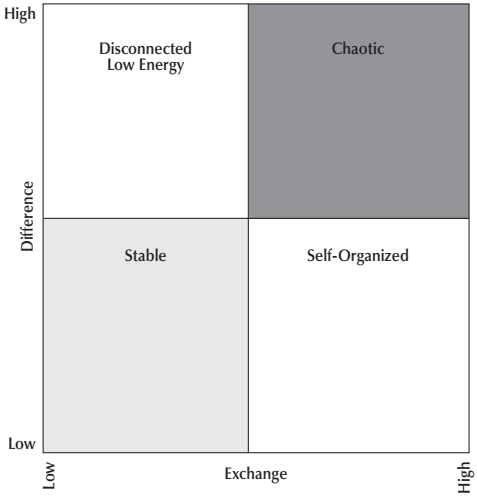
is moving from school-based education to offering home-based schooling to focus on a select number of students.

- **Increase or decrease the differences** of people in the container. This can be done by bringing more people who are different into the container (like implementing an open immigration policy) or by creating a situation where existing differences are reduced through engagement (like creating a buddy system at a seniors center) or increased through making visible the invisible differences (like exploring childcare value systems with parents).
- **Increase or decrease the number and/or type of exchanges** in the container. This can be done by creating life conditions where people connect more often and/or differently (like pensioners reading to children). Or it can be accomplished by preventing exchange (like building a wall between warring factions).

Thus we can see that the city, as a complex adaptive system, is a mesh of containers with varying amounts of differences and exchanges. Seeing the differences and exchanges can give us insights to the qualities of wholeness of the entire city system.

1. Exploitation (low potential, low connectedness)
2. Conservation (high potential, high connectedness)
3. Release (low potential, high connectedness)
4. Reorganization (high potential, low connectedness)

Figure 2.2. City states of change dynamics.



These properties seem similar to Bloom's explanation of how this plays out in the life of bees, described above. Eoyang echoes these in her analysis of agents and exchanges in the container, discussed in the Complex City sidebar.

In stages one and two, the objectives are to maximize production and accumulation. This would correlate to Bloom's stages of conformity enforcement. The "inner judges" and "resource allocators" of the species enforce activities of members to support production and accumulation of what is valued most.

Eoyang recognizes these system states as the experience of stability and self-organization (see Complex City and City Landscapes sidebars). Adizes identifies

INCREASING EXCHANGES, REDUCING DIFFERENCES ENDS STRIKE

At time of writing, an example of city fitness landscapes occurred in the Vancouver City workers strike. The union and the City could not come to agreement on differences related to work rules for over eight weeks: the union refused to concede more flexibility, and the City refused to concede less flexibility regarding the work rules. Moreover, both parties refused to meet for extensive periods of time. So the exchanges were low, and the differences were high, resulting in disconnection. Eventually the solution was to bring another person in (a mediator) to reduce the differences and increase the exchanges, which resulted in an agreement.

them in organizational life cycles as production and prime. Graves identifies them in individual developmental cycles as the zone of integrating and consolidating new learning and operating and adjusting to maintain steady-state knowing.

Holling then proposes that stages three and four maximize invention and re-sorting (re-deploying) resources. Bloom describes these activities as diversity generation. In fact, using the example of the bees, Bloom proposes that the diversity generation activities are going on all the time, but it is only when the conformity enforcement stage fails that the "inner judges" and "resource allocators" of the species allow diversity generators to catalyze new behaviors for the conformity enforcers.

Holling proposes that success in achieving one objective sets the stage for success in achieving the next objective in an endless cycle. When life conditions change the resource flow through the cycle, his research shows these four stage cycles adapt by shifting upwards to stages of greater complexity or downward to lesser complexity. He defines a "panarchy" as a hierarchy "of nested sets of adaptive cycles. The functioning of those cycles and the communication between them determines the sustainability of a system" (2001, p. 396).

EACH SCALE AND STAGE OF DEVELOPMENT HAS RECURRING CYCLES

As we see in the next chapter, at different stages of development, the capacities of living systems are used differently to sustain life through the processes of surviving, adapting and regenerating. Many keen observers of living systems have noticed that the dynamics at play, within any given scale and at any given developmental

level, are essentially the same. (This repeated pattern is an example of fractalness.) In their analyses of dynamic cycles, Holling, Bloom and Eoyang looked more at the stages of adaptiveness that contribute to the resiliency of large-scale whole-living system (ecosystem, species, organization respectively). Within organizations, Adizes looked more at the contribution of key roles; and within individuals, Graves identified the change states and trigger points. Figure 2.3 compares the contributions of each to the four phases that recur at each scale of development.

Figure 2.3. Comparing the adaptiveness components of Holling, Eoyang, Bloom, Adizes and Graves.

AUTHOR	HOLLING	BLOOM	EOYANG	ADIZES	GRAVES
RECURRING STAGES	ECOSYSTEM STAGES	SPECIES ADAPTIVE CYCLES	SYSTEM RESILIENCE STATES	ORGANIZATION LIFE CYCLE	INDIVIDUAL DEVELOPMENT
1	Exploitation (low potential, low connect-edness)	Conformity Enforcement Entry	Stability	Production Key Roles: Paei Production administration, entrepreneur-ship, integration	Delta-New Alpha
2	Conservation (high potential, high connect-edness)	Conformity Enforcement Peak	Self-Org-anization	Prime Key Roles: PAeI Production Administration, entrepreneurship, Integration	Alpha-Beta
3	Release (low potential, high connect -edness)	Diversity Generation Entry	Discon-nection	Bureaucracy to Old Age Key Roles: pAei production Administration, entrepreneur-ship, integration	Beta-Gamma
4	Reorganization (high potential, low connected-ness)	Diversity Generation Peak	Chaos	Startup to GoGo Key Roles: paEi production, administration, Entrepreneur-ship, integration	Gamma-Delta

What we notice is that all five authors have identified the dynamics of recurring sequences that allow the system to survive, adapt to its life conditions and regenerate. Essentially, all five authors agree that human systems are complex adaptive systems where the roles of conformity enforcers, diversity generators, resource allocators and inner judges contribute to the group mind for survival and regeneration.

SUSTAINING THE WHOLE CITY

With our criteria for aliveness — survival, adaptiveness and regeneration — we have some criteria available to us to consider what sustainability of the city might

entail. (This discussion on sustainability is very abbreviated and limited to the city because the topic as a whole is being explored separately by Barrett Brown in a forthcoming book.)

The active field of sustainability studies is challenged by the same spectrum of definitions, worldviews and frameworks as all other modern issues. How we understand sustainability is very much framed by the level of our conscious development, whether we are thinkers, writers, proponents or activists.

Thinking about the sustainability of the city presents an additional challenge, namely the sheer scale of the complex adaptive system that a city represents. When you consider the never-ending dynamics of behaviors, intentions, relationships and production systems that make up the city, the concept of sustaining a city seems to be more of an oxymoron than a possibility.

Any archeological dig will demonstrate the trajectory of city evolution and confirm the fact that the levels and layers of a city are not merely ethereal or esoteric, but are literally locked into the city streets, buildings and pipes. And although this infrastructure changes more slowly than the people who build or use it, change it does. Moreover it can change in the direction of more or less complexity. Many cities in the developing world, with modern infrastructure that was installed by its colonial rulers, display wide evidence of deteriorating public works. Sadly this is also the evidence that infrastructure requires a level of responsible attention and maintenance equal to the levels of complexity that designed it, and when the colonial governments departed, so did the necessary thinking that was required for modern maintenance.

So when we consider sustainable cities, we have to ask ourselves, what are we sustaining? Regional planner Ian Wight (2002) is attracted to the idea that cities arise from the act of place making — the integration of all the ways that people interact to create a place (discussed in much greater detail in following chapters). Can we relate sustainability to the act of place making? Or do we have to step back far enough from the sustainability debate to recognize that sustaining a city must minimally embrace sustaining order, strategic planning, caring and sharing and systemizing? From this vantage point, perhaps it is easier to consider that all we could sustain in as complex a system as a city is the potential to emerge. This would be key to sustaining the city's resilience as a self-correcting cycle of adaptiveness.

We could even suggest that the preface's description of cities as "wild" or "planned" might be extended into our concepts of resilience. For perhaps, the cycles we are describing really identify cyclical stages of wildness and planning? Wildness may be both unavoidable and necessary — the result of discoveries by diversity generators and the redeployment of resources. Perhaps we can see this quite easily when we look at neighborhoods and how people in them experience the realities of Holling's resilience cycle.

In fact Jane Jacobs' descriptions of the Boston and Chicago neighborhoods in her first book (1992) are graphic examples that the city's resilience goes through cycles, like all living systems. For, as Thomas Homer-Dixon points out, you can even have too much of an apparently good thing if one or more of the stages of the resilience cycle is over-extended because the system will have to over-correct. It seems that any phase of expanded growth will be followed by the contraction phases of maturity and eventual dissolution or reorganization. In other words, when any one of the phases of resilience is out of balance with the whole cycle, then resilience itself is threatened. The stories of tragic and unsustainable cycles in famous cities and societies have been chronicled by Jared Diamond in *Collapse* and Ronald Wright in A *Short History of Progress*.

Thus it would seem that a sustainable city is comparable to Graves' view of the individual person's "never-ending quest." It is perfectly natural that the city, as a collective of mixed human capacity, would mirror the dynamic patterns of the lives of individuals, organizations, systems, species and ecosystems. It appears that what is sustainable is the pattern and process of adaptation, which amounts to the resilience cycle discussed above. This is not a widely accepted wisdom where sustainability is mooted as a steady state of existence. Nor is this a politically acceptable pattern for sustainability, especially because the ebbs and flows to the cycles mean the fortunes of some people are falling while others are rising.

Perhaps the closest that we have come to grappling with the implications of this flow model of sustainable resilience is in the economic realm. However, our attempts are clumsily dependent on a mechanistic model of existence where government policies attempt to freeze the cycles of the stock market and attempt to eternally perpetuate its boom cycle. Little heed is paid to the possibility that the bust cycles might be both a natural and necessary reorganization of resources that will enable the next boom cycle. When any cycle becomes overextended, the

ensuing stage is also overextended. The experiences of the 1990s' bursting of the dot-com bubble and the 2007 mortgage-lending bubble seem to prove the point of the reality and the pain of over-corrections. On an equally graphic note, the management of forest practices is learning the terrible lesson of forest fire cycles as natural and necessary to keep forests resilient and emergent (of different species) over long time periods.

With this in mind, it is possible to conceive of a template for cities to develop sustainable practices (defined in such a way that the assets are sustained to serve future generations). But it is much more difficult to develop the minds of decision-makers who can create policies that are not only appropriate to the current conditions, cycles and phases of the city and the diversity of people and exchanges within it, but are flexible enough to change as everything in the city changes.

EMERGENCE: SEEING NEW CAPACITIES IN THE CITY

While I find it problematic to gain traction with the sustainable city, I find it much more promising to contemplate the emerging city. Emergence is a characteristic of living systems that arises from the resonance and coherence of the system. We have seen that resilience arises from the adaptiveness of the system to its environment. Resonance emerges when the system is aligned externally to its environment — it literally resonates with its surroundings. Coherence arises from the alignment of all the elements of the system internally in such a way that energy is optimized. When both resonance and coherence become synchronized, new capacities in the system emerge. This tends to happen at phase shifts, where the internal and external patterns shift from being out of phase, to being in phase with one another. This literally causes a jump into a stronger vibrational quality. We could say the system of the human hive would really be humming a new tune.

We can examine this capacity of emergence from two perspectives. One is holographic and allows us to see how the whole is disclosed from the patterns embedded in all of its parts. The other is morphic fields that emerge from the cumulative repeated activity of like holons and like species.

Holographic City

A hologram is a three-dimensional image that arises from the interference

patterns of two wave patterns. The hologram carries information about the whole in every part of its composition.

Thomas Homer-Dixon (2006), in T*he* U*pside of* D*own*, engages the reader with historical factoids that capture the nature of the holographic city. He derives the nature of three cities from single architectural stones: A foundational stone in the Roman Coliseum; the Temple of Bacchus gate in Baalbek, Lebanon; and the Stone of the Pregnant Woman near Baalbek. Each stone provides evidence for the civilization's values that created them. In that sense they are holographic: a small part of the city that reveals everything there is to know about the city when we uncover how they were created, why they were transported there, who did the work, who directed the work, who designed the structures, how they provided the energy to move the matter and the information to communicate the intentions.

Laszlo proposes that "nature's holograms are cosmic … they link … all things with all other things" (2004, p. 71). The evidence for the city as a holographic entity — where any part can reveal the whole — is available because the city is a whole system that arises from the massive interconnections and entanglements of structures, cultures, intentions and behaviors. In this sense, if we laid our hands on any part of the city and traced the connections of that part to all its other parts, we would discover the subsystems and systems that make up the city. If we could instantly draw that map of interconnections and synthesize their patterns, we would create an instant holograph.

The city's integralness arises from the nature of the integration of the city's holons and hierarchies, as well as the integrity that each of those contributes to the whole system. Integrated integrity is one way of describing the alignment and coherence of the city, and its measure of optimization also reveals the city's capacity for emergence.

It is quite possible that the holographic nature of the city reveals the city's capacity for emergence. We see the whole easily when the holograph suddenly shifts into view from any entry point in the city. For instance, this means that if we look at the quality of the healthcare system or effectiveness of the education system we can obtain a proxy assessment of the quality of life or the capacity for development in the city. Each of the quadrants we explore in chapters 5, 6, 7 and 8 offer holographic views of the city.

MORPHIC FIELDS IN THE CITY

Although we cannot always easily gain the insights that holograms of the city could give us, perhaps we can view the whole city through different filters. If we peer through the lenses that Rupert Sheldrake uses, we can glimpse an intangible reality about human existence that has long been known by people who have the capacity to access it. However, this has also been repressed by those who feel threatened by the existence of anything intangible, regardless of the evidence.

Sheldrake, a biologist, has been curious about how species such as homing pigeons, parrots, dogs and horses seem to know how to travel long distances and arrive at specific destinations with pinpoint accuracy. Individual animals even seem to be able to access human intentions and anticipate human behavior with a high degree of accuracy (Sheldrake, 1988, 1999, 2003). Sheldrake proposes that each species over time creates an energetic field, invisible to the naked eye and not registered on any instruments created to date, but which is nonetheless as real as a radio or television signal. He supposes that members of any species have built-in antennae that access that field and gain the knowledge that is stored there. Dogs can even access the field of another species to which they are closely related.

Sheldrake's recent research has expanded to include human phenomena such as the sense of being stared at, telepathy, foresight and predictive dreams (2003). He refers to these energetic fields as morphic or morphogenetic fields. It appears that some people have more capabilities than others to access the information in these fields. In some remote tribes in the Amazon and Indonesia, and in many indigenous peoples like the aborigines of Australia, these capacities are highly developed and widely shared amongst all members of their society.

In the so-called developed world, very few people admit to having skills related to these capacities, and little credence is given to those who do practise them (some exceptions include police departments who quietly use people with paranormal capacities to help solve difficult crimes). Nevertheless, as evidence builds, it is not difficult to speculate that the city may provide a particularly rich ground for demonstrating the existence of these fields. Nowadays we can measure the amount of physical heat generated by the city. We can also control television and radio signals so individual receivers can decode the signals into usable messages that inform and entertain us. If Sheldrake is right about individual people, in the not too distant future we may discover that every city has a morphic field

that reflects (and even transmits) the patterns of consciousness that individuals and groups are generating all the time.

Philosopher Ervin Laszlo has similar thoughts. He calls the morphic field the Akashic Record (2004) — borrowing from the Sanskrit word for "sky" or "space." Rather than use biology, he uses the science of physics to suggest that the vacuum of space is not empty, but filled with energy and information that we have simply not recognized nor learned how to access in any sophisticated way. Accessing it tends to be accidental rather than deliberate, notwithstanding the fact that, in every culture throughout millennia, select individuals have been taught the secrets of doing so. Laszlo suggests that the Akashic field holds a permanent record of all human (and Earth) activity — just like the brain apparently holds a record of all individual activity since birth (or conception).

The concept of morphic or Akashic fields creates the possibility that we could harness the intelligence that is concentrated in the city to generate much greater (more complex) intelligence capacities than we have ever dreamed of. If we could truly learn how to think together, we could harness the massive leverage of parallel processing that has enabled us to design modern computers and neural networks (like the linking of personal computers for the SETI extraterrestrial life search project). If we can do this, we will see a significant phase shift in human intelligence that will give cities major new incentives to create optimal life conditions to better support human existence. By the same token, in an optimistic spirit, I anticipate that when this intelligence is harnessed we will finally have the power to add value to life on Earth that is both sustainable (not over-using resources) and emergent (always creating new capacities from existing resources).

In the meantime, whether these morphic fields can be proven or not, people can sense the spirit of a city. This spirit may not translate into a metaphor (see Complex City sidebar), but the core values of a city are frequently translated into qualities that people experience as apocryphal, even before the marketers put labels on them. Toronto is good. Paris is romantic. Rome is capital. Rio is playful. New Orleans was naughty. Dallas is driven. London is finance. New York is liberty.

This spirit is palpable and shared by city residents who sense when it is healthy, stressed or damaged and fight to return it to a state of well-being. We have seen, with the visibility of modern disasters, that outsiders will even rally to restore the spirit of the city. Citizens who have experienced natural or terrorist

disasters, such as those of New York, New Orleans, Osaka, and Mexico City, can all vouch for the reality of shared intentions to return a stricken city to health. Such transpersonal support inevitably rallies spirit within the city to rebuild and restore and replace what was damaged.

CONCLUSION

If we don't see cities as if they were whole systems, then we cannot discern their purpose, alignment or coherence. We are blocked from recognizing patterns, processes and structures in the living system that can inform us of the natural emergence of the city's cycles and phases.

If we don't see cities as if they were whole systems, we are doomed not to achieve life enhancing results, supportive relationships or resilient well-being. We look at time frames that are too short, space frames that are too flat and people frames that are too narrow.

On the other hand, if we see the city as a whole system, we can appreciate its embedded wisdom for surviving in its unique life conditions; the mystery of its collective life force; and the tremendous potential it embraces in the energy, information and matter that it embraces. Seeing the city as a whole helps us to truly appreciate the performance of its subsystems and gives us the context in which we can understand and flow with emergence.

Three simple rules for applying Integral City principles from this chapter:

1. Survive so holons serve each other's existence.
2. Adapt to the environment.
3. Create a self-regenerating feedback loop, by interconnecting human regeneration cycles so that they replenish the environment.

QUESTIONS

1. How can all the fractal-like subsystems in the city reach their potential and contribute to the well-being of the whole without centralized control?
2. What supports does a city need at different stages of development? How can we lead any given city into the next natural stage of development for it?
3. How can the cities of the world see how they are connected as nodes in a global network of intelligences, capacities and potentials? How do we develop tools that enable release of blocks to this energy and enable open system flows, within cities and between cities?