Chapter Ten Section One

Outcomes and Sequels

Converging to Common Destinies and Diverse Sequels

This outlook sounds excessively optimistic, but remember that all that was promised at the start was the discovery of paths that could lead to a sustainable future and a new horizon in cyberspace. It does not take into account the accidents and wrong turns experienced along the way as matters of political expediency or attributable to natural disasters.

One conclusion stands out from the observations made in these chapters: Wildly different extremes in human options observed today will be pressed by global trends in:

- communication
- migration
- education
- financial markets

to converge toward a quality of life acceptable for (almost) everyone. Let us be satisfied with about the 95% level.

There will always be in our time, the isolated tribal peoples and widely deviant belief systems which have attracted communities of their own they are opting out of the mainstream.

Forces much larger than communities direct their planning toward goals that are not only compatible with each other, but are mutually reinforcing. Shortages and inequities that emerge unexpectedly can be overcome by stockpiling and rationing appropriate commodities, and preparing for restorative programs after local disasters.

The necessary resources can be tapped through enhanced transport capacity and, especially, telecommunications capabilities, if the needs are legitimate. These were the assumptions of the earliest visions of global urbanization (Doxiadis and Papaioannou 1961), but now much of the obscuring uncertainty has lifted.

The sustainable future that will follow from our present state of Knowledge is very different from what is being envisioned by economists, political
writers, and development enthusiasts. Their imaginations are tied down by
detailed evaluations of current expectations and statistics, rather than
being informed by the potentials of innovations already being implemented.

Twenty Forces of Social and Technical Change

The momentum of tested social and technological change is so great that it
will overcome the strongest barriers in view and carry us toward a crudely
stationary state for the well-being and life satisfaction of individuals.

It is expected, however, to be a bumpy ride for many communities, one
marked by emotional disappointments and upsets of idealistic dreams. Among
the strongest forces for change are the following:

1. There will be a continuing general drift of poor rural people into urban
   communities all over the world in search of a better life.

2. Cities will be integrated through:
   - commerce
   - finance
   - migration
   - tourism
   - education standards
   - popular culture

   into a world system that is simultaneously competitive and cooperative -- a
   characteristic of all ecosystems.

3. Women will gain increasing freedom to make personal choices to:
   - vote
   - gain education
   - operate enterprises
   - control human reproduction
   - fill top positions of management and leadership

   reaching the degree already achieved in Scandinavia at the turn of the
   millennium.
4. Voluntary efforts will reduce the birth rate to averages of less than two children per woman, thus solving the population explosion problem in two to three generations without coercion (as was too commonly used in China and tried for a short while in India and Pakistan).

5. Continued extension of the normal life span will be brought about through medical progress, thus contributing to further population growth, particularly among the aging.

It will be accompanied by a movement of the elderly into the growing number of service occupations that require less physical activity, leading to a peak world population of ten billion to sixteen billion, compared with a current figure of around six billion.

6. Regions with limited water and energy supplies will eventually abandon their aggressive takeovers of the hinterland and apply conservation strategies to overcome stresses from periodic droughts, floods, and blackouts.

7. Famine threats will be overcome through
   - enlarging world markets for staples like grain, cooking oils, sugar
   - plans for maintaining adequate stocks
   - stabilized irrigation contracts
   - urban organic waste recycling into perishables and small livestock

Consequently, food prices will be affordable, and move in a narrow range, roughly equal to those in the early 21st century experience.

8. Energy prices will be stabilized at levels 50 to 100 percent higher than the low levels created by cheap natural gas. Electricity will be supplied by various alternative sources, increasingly solar in origin, and nuclear fuels will come back where they are not feared. Petrochemicals and plastics will change little in price as new catalysts are adopted.

The final cost per capita of energy will actually be reduced by enhanced demand management, cogeneration, and designs for recycling.
9. Telecommunications satellites and fiber-optic cables will support a dense communications network and access to services so that costs of telephone, fax, e-mail, and Internet connection rates will be perhaps half those current in developed areas, and probably much less a generation later.

10. A global credit and investment system will dominate inter-metropolis transactions and most local financial services, within which transactions will reach a level of tens of trillions of dollars per day, will depend upon micro-payments.

11. Carefully graduated, locally managed, interactive education -- a principal component of future investment in human resources -- will be universally available by 2020 through telecom satellites at present costs or less, while examination standards will be maintained by global committees.

12. Traffic congestion in the expanded cities will be kept at tolerable levels by charging variable tolls electronically for use of:

- public bridges
- expressways
- mass transit systems

13. Most features of national sovereignty, such as:

- currency control
- development programs
- censorship
- postal systems
- military drafts
- entitlements for pensions
- migration control

will effectively slip out of the hands of the executives and legislators of the nation-states, which will be reduced to serving mainly as cultural entities.
14. Conflicts between nations will continue to get headlines, but so will the resulting follow-up negotiations, while rogue nations’ quarrels originating from feudal animosities will be deflated by outward flows of funds, emigration of talent, degradation of local education, and warnings of increased risk.

15. Escalation of destructive, organized conflict can henceforth be halted by regional police units’ use of non-lethal weapons to disable and disarm paramilitary forces in out-of-the-way locales. Conflicts are suppressed by the free flow of information.

16. Terrorism, the willingness of some groups to risk their members’ lives and those of others in defense of tradition-based political, religious, and ethnic concepts, will diminish as cities homogenize. However, weird religious cults are likely to recruit from the minority of individuals who continue to seek beliefs demanding their total commitment.

17. Urban regions will administer most sovereign functions of nations and will compete with each other by offering various improved formulas for quality of life.

Therefore, when metro population or influence declines in a given region, perhaps because residents feel the city is too crowded, the resulting emigration will reflect upon an urban management that does not adapt to strongly shifting tastes.

18. Urban communities within the respective regions will continue to improve a planning process that chooses a subset of goals that are compatible with their immediate environments.

They would choose indicators for well being:

- serenity
- life satisfaction
- happiness

with which to assess performance over time.
19. A new ecosystem is emerging in a virtual electronic universe of bits, which vastly speeds up the acquisition of relevant information, greatly reduces routine transaction costs, and seals the alliances of "world-servers" who overcome political blockages.

Consequently, desirable adjustments can be executed relatively promptly and undesirable proposals hooted down in very short order, thus accelerating joint progress toward a sustainable society.

20. The most impressive evidence offered for future cultural convergence of civilization is that, in the next generation, a common tongue is not only possible, but already developed.

We will not only gain greater competence in speaking to our computers through an interlingua, a translatable nuts-and-bolts language, but it can speak back to us in "computer English," or a direct translation into a familiar tongue containing jargon, but uncomplicated by metaphor and idiom with local origins.

According to the second law of thermodynamics, the normal drift for a world order is toward increasing entropy, adding to the chaos that prevents realization of expectations of higher integration.

However, the powerful set of forces listed above accumulates information (negative entropy) at all known levels. Those forces and trends make possible a future world order with incremental improvement in achieving common aspirations.

Such a global outlook sounds excessively optimistic, but remember that all that was promised at the start was the discovery of paths that can lead to a sustainable future.

This scenario does not take into account the accidents and wrong turns experienced along the way as matters of political expediency. Nor does it suggest that political incidents resulting in extremely undesirable outcomes other than war.

- Financial inflation will diminish in frequency. Innocent bystanders, however, are much less likely to suffer.
- People can be stupid, even when working in their own interests.
Machines are often perverse, and organizations are loath to change their ways, often splitting into mutually destructive factions. Nevertheless, powerful techniques of collaboration for achieving the goal of universal sustainability have become available, creating an unprecedented opportunity.

A strong effort has been made here to suggest a family of paths that possess the lowest environmental costs and the fewest technical difficulties, as judged by human world-servers. Principles for incremental social change and management seem to apply across many cultural boundaries, and they are now widely taught in schools and workshops.

Once the foresight, envisioning, and planning are set into motion, the hardest task will be to persuade community members -- i.e., to achieve a sufficient degree of consensus. For the world as a whole, that consensus may take less than a century of effort.

If you represent an institution with money to wager on the very long term, your winnings should be surest when betting on the changes listed above.

Just as national boundaries are eroded by a flood of bits, the boundaries of urban communities are made increasingly porous to all types of immigrant actors, whether these fit the categories of humans, animals, weeds, homes, schools, commercial establishments, vehicles, or voluntary organizations.

Local bursts of growth result which create both threat and opportunity.

A surplus in one community may fill a deficit in another with a lag of a few years, but this occurs more promptly as transaction rates increase.
Chapter Ten Section Two

Gated Communities and Women’s Preferences

Roads to Sustainability that get Lost in a Muddle

One of the best ways to illustrate the process of change is to review prominent cases in which people have attempted to keep out intrusions.

"Gated" neighborhoods in North America were mentioned as a design category for new construction that attracts members of the moneyed classes who fear:
- violent crime
- traffic noise
- lack of orderly appearance
Also insist upon a solid house that has an expected life of one hundred years or more (Blakely and Snyder, 1997). These residents are willing to pay a large premium for a community fence or a wall, uniformed guards at the gate, and a homogeneous appearance.

When a high level of quality has been achieved, the intent is to preserve the neighborhood in a physical and legal cocoon for resident households.

That image of perfect security and splendid order lasts for perhaps five years; at that point, varying tastes for landscaping begin to show. Dependent and disapproved relatives have to be taken in as families evolve, causing houses to undergo discreet remodeling, usually in the back.

After about ten years a scattering of houses comes onto the market, and it becomes evident that the moneyed classes are changing their style preferences, so the houses can be sold only at a notable reduction in price from the top of the market.

At about fifteen years maintenance costs build up and special community charges feel onerous, so the neighborhood drops its security to a level with no guards and depends upon electronic alarm systems or block groups organizing a neighborhood alert arrangement.
At twenty years changes by new proprietors become frequent and structural changes are common. Solidarity among the residents wavers in the face of economic losses, and even the order imposed upon the fronts of homes by the original designers is broken.

Before thirty years the turnover of first owners exceeds 50 percent, as some of the remaining first residents are moving to nursing homes. Those people who are willing to buy have come up from the working classes or are middle-class immigrants.

At thirty to forty years the once-gated community reverts to the mean in the metropolis. However, each building still has more than half its life cycle remaining, so it will be remodeled to fit local circumstances two or three times before it is replaced.

At ages fifty or so the former high-status community will converge with some of the up-and-coming, formerly poor neighborhoods that have been gentrified and have become stylish.

Europe and Japan have less violence and therefore less demand for gates in residential areas, but they experience almost the same levels of spatial segregation by social class as occurs in the United States.

South Africa, at the other extreme, has much lawlessness left over from the era of apartheid, so it has gated shopping areas equipped with parking lots and armed guards, though these are gradually relaxing. Communities cannot keep the homogenizing urban ecological forces out forever, even in Africa.

**Women Unveil Their Preferences**

It is also possible to grasp the meaning of convergence by considering adaptations made by individuals, by gender and by aesthetics, to the sweeping changes that are known to be imminent. The free choices that people make will add compatible variety to community ecostructure.
We know, for example, that boys outnumber girls at birth, but women live longer, making it possible for women to outvote men fifty two to forty eight.

Why then have women not mobilized their majority to trim legal restrictions imposed by traditional, patriarchal institutions? Behind closed doors, many women have already acted, so that abortion, defined as murder by the fundamentalist churches, is paradoxically most often practiced in Catholic- and Protestant-dominated communities, though covertly. Women have very seldom organized their own political parties or demonstrations on a scale greater than of face-to-face communities.


These investigators asked:

- What are women's nagging concerns?
- What are they willing to sacrifice?
- How would they respond to ten perturbing mega-trends that cannot be deflected for at least a decade?

These reports were assembled into collective behaviors that responded to distinct possible global waves:

- backlash from forced changes
- equalization of opportunity and reward
- "two steps forward and two back,"
- "separate, but doing nicely, thank you!"

The future is likely to include all of these trends somewhat, and the mix will add some trends not yet imagined.

For both sexes, the major prospects in the developed countries recognize the strong influence of aging populations. That process will create opportunities for female migrants to be employed in providing nursing and personal care (pioneered already by six million Filipinas, but they will be outnumbered twenty fold).
Among retirees themselves, 60 to 80 percent will be women; this group will include individuals who are in personal control of assets amounting to well over half of the total private wealth.

Therefore the remuneration for service workers who learn the local languages, and earn the trust of their employers, could be quite high. Migration from rural areas can supply temporary helpers, who will do the cooking, cleaning, and simple services that require less training.

Some middle-class pensioners already recognize that they can get much more service for their limited funds if they take the initiative, and they migrate to places in Latin America and the Mediterranean coast with the most pleasant climates. Many win-win-win solutions can be found in African and Asian niches where these population interchanges are welcomed and expedited.

Mention has already been made that education for girls and poor women has been recognized as being the best current investment in human resources available. Most successful teachers (a group made up predominantly of women) will switch from teaching techniques and procedures to an emphasis upon learning.

"Collaboratories" employing interactive media and the Internet seem to be more fun and more efficient than most of the standard schooling approaches. Learning technologies contribute depth as well as breadth. When information-deprived regions acquire learning, we should expect some women to use their experience and move up from running micro-enterprises to management of sizable companies.

At the frontiers of biotechnology a fully artificial womb is a natural successor to the arts of saving the lives of infants born premature and the techniques associated with cloning. In the beginning, while an external womb is still expensive, it would be embraced by women in business and the professions because it overcomes the most tedious stage of motherhood, pregnancy.

It may also be popular among poor women in backward, misogynistic social systems. McCorduck and Ramsey (1996) suggest that many women in those
circumstances could opt to live in "femmunes" that offer refuge, productivity, and sisterhood. The rapidly increasing proportion of women electing to be single mothers (30 percent in some cities, many of them well educated) might consider joining specialized convents and refuges offering mutual support.

Societies with surpluses of males that are created as a consequence of the selective abortion of females (a practice reinforced in China by the imposed requirement for one-child families) will be searching for alternatives to polyandry. An artificial womb may appeal to men forming permanent brotherhoods (secular monasteries), and gender-segregated communities may exchange frozen sperm for frozen ova. Natural communities containing birds, fish, and insects have evolved many arrangements for reproduction and rearing of broods. With the aid of modern science, humans can invent many more.

In an increasingly permissive urban society, places can be found for all of these strikingly diverse associations and neighborhoods. Convergence of traditional values can distribute a variety of quite different personal lifestyles, as well as ecological interdependence, without sacrificing political stability.
The twenty separate trends listed above, and the appearance of the new capabilities that will be listed later as prerequisites for true sustainability, are strong enough evidence to justify wagering on peaceful intermingling of peoples, but a recent finding regarding constructed and preserved environments reinforces that expectation even more.

The finding arises from elegant experiments on images of the environment reported by Stamps (1996, 2000), some of which have already been introduced. Since the ecology of images supplies controls for change in the community, explicit images in transactions are used to plan, design, construct, and manage the change.

If the meaning and value (preferment) of images tend to converge among new residents in the city, they are expected to cause real conditions to change in that direction for the newest urban settlement. Stamps's original experiment was not designed to test this proposition, but to discover fundamental conditions determining environmental valuation.

Relationships between populations and illustrated environments were intended to throw new light on arguments regarding environmental determinism and public choice. He is interested in the extent to which beauty is inherent in the natural and built environments, and how much it depends upon what people have been taught, as distinguished from experience. He sought answers from random environments and randomly selected people.

Stamps categorized his subjects as:
(1) women or men
(2) white or nonwhite males
His original environmental settings from San Francisco and Boulder, Colorado, were pictured on slides. They ranged widely in content and were stratified, each of them constituting existing associations of specific images that could be named and listed.

Each respondent judged the slides on a seven point scale ranging from extremely unpleasant to extremely pleasant, and the components were calculated.

Overall, it is valid to argue that places themselves have a far greater effect upon people’s feelings at a given time than do their individual social backgrounds. The choices of all ethnic components among the subjects were highly correlated with each other ($r = 0.84$ to $0.97$), with the largest divergence being very limited separations in preferences between poor African-Americans or Hispanics versus middle class Caucasians.

Surprisingly, conservatives in these populations most preferred modern offices and smaller houses, while liberals favored Victorian revivals. The choices of women were very closely correlated with those of men.

Stamps concluded that very little dissension would exist in the public when and if environmental preferences came to a vote. It should be noted that the preponderant adult population in San Francisco is made up of first- and second- generation immigrants arriving from extraordinarily different environments elsewhere in the world, and not the immediate region, while Boulder attracts urbanites mainly from the Atlantic states.

The combination of human subjects in this study is indicative of the expected makeup of a large share of future urban populations in America.

The subjects of the Stamps study showed well-formed preferences for specific types of environments. The greatest difference was reported.
between the reactions to slides showing nature and those portraying older industrial settings. The variance in preferences was low enough to suggest that it would not be difficult to reach a win-win-win resolution for urban and environmental change.

High levels of agreement on sustainable designs are expected. In extreme cases, on occasions where there is some doubt, a study costing less than 1 percent of the budget for an improvement project could point the way of least resistance to constructive change. Observed resistance to such change may be attributed to a lack of information or to suspicions about the motives of its proponents, and reinforced by the ingrained ruts of conservatism that normal people create for their impressions.

Remember, however, that these images of the environment were untainted by their names or verbal associations.

A psychological study such as this one suggests very strongly that previous popular resistances to change in urban environments can be overcome.

Populations that have migrated one or two generations earlier from varied ethnic communities in the countryside learn quickly. Stubbornly held preferences are overwhelmed in a decade or so, and tolerance for diversity eventually prevails.
Chapter Ten  Section Four

Personal Image, Unique Identity and Privacy

Issues for the Next Century

More forceful than any of the twenty trends raised at the beginning of this chapter is the realization that most ethical dilemmas of the twenty-first century will be shared by large numbers of people, rather than particularized in small societies and tribes.

Moreover, agreement regarding human rights and preserving the Environment will be recorded on the Internet, thus dampening inflation of threat by wild rumors. Violations of the global agreements intended to achieve sustainability can no longer be hidden effectively by authorities.

The genome of the human race, as well as those of the species of model organisms used for studies that have enabled us to understand our own physiological management, is an extraordinarily rich common resource.

Genetic maps of our crop plants, domesticated animals, and indicator species for the natural ecosystem will be completed and shared shortly, now that the human map has been decoded to reveal the locations and functions of all our genes. World-serving professionals have remarkably high agreement on what should be done with the new knowledge.

The life of the mind is molded first by parents and educational institutions, and later by the biases in the media. Information scientists and technologists believe strongly that the flow of information and an idea on the Internet is self-correcting, requiring much less time to erase error than before. Life of the mind in urban ecosystem is now quite familiar, and it seems to reach its high points while in collaboration with other minds.
The world as a whole now has an added dimension for accelerating consensus building, taking an incipient collective Mind into totally new territory which will require responsible professionals to intervene.

For example, several surveys show that 6 to 9 percent of the population, regardless of environment or wealth, suffers from chronic depression (The Economist 1998), a significant part of which can be traced to genetic triggers.

If this disorder, or the widespread acute arthritis anticipated in the threefold to fourfold increase in the proportion of the elderly in future no-growth populations, could be banished by the burst of new knowledge, there would be an objective basis for meddling with life. Until now incremental advances have been found only after groping in the dark with exploratory studies on animals, followed by exhaustive tests on human samples costing much time and more expense. In the future, better results can be achieved in less time by changing the functions of some genes.

What should be the rules for and against meddling with life? The first arguments have been widely aired in public, but the worries expressed have been based upon imaginative guesses, ignorance, and the taboos the twentieth century inherited from the deep past. One of the first critical points for responsible use of genetic information, for example, is to decide on the assessment of evidence and the management of risk, so that risks can be balanced on the basis of tested knowledge rather than on strongly held beliefs. Another is to apply knowledge provided by the genome study to replace inherited defects (Kitcher 1996; Orlica 1996).

Intervention with gnomic knowledge causes less mischief in the future of a community than, for example, the current tolerated practice of applying quick tests to determine the sex of a fetus, which in many developing societies typically results in the abortion of female fetuses. Striking social changes that occur later are obvious when parents negotiate dowries and bride prices.

In communities practical short-term reasons abound for not having many more young men than young women in the property-owning classes.
Fortunately, a continuing stream of responsible world-serving professionals will post clear warnings of the social costs as the threats arise.

A second "sin" against the ecosystem is the irreversible modification, on the basis of administrative whim, of someone's personal image, whether it is the passport photo, telephone number, voice print, tissue type, unique DNA sequence, or other proof of identity.

All of these are specifications of an individual person better than fingerprints. A digitized wallet card will contain much of this information, plus codes for entry into homes, bank accounts, passwords in a personal computer, and avatars in virtual communities.

Known instances of theft of identity have caused much more mischief than the loss of mere cash. Psychologists were morally concerned decades ago about the application of behavioral modification techniques that caused unthinking reflex behavior or acute nausea and would thus cause a partial loss of personality (although one that can be undone at considerable expense).

If readers imagine other serious sins against the ecosystem, a moral philosopher will have the basis for amendments to an existing set of commandments that are applicable when a community feels obligated to maintain harmony.

An area for moral consideration is tolerance.

Many more challenging differences in people, things, and styles will confront communities in the future. Given an accelerated growth in the stocks of Knowledge, we expect that much more of it will be available for community judgment.

Remembering that images in these stocks cooperate and compete for survival in an ecosystem maintained by media of communication and interaction (chapter 6), we depend upon that huge enlargement of Knowledge for "leveling the playing field." Protection of identity for humans will
continue to be jealously guarded, but for other members of communities, such as:

- pets
- trees
- flower beds
- buildings
- vehicles
- robots

mutual understandings have yet to be reached. Concepts of privacy are closely related to those of identity, and they will be redefined in every generation and transmitted informally by parents and the juvenile culture in schools and formally by changes in the law.

Classic views of toleration and equity, from the libertarian to the neo-Marxist and religious positions, will need to be explored. The conflicts can be tried in role-playing gaming simulations to discover implications for future human predicaments. Clashes of personal values and feelings will sometimes be monumental -- the stuff of great drama -- but such rifts no longer seem likely to lead to armed conflict -- merely a rash of small-scale rebellions.

In the forthcoming ecumenopolis most people will "live" in two or more communities and make repeated visits to others, each having different rules for respecting privacy. The range of possible roles for alter egos on the Internet will attract those who are still explorers.

Domestic partnerships, day-to-day living arrangements in households, and living co-ops associated with a variety of cultural environments can be investigated by the curious. This choice of communities could diminish the frequency of unhappy divorce and dissociation. Charters for launching idealized "new towns" and neighborhoods will continue to be formulated, and they will advertise their way-of-life attractions widely.

New town planning and design brings up the thorny issue of land management.

- How can urban residents obtain multiple occupation of a site (mixed use at a single address) and easier recycling of space? Concepts of privacy, property, and territoriality intrude to stimulate many gradations of "No Trespassing" signs.
• When may strangers be permitted travel through private property, rather than going all the way around?

The tradeoffs between human time budget, privacy, and location preference require the existence of more efficient transfer of land use and a land market expedited by an integrated transport service.

Land boundaries that were firmly impressed upon the map during an earlier socialist, feudal, or tribal period introduce a handicap that is not readily overcome. For example, when Tokyo’s feudal traditions were married to modernized financial instruments after World War II, a gigantic price bubble grew to five trillion dollars at market price by 1990! The effects of the burst of that bubble upon urban real estate values had repercussions felt around the world.

They resulted in a frightening, decade-long recession for Japan before its institutions could start readjustment. Japan’s painful deflation postponed any meaningful planning for sustainability during a period of record growth elsewhere.

Land use economics are also misunderstood in countries that have long been committed to capitalism; the worst instance of land price inflation (that of Japan peaking around 1990) reached a scale sufficient to break the banks and other key institutions, requiring government rescue on an unprecedented scale.

Mistakes elsewhere (in places like Taipei, Jakarta, Seoul, Bombay, Bangkok, Malaysia, and the United States) have been short-lived and more forgiving.

Recognition of the technological capability of moving to offshore settlements in the future could reduce the serious losses in land assets that might otherwise destroy banks, insurance firms, and other important institutions.

World cities should converge upon land rents that fit into a quite narrow range, perhaps 20-30 percent on both sides of the mean for the world as a whole, due to interchangeability of locations once they all have access to the Internet.
Scarcity of land types and the uniqueness of sites for headquarters, manufacturing, and food production are disappearing over time. Due primarily to the Internet and telecommunications advance.

Their significance will give way to investments in human resources. One might think of the new prevailing scarcity as being capacity for human attention instead of space-time.
Trends leading to global political and cultural convergence suggest that managers with an ecosystem insight will have a much wider range of opportunities.

The possibility of being promoted to higher posts is a major consideration for managers, and it is evident that managers will need multiregional, multicultural data-interpretation qualifications. Serving the organization outside the headquarters is no longer a serious separation, and it is more likely to lead to recognition of merit in manufacturing, accounting, community relations, training and other expertise.

Managers must still be generalists, ready to rise to the challenges of the moment, and an ecosystems background reaches toward a wider range of solutions than previous concentrations in classics, history, engineering, chemistry, or economics.

The strongest, fast-growing companies and state enterprises depend heavily upon staff members who have learned to negotiate with an increasing variety of actors who influence quality when buying, making, selling, and servicing goods. The best of them will look for skills in appraising life cycles of products, images, and the agencies that promote them.

Organizations hiring managers are becoming bigger than ever. Some new ones, such as Intel and Microsoft, are catching up to behemoths like Toyota, Citibank, and Exxon, riding the growth waves of urbanism, of relevant knowledge, and of market.

Managers of such mega-firms feel they cannot afford to neglect the challenge of entering China or India, and they may forgive early failures.
while wondering how anything can be done to get Africa moving before its population size exceeds critical dimensions.

Pacesetting organizations are already reacting to the recognizable global shifts, and the twenty trends toward convergence in outlook ensure a large population of imitators, some of whom will emerge as successors whenever the leaders stumble.

An added emphasis upon equity, and continued outreach to bring marginal people into the modern ecosystem, will gain greater weight as the International Standards Organization's norms are taken seriously and are integrated into corporate behavior.

Threats to the natural environment have already confronted almost all entrepreneurial teams, with inventive managers often becoming enthusiastic defenders of nature. NGOs dedicated to promoting equity and the environment are finding ways to reward their managers' achievements with the kind of respect, intellectual freedom, and other satisfactions that substitute for mountains of cash from bonuses.

A full career in the management of nonprofits would include time spent in creating organizations, piloting them through rough seas, and taking on public service, even politics, to help regulators keep the system healthy. That prospect should never be boring, but would yield much fun and satisfaction. Leading schools of management are taking notice, and creating special curricula in nonprofit management.

Profit and wealth goals give way to indicators of human and ecosystem betterment
Planners face a major expansion of their concerns. The old methods still being taught in the universities do not tell them how to achieve a high quality of life with less and less resource input.

The proposed alternative, a community ecosystem framework, offers more opportunities along with a far greater range of responsibilities. In the transition period increasing uncertainty prevails regarding what policies are right and proper. When earlier paradigm shifts took place in other fields, such as physics, biology, and engineering, the establishment denounced the "new wave".

Only when the new tools are shown to serve up more and better answers to embarrassing and perplexing problems than the old, is the shift vindicated. Ecological principles offer a more holistic planning theory than exists now in the urban, regional, environmental, and corporate domains. A wider range of indicators supplies much greater influence for redirecting the evolution of communities toward sustainability.

**Twenty Prerequisites for Sustainability**

A brief explanation precedes the presentation here of prerequisites for communities to be sustainable. The essential propositions are restated succinctly before suggesting further outcomes.

Comprehensive models for flow-through, ecostructure, and life cycle, are quite descriptive, offering only a few surprises to an urban dweller.
However, ways of redefining interaction in basic elemental units, called transactions, are familiar to experimental behavioral scientists and physicists, but not to bioecologists, urbanists, or most managers. Those concepts of transaction require extra emphasis in professional education.

The transaction is a fundamental, elementary unit of ecological life. It has actors, exchange, an address, and a calendar date with time for completion, media for information transmission, a process, and payoffs. Any kind of transaction that pays off positively to two or more actors (win-win) is likely to be tried again. If the community or environment also gains (win-win-win), there is not likely to be a delayed backlash against repetition.

Thus transactions have a space-time dimension, information transmission, and an energy component. However, something else must be added that we can call alertness, which mobilizes attention. When it is present, a trace or essence is distilled from the transaction that takes the form of memory, and it is connected later with the experienced outcomes or rewards. When the most valued memories are codified and communicated, they become small pieces of shared experience that can crystallize as public Knowledge, after being tested for validity, using the experience of others.

Sustainability requires a selection of those transactions in which everyone wins. This enables us to overcome the effects of those that inadvertently and unexpectedly have a lose-lose outcome, and those that are exploitatively win-lose. The greater the number of completed voluntary transactions per capita per unit of time, the better is the overall quality of life in the community; and its security improves.

An acceleration of economic transactions -- a subset -- generates economic development and accumulation of wealth, while other subsets strengthen human bonds, add to recorded knowledge, produce happiness, and other components of human well-being.

A distributed control system for the community was identified. This system has a function similar to that possessed by the nervous system for an organism.
It must contain a map of the system itself and a charter for its actors and transactions in some easily manipulable, iconic form that behaves like an ecosystem, e.g., and ecology of images. It expands beyond physical reality to include myth, metaphor, abstract mathematical concepts, poetic statements, and the like.

An image, too, has a life cycle, something like that of a species in the biological world, with a population that rise and falls, and it may become extinct if not used. Artists, designers, scientists, explorers, and other creative people generate new images and connect them to existing populations.

Within organizations their utilization influences and directs the transactions. Technologies are ordered series of transactions that yield known behaviors and products with very high reproducibility.

Finally we come to the process of planning change in complex communities such as urban settlements. Planners can ransack Knowledge for the frequency of images in transactions, construct ecological accounts, and set up optimization strategies for obtaining more of the winning outcomes in future transactions.

One body of information needs to go out to producers and suppliers, and another to the consumers who pay the costs. Planning can be made to sound simple in terms of ecological theory, but unfortunately planners must cope with fragments of experience, many of them unrefined, inadequately connected, and backed by poor data.

Therefore, intuitive approximations of frequencies, from rare to very common, are still employed by decision-makers. The important feature of ecosystem management is that the ecology of images brings animate and inanimate, economic, social, cultural, aesthetic, and moral components into the same information system.

A small population of search engines can then be instructed to comb the stock of public Knowledge for answers to questions.
These concepts have been taken to the field by planners, teachers, and students in several poor countries to obtain impressions as to what detail of planning is feasible immediately. In that way a set of realistic goals for the “paradigm shift” can be established.

An overview of the:
- inputs
- outputs
- population sizes
- human time allocations
- various transaction rates
- recorded knowledge
- photos
could be obtained for an urbanizing village of about eight thousand persons outside of Delhi at a cost of only one person-year of junior professional investigation (Saini 1989).

The proportionate cost decreases as urban databases are applied and smaller samples can be used, making a comprehensive view of the community ecosystem anywhere in the world seem quite practical, allowing reasonable margins for error.

Conclusions from empirical investigations of poor communities suggest that the quality of life can be improved with a low demand for scarce resources.

The densely settled state of Kerala at the southwest tip of India, for example, has evolved such communities with:
- adequate nutrition and health
- a birth rate holding at replacement
- high levels of education
- a superior degree of equity
- public order
with a consumption level only a bit higher than the Indian average.

What should be done with community ecosystem data? One can estimate, with some precision, efficiencies in consumption (i.e., local consumption as compared to the best reported) for such inputs as fuel energy, food, water, land, and various scarce materials.
Then planners can ask, “What adjustments would be required for the respective populations in the community for each proposal for economizing?”

The evidence shows repeatedly that to reduce the need for scarce inputs significantly a major increase in information-rich transactions, such as educational messages and telephone calls, is required.

As additional capacity for communication becomes available, the economizing policies of demand management have an excellent chance for success. A comprehensive review is presented as a checklist in Box 10-1.

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**Box 10-1**

*Community Requirements for Stability*

*Prerequisites for Sustainable Communities*

*The Setting*

Recall that community is a stratum between a macro-world and the micro-context.

Society (state, economy, culture, region) makes up the next larger scale level, and ecosphere is a still more expanded level. Different prerequisites for sustainability apply at the respective levels. At a smaller scale than community, we look for the viability of organizations, for which the prerequisites depend strongly upon type and function (market and nonmarket, governmental and nongovernmental, voluntary and involuntary, etc.).

Organizations expedite special portions of the lives of individuals. The prerequisites for sustaining urban communities that follow are framed so as to be as explicit as possible. Each of them suggests counts or scales, so that measurements over time are possible.
The community seeking balance and adequacy can then establish where it has been, what the trends are, the best guess as to where it wants to be, tradeoffs between one idea and others, and much more. Planners are then able to prescribe actions that should lead to sustainability, thus preventing destabilizing overshoot.

Physical Prerequisites
1. Stable Site. A community needs a place in the sun that will not erode away, be washed out by flood, or sink below sea level. The records available for the site should allow a one hundred- to two hundred-year time span to prepare people for events somewhat more drastic than those that have occurred in the history of such places.
2. Water Supply. Reservoirs that store enough fresh water to tide residents over the worst drought in the expected lifetime of the community and its infrastructure are needed. This implies that consumption during the emergency could be reduced to 20 to 30 percent of the average. Earthquakes, floods, and storms should not interrupt the flow of water, because the design should incorporate sufficient safety factors.
3. Food Supply. A community needs access to regions where surplus food can be produced reliably. Food stocks can be held within the urban boundary and should be large enough to meet interruptions in supply that occur with natural disaster, political divisions, strikes, etc.
4. Power Supply. Fuel for electricity should be available from multiple generators; regional distribution networks have fewer risks of power failure. In the longer term, supply sources of renewable will be sufficient to replace petroleum, gas, and coal as they become depleted. Eventually the overall demand for power should exhibit a declining trend, reflecting a greater dependence on telecommunications and computing.
5. Liquid Fuel Sources. Critical for transport of goods and people, the liquid fuels should have multiple origins. Fossil fuels are convertible at a reasonable cost as long as they last. Metropolises need both refineries and tank farms for insurance against paralysis of movements. Later some kinds of solar technology transforming biomass into alcohols and hydrocarbons must be ready, or a path to hydrogen fuel cells for electromotive vehicles should be worked out.
6. Telecommunications Channels. Capacity for the transmission of information should rise steadily over time, because increasing efficiency in
the use of depleted resources depends upon information-based technology and management. Global limits to channel capacity for growth and information storage are not in sight, and prospective marginal costs per gigabit are still declining. No fundamental laws of nature are being encountered as limits to growth, except for the prospective scarcity of human attention.

Functional Prerequisites
7. Permeable Boundary. A multiple, mostly invisible "membrane" must exist to admit inputs, export products and services, and excrete wastes; it must also protect citizens from unwanted disturbing agents in the exterior. Boundary regulation must be managed in a way that is not capricious.
8. Fertility-Mortality Balance. The birth and death rates for humans, animal species, plants, and artifacts must equilibrate. Population explosions invite destructive conflicts with neighbors defending "their" resources. Later come the inevitable crashes resulting from overshoot that exceeds carrying capacity.
9. Migration Balance. Rural population flows strongly to cities as people seek to participate in a higher quality of life. When life prospects are not sustained after moving, refugees and/ or migrants to other cities with better opportunities will be observed. Cities can sustain quality of life by balancing cohort structure with selective immigration, especially when labor and skill shortages are experienced.
10. Knowledge Participation. Each city must maintain part of the global knowledge in order to use it. Technology, education, health maintenance, and organization are knowledge-based in different ways. Knowledge is an expanding universe, and city life stimulates its continuous growth.
11. Public Order. Inequities in justice, opportunity, and privilege (especially wealth) need to be reduced so that they do not explode into internal violence. Civil disorder can greatly reduce the capacity of a city to compete. The frenzies set up by deprivation and frustration may cause residents to burn, or even blow up, a city. Multidimensional balances negotiated between institutions and sensitive organizations are the bases for stabilizing urban politics.
12. Identity. Urban communities are characterized by a unique cluster of lifestyles and associated images that residents take pride in reporting to visitors and to themselves. When the cluster is coherent, new ideas are born, borrowed, evolved, and matured, and they eventually die out. These mosaics of images and behaviors are named, and observant outsiders not only
identify the sources of the images but also the eras in which they were
dominant. When coherence of images presented is not sustained, fission
ensues. If adherents for styles lose interest, or their behaviors are strongly
curtailed by authorities, they may be assimilated into neighboring
communities or be co-opted from the outside through the introduction of a
new ideology. If the identity becomes archaic or has been dissolved, we may
say that "the community was not sustained." A center, or forum, for intense
exchange of diverse cultural transactions or, better yet, a network of such
cluster centers must be maintained.
Chapter Ten Section Seven

Extra Responsibilities not Fully Defined

Poorly Defined Further Tasks

The ways now being developed to transform cities into sustainable urban settlements deal with a major share of the foreseeable challenges for eco-technology.

However, they do not yet handle the residual 20 percent of the world’s population living at, or very close to, bare subsistence. Earlier peacekeeping agreements among imperial nations of the world have forced large segments of the population into relatively new nations, which are not able to maintain public order or provide necessities for their citizen members in times of famine, fuel shortage, and epidemic.

These cities periodically become dependent upon the rest of the world for survival. There are thirty to fifty political units that can be identified in the compilations of the United Nations that have prospects which in one or more ways make them seem unsustainable.

For varied reasons these societies cannot follow the path toward socioeconomic development that has been laid down by the urbanized societies to date. They are caught in a socio-environmental trap that has evolved in part because of prior development elsewhere. For the last several decades these retarded societies have made no progress in development and their welfare has generally declined, except in some urbanizing districts that are swamped by surrounding needy populations. Sustainable communities can come into existence even there, if the following points are acted upon:

1. Injections of long-term aid should emphasize new technologies that require considerable education to employ them effectively. Much of this intervention is concerned with food supply, where the labor for
production and management is predominantly female. Patriarchal government officials must often be sidelined, but not displaced.

2. Programs for education for this largely illiterate population involve teaching teachers, building schools, and creating curricular materials in the local languages. Decades would pass before the educational enrollment is comprehensive. The newly introduced technology must speed up provision of literacy for females, which is presently half that of the level of males. The new emphasis must be on learning by girls, whose education is often strictly segregated by the culture.

3. An essential part of the technology package is public health. When women have achieved literacy (three to four years of schooling), a large part of the public health technology can be embraced, and the effects are popular.

4. The immediate consequences of improved public health are reduced infant mortality, extended longevity into less productive life stages, and a rapidly increasing demand for schooling (due to cohort growth). These demands arise before government revenues have expanded to cover them.

5. Eight to twelve years of school attendance by girls are needed in order to reduce effectively a community’s birth rate to replacement levels. This approach to education costs about ten times the amount of achieving literacy, and it is far beyond the capacity of a poor society to finance. Very recent findings indicate that women microentrepreneurs reduce their own fertility much more quickly, so there is reason to change the studies in that direction.

6. The introduction of the technology intended to stimulate production also increases population by reducing mortality and increasing immigration. Therefore, outside markets are needed to support the development promised.
7. The most educated fraction of the community's population is attracted to cities elsewhere in the world, leaving behind a population very similar to what it was before teaching modern agriculture was initiated.

8. Conclusion. What is needed for sustainable growth of such poor communities is a mix of technologies containing amplifiers, multipliers, and accelerators that go beyond the present procedures in education (especially of girls), public health (especially providing motivation for contraception), dependable water supply, food production, and organization for self-help.

Other difficulties in achieving sustainability have been raised. Paranoia based on risky images (e.g., radiation, carcinogens, types of crime, etc.) is one source. Addictions (substance abuse, automobiles, gambling for high stakes, escapist absorption in virtual communities, etc.) also have serious social consequences, which prevent a community from arriving at ecologically preferred solutions.

However, for at least another generation, ideological conflict will remain the greatest barrier on the horizon. We need to know how seriously these phenomena may warp the human-dominated ecosystem. Can astute communications reduce their impact and accelerate social learning in the way they seem to do for technology?

Much of the answer depends upon the ecosystem arising in cyberculture to manage the accumulating images (Figure 10-1). Astonishing rates of growth for Internet operations suggest that its coverage will be as universal as that of television today by the year 2010, and that the World Wide Web will become an even stronger force for the convergence of human prospects than anything available before.

By that date, several global networks that are now in various stages of construction should be in operation. Skeptics should read the libertarian sentiment reported in the monthly Wired magazine, a self-appointed agent for the "new wave" (Leonard 1997), along with the still sketchy Internet growth reports, and develop their own expectations about the Internet's eventual breadth of influence.
In chapter 5 the discussion of community-originated indicators for ecological planning introduced another use of the community sustainability goal already embraced by most environmentalists at the Rio Conference of 1992.

This goal became part of an advanced community ethic that has expanded into a growing social movement. The ideas flowered in the later 1990s, as has been noted for Seattle and San Francisco, and were accompanied by social and environmental indicators that could be used to measure progress toward what people believed would be a sustainable future.

In India the interest in sustainability took the form of a People First Movement embracing Gandhian proposals for local governance and socially accountable private enterprise as a basis for true democracy (www.ecouncil.ac.cr/devalt/peoplef.htm), accompanied by social and environmental indicators that could be used to measure progress toward what people believed would be a sustainable future.

That "bottom-up" kind of planning identifies "sins" against the community, such as violence, waste, and bigotry, together with acts of meritorious behavior, such as preservation of historic icons and starting programs for collective learning, in order to initiate major reforms.

There can be major technical flaws inherent in this approach, as revealed by the experiences of the microcosm ecosystem Biosphere 2, an experiment designed as a formula for sustainability. There, principles for policy and behavior of participants for a sustainable human-environment model, which were firmly held to be a best mix on the basis of early bio-ecological observations and environmental ideology about appropriate technology (Science 274, 275), had to be aborted.

In less than two years, nineteen of the twenty-five vertebrate species hosted in this ecosystem became extinct. Its human occupants would have joined the list if oxygen had not been injected after the first year, and if accumulated carbon dioxide had not been scrubbed later. Ideologies need testing as rigorous as that applied to scientific theories, but social justice
suggests that volunteers should accept costs first, rather than by gambling whole populations without their understanding and consent.

Planners need to lay out a path to sustainability with comprehensive, science-based community ecosystems in order to forestall rushing off the "wrong way" into a crash, but they gain little public enthusiasm for engaging in that kind of planning process.

Social movements, on the other hand, have energy, dedication, and participation that can persuade a majority of the people and mobilize them to support appropriate changes.

The challenge for planners is to find ways of infusing their pragmatic knowledge into the popular enthusiasm for change and its expression of environmental values.

Fortunately, the open systems of modern cities are much more forgiving of errors in preconceptions, because cities are greatly more connected with a world that can mount a timely rescue.
Chapter Ten  Section Eight

Opening Up Novel Environments and Neighborhood Options

After Sustainability, What?

Remember that sustainable development can be environmentally sound, but it is only a way station on the road to the achievement of society’s long-term goals.

If we take prudent, practical steps toward achieving sustainable urbanism as our ecosphere approaches its carrying capacity, other kinds of futures will open up for the human race.

A strong parallel will be noted between this view of future development and the evolution of prehistoric ecosystems, during which a cataclysmic event extinguished many species -- a "punctuated equilibrium." Accelerated evolution of the remaining species then occurred to form new communities for living on Earth.

We are now experiencing a revolution in communications that renders most species of artifacts and organizations obsolete within a very few generations. The period in which we live already has produced some of the replacements, and interdependencies among them can be detected, allowing us to infer some forthcoming community structures.

Cities breed supporting organizations, most of them registered in the directories, but some are latent and ready to spring up like unfamiliar weeds after a fire.

Henceforth many kinds of virtual entities inhabiting the electronic networks will be lodged in Internet systems that were originally designed to survive hydrogen super-bombs. Many, but not all, urban organizations should be able to reorganize so that they can survive and operate in changed circumstances.
When the possibility of a decent quality of life is available to anyone who is willing to move to sites where it is possible to work and live better, philosophers and scientists will muse even more actively on the question of what comes next.

Humans have the imagination needed to lead, while the rest of the species—animals
  • plants
  • machines
  • automata
must adapt.

Humans will create more powerful organizations:
  • world banks
  • public and private consortia
  • open universities on the Internet
  • numerous law-with-order consultant groups
  • genome collections
that will enable big new projects and enterprises to be launched. Many directions will be explored, including communities on the sea and in cyberspace.

The Good Life Afloat

Not long ago, at the time of the Taiping rebellion against the Manchu Qing dynasty in the nineteenth century, hundreds of thousands of political and economic refugees left the land to spend the remainder of their lives on the water. Most of them dwelled in boats around Hong Kong and Canton and made a living from fishing, smuggling, and the fabrication of paper, later plastic, flowers.

When their children were schooled, after World War II, the new generation stayed on the land; and now the "water people" villagers are almost extinct. Since then families with modern fish farms have moved far out into the estuaries. They are the vanguard for a new kind of suburb. A large coastal metropolis will contain hundreds of thousands of people who are enamored of the marine environment.
Water enthusiasts already spend much of their leisure time boating, fishing, swimming, jet skiing, and scuba diving. These people would very much like to construct a complete seaside lifestyle and raise their families by the water.

They find, however, that the prices for services are initially quite high.

Who among us can start a true aquatic suburban community, recruiting fisher folk, yachtsmen, swimmers, jet skiers, and beachcombers?

Much of the future urban population must learn to live in estuaries, if they are to be assured of fresh water in times of drought. They must conquer:

- floods
- tidal erosion
- muck
- mangrove swamps
- pollution problems

most of which are already being attacked somewhere in the world.

Minimization of risks to life and property will require an extra set of institutions. Mixed "land use," introducing water corridors, seems likely to expedite urban transportation. districts offering many of the best employment opportunities.

High population densities in:

- Hong Kong
- Singapore
- Tokyo
- San Francisco
- New York

would make this option profitable. Ideas adapted from resort-planning techniques used by landscape architects could lead to wholly different formulas that are equally attractive.

A novel option would be to start a completely new city in mid-ocean (Figure 10-4). Large floating structures with temporary housing have been built by companies drilling offshore for petroleum extraction, but they are far too expensive to support residences.
Figure X-4.
Food producers can upgrade to skilled technicians in two generations in metropolitan environments. Cities 'moving up the value chain' can produce more exports per unit of labor, energy, and scarce space. Premium fresh fish from netted ponds are produced along with commuters to the CBD and telecommuters.

The call of the sea can have almost unlimited access to civilization.
A prime opportunity is made available by ocean thermal energy conversion (OTEC). Only a few hundred meters below a sun-warmed surface, the water is cold, and simple machines can be designed to extract energy from the temperature difference (an inverse refrigerator). The highest yields per unit area harvested are obtainable in the tropical reaches of the western Pacific Ocean in the region where the El Niño phenomenon originates periodically.

Presumably this is where OTEC power would be the most economical, but other areas might supply superior fishing opportunities or fewer storms, and still compete.

Electricity can be generated at a reasonable cost by OTEC, but how could power produced in mid-ocean be delivered to consumers? Electrochemical production for export is a promising possibility. Ammonia can be made from air, water, and power; phosphates from imported apatite rock can be upgraded in electric furnaces; and high-grade fertilizers could be transported to consumers in barges.

By-products of these technologies are very interesting because they could lead to designs for integrated facilities. Condensed low-pressure steam is purer water than rain, for example. The originally cold seawater used to condense the steam is released on a sunlit ocean surface with all of its nutrients, ready to become an artificial upwelling teeming with marine life. Recent experiments have shown that adding a tincture of iron would lead to a rich green marine ecosystem nurturing squid and sardines, which attract tuna.

Meanwhile, the fresh water, with some fertilizer added, could produce premium vegetables by hydroponic techniques.

Moreover, precipitating minerals from seawater can build the sea platform itself. A small electric current trickling through shaped metal screens will produce shells as strong as the best concrete. Platforms of these floating shells can also serve as holding points, warehouses, and tank farms for fuels and foods, which can be economically shipped to meet market opportunities as they arise.
Designer Eugene Tsui, working within strict technological, meteorological, and ecological constraints, and applying his concept of "evolutionary architecture," arrives at a fantastical "macro-organismic" form (Figure 9-4).

It could be a floating, even migratory, city-state free of any sovereign economic control granted to marine states by the Law of the Sea, making it more independent to set up its unique evolutionary design for an urban ecosystem. The structure, form, and public utilities of the floating city-state would derive from the sea and the sun.

The limiting economic size is determined by competition with island states. It should be able to support more than fifty thousand persons.

It would compete with
- Hong Kong
- Singapore
- Zanzibar
- Cayman Islands
- Tonga

A project such as this looks very promising until the implications of the numbers are analyzed. The manufacturing processes are highly automatic, requiring so little labor that the economical solution would be to ferry workers in shifts by helicopter, rather than to create a company village.

The integrated complex provides only enough jobs for a fish camp, accompanied by a few intensive gardeners and maintenance technicians. It would not be a real city. Quite a few islands in the Caribbean and the Pacific and Indian Oceans are at least as attractive for tourists and pensioners migrating from cold countries, and they lack the high startup cost.

However, one community of world-servers might be attracted to the ocean city-state by its independence. They could connect with the world's financial markets through the satellites overhead, and they would require small amounts of electricity for air conditioning, circulation, and computing.

This highly specialized occupation, often called offshore banking, is most concentrated in Hong Kong, where the 1990s change in hegemony raises
questions about threats of government control. Many of the investment promotions advanced by these speculators offer evasion of old-fashioned income and inheritance taxes. The scale of a floating city is small enough to enable a high-rolling property developer to put it together as a matter of pure whim.

The importance of this concept of floating cities is that successful execution would open a path to doubling the surface available for human habitat on Earth. Threats of overcrowding would vanish! While the advance upon the sea from a coastal metropolis would probably be an extension of "lumpy" urbanization, as described in chapter 7. The inhabitants, sojourners, and visitors leaping out to a floating city-state would be predominantly a mix of self-servers and world-servers in outlook.

If such a city were founded, the development of marine urban habitat would take off. Once the concept is well proven, it would be another very strong force accelerating convergence of life chances for everyone.
Chapter Ten   Section Nine

Cyberspace Surround and the Urban Underworld

Cyberspace for Sustainability

The boom in cyberspace has been heralded as an unanticipated consequence of an explosion in information technology that opened vast new possibilities (see chapters 7 and 8 especially).

Most new capabilities arise out of the Internet’s sheer speed and range for communication. An exercise showing how to plan and manage communities systematically to greatly extend their diversity potentials illustrates other exciting possibilities for the future.

The physical city, built up with concrete, steel, and glass (and not a small amount of wood and plastic), consumes:

- energy
- water
- materials
- foodstuffs

inside protective shells that cover real estate. Maintaining that protection requires continuous supply of resources, and actions to assure those supplies are the principal concern of policies for sustainability.

However, attention to stewardship duties demands less attention in maturing cities, which are less subject to invasion by masses of unskilled immigrants.

The city of images adds recognizable features to these static shells and their streams of vehicles.

Its lifeblood courses through the infrastructure of the physical city, making it possible for people to meet people and merge their current ideas. To be sustainable at this level, urban communities depend upon effectiveness in attracting the attention of diverse groups possessing a repertory of images they know how to apply and a palette of colorful forms with which to clothe them.
Without an adequate distribution of reasonably appropriate messages to keep up with the competition (read level and kind of education), members of the community can lose their livelihoods. Most of the actors in this city have roles in the service trades, assembling for work in office blocks, supermarkets, and bazaars the familiar images that fit the wants and needs of others.

Plans for sustainability in this city of images require that special attention be given to balancing awareness of changes in knowledge against the anticipated impact of threats. The principal resource in this city of images is the newly computerized system for searching the stockpile of records representing accumulated Knowledge.

The designed non-place communities that are of interest maintain only the loosest connection with cities at the visual levels. Quite a few are moving out of their place in the city of bits to new sites on the World Wide Web, where operating costs are much lower.

An association of scientists, for example, will first transfer databanks to server farms and follow this action over a period of as much as a decade with online news, correspondence, journals, elections, and member services.

The members are primarily interested in information flow, but “intelligent agents” that have learned how to navigate a crowded Web increasingly represent them.

In such a community, a variety of designers from all domains of the Internet can collaborate to improve a gigantic simulation of a new aircraft, a new urban neighborhood, or a complicated fiber-optic infrastructure. The advantage is that the most complex designs can be finished speedily and tested in many ways before they appear in the physical world (Figure 9-5).

The city of bits is still less than 1 percent of what it can become.
Urban Underworld and the Internet

A huge shadow looms over the Internet in the 21st century. The markets of the world, with their brokers, agents, intermediaries, regulators, attorneys, managers, and speculators, are exploring how to make the risky transition into low-cost and highly informed niches in cyberspace.

Each actor must take a step into swirling chaos, while hanging onto what may well be a disintegrating Titanic. Much depends upon finding the right kind of encryption for the transactions so that predatory cheats who can activate hordes of cloned agents can complete deals quickly without exploitation.

The major markets are moving, but no one can forecast what formulas they will invent to conduct business or how they will use their website connections. Small subsystems are working and they promise to be profitable, but will they survive the discovery of a blockbuster formula?

The last radical reorganization of global markets occurred after World War II, when the automobile was freed to service suburban spaces. The availability of cars made possible the shopping centers that emptied out retail streets in the central business districts of most North American cities, and it went on to produce the mega-malls that made most of the original shopping centers obsolete.

With a marked lag, Latin America and Europe followed this reshaping process, and now Japan, with a flurry of embarrassments, is seriously affected. But the changes caused by auto-oriented marketing modifications in urban areas at their peak exhibited growth rates only a third of those associated with the Internet at the beginning of the twenty-first century.

Just as automotive-related crime was novel in its day, so some of the forthcoming transformations will arrive in a way that is shocking to peace of mind.
Social Costs of Virtual Markets

The vice of the financial markets is gambling, particularly the high-stakes kind that is most often based upon the misuse of derivatives. They result in billion-dollar losses of other people’s money.

The most spectacular bankruptcies can push whole interdependent networks of firms into insolvency. Business people have agreed with the mass of urban families that gambling should be outlawed, but they discover that the addiction is so grave and so common that it would encourage an enlarged underworld to provide the excitement of pure risk taking.

So the city of images has evolved regulated forms of gambling, such as lotteries, which channel 40 to 44 percent of the legitimized take into “good causes,” and highly taxed gambling, such as racing, which feeds the public coffers. On the Internet the gambling vice can be reinforced by other gratification.

Channels that could siphon off funds to rectify social losses from addictive gambling are infested with racketeers. Adequate substitutes catering to the craving for risk taking remain to be invented.

Other vices tolerated by the present legitimate markets are nicotine and alcohol abuse. It has been naively proposed that for them the tax should be doubled or tripled. Economists suggest that the consumption of tobacco and alcohol among the youth will be cut in half, but in the future people who have little to lose could resort to the Internet for expediting the smuggling of contraband.

Research has frequently shown that marijuana is less to be feared than nicotine with tar in cigarettes, but this fact is not believed by many and is actively disputed. The active element in marijuana has very often been banned. Therefore, an underworld has grown up to carry on an illegitimate commerce, and it frequently resorts to violence, instead of litigation.

Many urban regions have prohibited alcohol and spent great efforts to enforce those laws, but its prohibition also leads inevitably to shadowy commerce conducted by lawless gangs.
The trade in hard drugs, which are refined from agricultural products before shipment, has demonstrated that national boundaries are increasingly porous, despite the allocation of military weapons and high-tech barriers to the defense of the borders.

The underworld has found the sale of hard drugs to be more profitable than other sources of income, such as the kidnapping and protection rackets, illegal migration, gun running, international prostitution, traffic in human body parts, money laundering, and bank robbery.

Illegitimate enterprises of the underworld have in the past generated an estimated 5 to 15 percent of the income of urban areas, with the figure going as high as 40 percent in cities, such as Moscow, when trying to impose an unfamiliar tax and finance system upon the fragments of a broken economic system could not defend themselves.

The movement of the markets to the Internet brings with it the most violent underworld. Its members are human predators of the respectable, legitimated social classes. Castells (1998) documents how the regional associations of underworld clans:

- mafia from Italy and the United States
- Maffiya from the former Soviet Union
- yakuza from Japan
- triads from Chinese communities
- the Cali cartel from Colombia and Mexico

have set up international collaboration.

Since they adopt the highest available technology for intimidation, they are likely to move into an Internet policed by volunteers more quickly than any business would.

Thus there is good reason for the wariness of the major markets about making the transition to e-commerce. The water may be fine, but circling schools of sharks are reported.

In cyberspace, as in the mythic Wild West boomtowns, volunteers are essential to fill the roles of deputy sheriff, detective, mediator, and point
man for a posse. Institutions for maintaining law and order have been established; because even the U. S. government, the founder of the Internet, will quickly lose credibility as people from other cultures go online (Deibert 1997; Kahin and Keller 1997; Kahin and Nesson 1997; Loader 1997).

The institutions and rules have to evolve out of the experience of groups such as the Computer Emergency Response Team of Carnegie Mellon University and the international accounting firms in cooperation with the ISPs (Internet Service Providers).

Actions to prevent damage and pollution must be accepted by netizens who spend much of their attention on Internet activities.

Coverage of Web governance issues has vastly increased and is now supplemented by the critical abstract journal Future Survey. New entrants are announced seasonally.
Chapter Ten Section Ten

Formation of Cyberspace Communities

New Communities in Cyberspace

Most of the talk about new non-place communities on the Internet has been about avocation rather than livelihood. These virtual villages should be compared to drama societies, debating clubs, and vacation resorts.

Entrepreneurs have invested very little cash, and not much of economic value is yet at stake in these communities. Investment by participants is real, since time is spent getting ready before interacting, but that overhead cost is passed on to:

- game players
- people-to-people organizers
- religious seekers
- scientific investigators
- auction market bargain hunters

The aggregation is highly democratic, and open to newcomers; participants are shorn of attributed social status and must earn respect from the questions they ask and communications they send.

Scientists exchanging observations have built tight little islands protected by jargon. Nevertheless, on occasion participants will publish important items for wider circulation on topics that range as widely as space technology, geophysics, medicine, and public policy, before their appearance in print.

An early-established virtual neighborhood, such as the well regarded WELL in the San Francisco area, can reinvent ways to survive.

As happened in earlier frontier regions, occupied by the untamed and the unknown, ad hoc communities are being set up on the Internet in a loosely mapped commons. They are largely self-governed and usually evolve a code
of fair play that prevents the "tragedy of the commons" (encroachment of private interests upon what was agreed to be public). If members do not defend shared interests, the community will soon dissolve and disappear. It may sometimes need to mobilize for action against external threats.

An interesting control device is the posting of the addresses of the top ten polluters of cyberspace, so that outraged victims can bombard them with e-mail protests when they feel hurt.

Oversight of the Web by the FBI and the CIA, allowing them to peek into coded communications as an essential part of their crime control responsibilities, has been fought to a standoff in the U. S. Supreme Court.

Desperado hackers, when caught breaking through heavily protected "firewalls" and causing damage, are, however, hunted down and charged in real-world courts. Attempts by central governments to assert control over long standing communities with a presence on the Internet show up repeatedly. Issues of regulation and control are debated openly at assemblages of scientists, technologists, and associated professionals to discover emerging consensus.

Livelihoods will be moved online in large numbers very soon. Foreign currency exchange transactions have their own private network, where they exceeded a trillion dollars a day in 1997, after climbing many times faster than the volume of world trade.

More than twenty thousand work stations were then involved, with the most complete of them maintaining six screens introducing information and announcing transactions to players on the markets. Securities exchanges are now following their lead by going through a series of institutional "big bangs" into round-the-clock global markets.

Any part of the world retaining cozy local financial arrangements, as occurred in Tokyo in the 1990s, loses jobs and influence rapidly. Stocks, bonds, and property exchange will transfer a hundred thousand high-paying positions per year to the Internet. Many of these will appear in India, Kenya, South Africa and other low wage societies where English is the major language of secondary and higher education.
Cost savings can be phenomenal: At the beginning of 1998, the wire transfer of funds via branch banks cost one hundred times as much per transaction as did transfers through the Internet and five times as much as those using automatic teller machines.

Intransigent communities that refuse to participate in the transition to cyberspace, which they call "globalism," will not be able to sustain their quality of life for more than a generation their best young people will rarely return after spending time in higher education or public service. Vigorous organizations that do not replace senescent officials and customers find that their output steadily dwindles.

Internally conflicted and reluctant communities that fail to undertake renewal are devitalized, using up their liquid capital and their influence on small scale politics, and as a result are on their way to becoming ghost towns.

Should the new virtual communities, firms, and nonprofit organizations be designed to be sustainable? A strong case exists for claiming that they should not!

This argument starts from the observation that virtual communities are flimsy and disposable, and it recognizes that, in the chaos of the transition to a globalized society, these are the most insubstantial and accordingly highly vulnerable participants. Thus virtual communities have a short life expectancy. They do not have the margins or the cash flow to pile up surpluses that could enable them to survive the shortfalls. If there are to be abandonments and bankruptcies because of risk taking, it is better that they occur on the Internet.

However, at least one noteworthy possibility for community preservation should be mentioned.

Many small cities and towns are doomed in a period of rapid change by the loss of their major industry, mine, or commodity market (as in the tobacco-growing parts of the country). Their mutual social support investment, along with the physical infrastructure, will be wasted. However, members of a virtual commercial community, whose livelihood is extracted from the
potential of the Internet, can find cheap rent and comfortable living in these communities.

A recipe for a high quality of life for community interactions can be formulated for such a town when its citizens are physically participating in a familiar environment with low rents and service costs. Two complementary communities on a single site, one growing while the other declines, are better than one skidding down a slippery slope.

A few telecommuters are experimenting with this option, as are some micro-entrepreneurs and consultants. The immigrants need only a postal address and access to an airport in order to operate as world-servers while sustaining the cash flow.

A good case can be made for designing a few such sustainable communities within a metropolitan neighborhood. The most impressive of these experiments is an outgrowth of the cell phone explosion in Scandinavia on a coastal plain on the edge of Helsinki. Arabianranta hopes to complete by 2010 a community of 12,000 residents with 8000 workers, 710 industrial companies, and 4000 students from neighboring universities. The communication facilities and the designed internal environment are calculated to speed up self-organization of this "virtual village". (Shaw, 2001)

In the San Francisco Bay area cooperative organizations, such as the WELL, became a way of obtaining human support and exchanging technical information that fits a cosmopolitan existence. Members bump into one another in the food markets and parent-teacher meetings.

An early retiree might be eager to take on the management of an Internet connection for a school, or a small company, and find successors among helpers. A tight little virtual community could raise offshoots into a threatened real one and extend its sustainability by speeding up the action on important issues. Again, achievement of secure, rewarding human life is the justification.

The sheer fun of cultural exploration and conducting social experiments, when errors are easily forgiven, is leading to the formation of many more of
these ethereal communities on the Internet than could exist in the previous periods when religious and environmental communitarian groups were forming.

It is not astonishing to find that whenever new communications media have been introduced, from the days of the telegraph and the ham radio onward, they have become playpens for the curious and adventurous. "What is this new territory like?" members ask, "and what unexpected challenges does it present?"

Therefore, games have become a principal means for exploring potentials for excitement and skill development in each independent medium, while entrepreneurs look for less constraining technologies. The trend to ever-more elaborate and compelling games is already evident. In fact, Internet games have become a multibillion-dollar market in technology and are extremely popular with the youth.

What is different about a community formed on the Internet, when compared to a physical community? Most important is the participation of people who rarely see each other, if at all. They share a vocabulary and morsels of relevant context, but their respective experiences with real-world communities seldom overlap. The reason for the existence of a new community -- its mission and its intended contribution to the world at large -- is something its netizens agree upon almost fully at the time of establishment.

Many such communities are research groups in science and engineering dedicated to macro-scale problem solving, or to the synthesis of subsystems (example: a lasting set of global standards for some newly emerging activity).

Its organizers have an intention to maintain social roles while justifying a paycheck, as well as pursuing ideals. What is important to note is that it is easy for community netizens to envision themselves as world-servers, so they expect the world not to interfere in the organization of their own community as long as good things are anticipated.
On the horizon, then, is a collateral urbanism that is expanding into cyberspace at a hectic pace (see Figure 10-5). In it the economy of water,
Figure X-5.
Planners and designers use checklists to assure that essential and desirable considerations have not been neglected. The old lists are incomplete for the city-of-the-future, so here is a proposal of things-to-come.
energy, land, and other resource scarcity is not evident, and economies of scale of activity are turned upside down and inside out. Thus conjectures based upon trends look weird.

Concepts taught in graduate school in the twentieth century will frequently be inapplicable in the twenty-first century. The background technology in cyberspace demands paying attention to current events, and the amount of attention that could possibly be allocated by the human race is perhaps one thousand times greater than what is experienced in the present. Long before then, however, present foci could become boring for young people, so adding another target will be critical. Some of the proposed, emotionally satisfying, possible real communities described earlier (e.g., "femmunes," monastic families, "collaboratories," aquatic settlements, secure earth-sheltered neighborhoods, etc.) may be preferred or they may be abandoned for something better.

In the era of the Internet, thousands of designers will gain full employment creating and maintaining superior Web sites with moving images. The appliances, furniture and walls will talk back to the occupant of a dwelling, and respectfully take orders, while planners will seek harmony between component activities (e.g., retailing, real estate, entertainment, education, technology, research, job-hunting, etc.). They also have to make operations difficult for a predatory organized underworld that has already invaded. Numerous other bad actors that ignore decency and invade privacy are multiplying. Planners will set up a checklist of the respective populations and flows to keep in mind, so that they can guide virtual communities to interact peaceably.

A new kind of manager will attend to strategies for their survival in the midterm.

Conclusion: Virtual communities are not rooted in long-lasting local infrastructure, but in global services, like systems of communications satellites, and are therefore short-lived, disposable, and replaceable.

They rarely need to be sustained, unless intended to be guardians of cumulative experience, such as refined data, catalogs, and cultural contributions.
Virtual communities can test new concepts for living together both far and near in distance, and for sharing experiences.

Together they form a degree of control over the ecosystem of images both virtual and real, and a means for producing successors that are winners.
Index Chapter Ten

A

African-Americans 480
agents 496, 511, 512
aircraft 511
alcohol 513
America 480, 468
Arabianranta 519
arthritis 483
Asian 477, 480
attorneys 512
automata 504
automobile 512

B

backlash 476, 491
Bangkok 486
bank robbery 514
bankruptcies 513, 518
bigotry 501
bioecologists 491
Biosphere 2 501
biotechnology 477
birth rate 469, 493, 499
boating, 505
Bombay 486
Boulder 480
brokers 512

C

Cali 514
Canton 504
carcinogens 500
Caribbean 508
Carnegie Mellon University 515
carrying capacity 496, 503
Caucasian 480
Cayman Islands 508
Chinese 514
CIA 517
Citibank 488
Colombia 514

Colorado 480
Computer Emergency Response Team 515
consortia 504
corporate 489, 490
cyberspace 467, 504, 510, 512, 514, 517, 518, 521, 523

D

Delhi 493, 469
depression 483
deputy sheriff 514
detective 514
DNA 484

E

Earth 503, 509
e-commerce 514
ecosphere 494, 503
ecostructure 475, 490
eco-technology 498
ecumenopolis 485
education 467, 468, 470, 471, 477, 491, 493, 496, 498, 499, 500, 511, 517, 518, 523
El Niño 507
elderly 469, 483
elections 511
energy 469, 491, 493, 502, 507, 510, 523
environmental 473, 479, 480, 481, 490, 501, 502, 520
equity 485, 489, 493
estuaries 504, 505
Eugene Tsui 508
Europe 475, 512
evolutionary architecture 508
Exxon 488

F

fabrication 504
FBI 517
feudal 471, 486
fiber-optic 511
Filipinas 476
financial markets 467, 508, 513
fish farms 504
fishing 504, 505, 507
flowers 504
foodstuffs 510

G

gambling 500, 502, 513
Gandhian 501
gangs 513
Genetic 482, 468
genome 482, 483, 504
girls 476, 477, 499, 500
gun running 514

H

hackers 517
happiness 471, 491
Helsinki 519
Hispanic 480
holistic planning 490
Hong Kong 504, 505, 508

I

illegal migration 514
images 479, 480, 481, 484, 488, 492, 496, 500, 510, 511, 513, 523, 524
immigrants 475, 480, 510, 519
India 469, 488, 493, 501, 517
Indian Ocean 508
infrastructure 495, 510, 511, 518, 523
Intel 488
international prostitution 514
International Standards Organization 489
Internet 470, 477, 482, 485, 486, 487, 500, 503, 504, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 523, 468
irrigation 469
Italy 514

J

Jakarta 486
Japan 475, 486, 512, 514
jet skiing 505

K

Kenya 517
kidnapping 514

L

Latin America 477, 512
Law of the Sea 508
libertarian 485, 500
literacy 499
litigation 513
lotteries 513

M

machines 504, 507, 518
Maffiya 514
Malaysia 486
managers 488, 489, 491, 512
Manchu Qing 504
marijuana 513
mass transit systems 470
materials 493, 499, 510
mediator 514
Mediterranean 477
men 476, 478, 479, 480, 483
Mexico 514
microentrepreneurs 499
Microsoft 488
migration 467, 468, 470
money laundering 514
Moscow 514

N

neo-Marxist 485
New York 505, 468
nicotine 513
non-Hispanic 480
nonprofits 489
North America 474, 512

O

online news 511
open universities 504
OTECK 507
### P
- Pacific 507, 508
- paper 504
- pensions 470
- People First Movement 501
- photos 493
- plants 482, 496, 504
- plastic 504, 510
- posse 515
- privacy 485, 486, 523
- private 477, 486, 501, 504, 517
- protection rackets 514

### R
- racing 513
- racketeers 513
- radiation 500
- real estate 486, 510, 523
- regional 471, 490, 495, 514
- regulators 489, 512
- Rio Conference of 1992 501

### S
- San Francisco 480, 501, 505, 516, 519, 468, 469
- scuba diving 505
- Seattle 501
- Seoul 486
- Singapore 505, 508
- smuggling 504, 513
- South Africa 475, 517
- Soviet Union 514
- speculators 509, 512
- suburban 505, 512
- swimming 505

### T
- Taipei 486
- Taiping 504
- Titanic 512

### U
- tobacco 513
- Tokyo 486, 505, 517
- toleration 485
- Tonga 508
- Toyota 488
- transaction 472, 473, 491, 493, 518
  Transformation 490, 468

### V
- vices 513
- violence 475, 496, 501, 513

### W
- water 469, 493, 495, 500, 504, 505, 507, 510, 514, 521
- WELL 516, 519
- Wild West 514
- womb 477, 478
- women 476, 477, 479, 480, 483, 499
- world banks 504
- World War II 486, 504, 512
- World Wide Web 500, 511

### Y
- yakuza 514

### Z
- Zanzibar 508
References


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