

# Restructuring the City: Thoughts on Urban Patterns in the Information Society

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## **The Time Colonist**

Kristin Hansen is a time colonist. She gets up at 6 a.m. in a suburb of Tokyo. After a quick breakfast, she takes the train into the financial district, where she has an office in a building owned by a major Japanese bank. Ms. Hansen doesn't work for the Japanese bank. She is senior vice president of a Danish trading firm with collateral relations to the bank. Her job is to watch over the flow of investments of her company as they move around the world in an endless cycle of cash transfers between Copenhagen, Karachi, Tokyo, San Francisco, Chicago, New York, London and Copenhagen again. She also manages a limited number of major trades on a personal basis. Many traders work with short-term investments. Hansen watches over long-term trading positions: she may hold some of her investments for as long as half an hour. As a senior vice president, however, Hansen's most important task is making an occasional urgent decision when her colleagues in Copenhagen and New York are asleep. Kristin Hansen's business is located in time, rather than in space. Money moves around the world at the speed of light. The markets operate twenty-four hours a day. A second here or a minute there may represent immense gains or losses -- millions of dollars, millions of kroner, billions of yen.

When the evening comes, Kristin stops at a Tokyo restaurant for meal. Then she returns home to her suburban apartment. She logs on to her computer to check a few last details of market action for the day. Then she makes a phone call to her boyfriend, a chef in Paris who has just finished the day's shopping for his restaurant. Finally, she settles into a chair with a glass of wine and a stack of books to work on her Dr.Oecon. This weekend, she'll be at school in Scandinavia. At any rate, her mind will. Her body will be in Tokyo, while she interacts with students from Finland, Sweden, Denmark, England and Germany. Half of them are in Scandinavia. A few are in other countries. Some of them live in time colonies, as she does.

## **Nordic Cities in the Information Age**

The question is simple and profound. How will the flow of information restructure Nordic cities? If the question is simple, the path to an answer is complex. The structure of information is based on the interaction of flows rather than of places. Human action is connected to places as well as to the information that flows through them. Thus it is that cities and their relationships will inevitably be redefined in the information age. How will the flow of information restructure cities such as Oslo and Stockholm, Helsinki and Copenhagen? We will the flow of information restructure small cities such as Haugesund and Joensuu? How will information affect the rural areas, crossroads and hamlets of the Nordic nations, where so many people live.

The emerging knowledge economy raises intriguing questions about the future of the Nordic cities, poses challenges and opportunities to large cities and small, to the villages and rural places between them. Considering answers to the broad question requires a consideration of information, information technology, knowledge management, and information science as well as architecture, urban planning, urbanology, sociology, public policy planning, political science, education policy, pedagogical methodology and nearly every other theoretical discipline and practical application field that helps us to determine how we live and work.

The radical role of information in transforming nations and cultures is the most visible topic in the media today. It is impossible to open a

news magazine or daily newspaper without reading about the increasing importance of information to modern cultures or the world economy. In 1995, there were any number of cover stories on information in Time, Newsweek, The Economist, Business Week, and Fortune, to mention only a few major English-language news magazines and business journals. The influence of information on society seems to grow from one day to the next. Public awareness of information certainly does. We are all trying to figure out what it means, how we will adapt to it, how we will use it.

One of the most intriguing but least considered aspects in this public debate is the challenge that information technology poses to urban planning. We can see this in the big picture as well as in the small details. Over the next few years, there will be an increasing number of details to consider as information technology becomes an all-embracing factor in public and private life (Green 1996). These factors, large and small, converge in cities.

### **Cities and Civilization**

Cities are visible artifacts of information society, technological change, economic growth and cultural transformation. Cities are places where people meet. Where there was once only one kind of meeting -- physical and face to face -- there are now many kinds. Physical meetings remain important. Meetings that once took place only to transact information on a swift, interactive basis are no longer necessary. While physical proximity and civilization were once synonymous, it is no longer necessary to meet in person to work together. Today, the term civilization more generally refers to cultural interaction and to ideas, a suitable meaning for a world in which the pure quality of interaction is more definitive than physical presence. J. M. Roberts notes that "...civilizations... bring together the cooperative efforts of larger numbers of men than any earlier societies and usually do this by physically bringing them together in larger agglomerations, too" (Roberts 1987: 61). The global communication network is a physical connection creating the largest agglomeration of people, ideas and possibilities in human history. What impact will this have on the cities in which we live?

Cities, civilization and government have been nearly synonymous for several thousand years. For a time, national economies have had the dominant role in world affairs. In recent times, however, cities and city regions have once again taken on a central role in world affairs. It is symbolic that the most advanced national information development policy has been shaped by a city-state, Singapore. A small nation surrounded by huge powers must structure its affairs in terms of international forces. The flow of information is among the most important forces in the developing transnational economy of the Pacific region and an effective information policy is one reason for Singapore's economic and political success.

Kishore Mahbubani, Dean of the Singapore Civil Service College, notes that the transformation of information into knowledge means change. "The Pacific community will be a completely new creation. It will not be an Asian community, nor will it be an American community. If the Pacific has emerged as the most dynamic region of the world, it is because it has drawn on the best practices and values from many rich civilizations, Asian and Western. If this fusion continues to work, there could be explosive creativity on a scale never before seen" (1995: 107). Mahbubani is effectively describing the integration of his city-state with the cities and nations of the world.

How nations address this challenge will be a decisive factor in future prosperity. Policy experts state that "knowledge, more than ever before, is power" (Nye and Owens 1996: 20) and recognize that it is difficult to "capture the implications of growing information capabilities, particularly the interactions among them... Information power is ... hard to categorize because it cuts across all other military, economic, social and political power resources, in some cases diminishing their strength, in others multiplying it" (Nye and Owens 1996: 23). In this milieu, cities may become as powerful as nations, and nations may lose power to cities that are redefined as communities of time and space. It is impossible to predict the challenges this future will bring. It is equally impossible to avoid them.

### **The Experimental World Classroom**

It's just after 4 p.m. in Oslo when Jens Espen logs onto the World Wide Web at his middle school. He's working on a math project together with Else and Tommy. They're part of an experimental class that meets twice a week with students and teachers from around the world. Eight hours later and half a world away, three Japanese students meet their Norwegian friends. School has just started in Austin, where a University of Texas math professor and a local school teacher log on with their six students and link up with groups of children working in the morning in Brazil and Connecticut. It's mid-day in Iceland where three students and a teacher sign on and early afternoon in England and Denmark where two more groups of three are working. There are twenty seven students altogether. The teacher-student ratio is excellent, with nine students for each of three teachers. These are talented students with skills that stretch across several areas of math and they often help each other. The children have worked together for three years and some also share their knowledge and skill with other students in their home schools.

The students work in a big virtual room. Sometime they go to side rooms to talk about specific projects or assignments. The students work on special interests and specific projects. The Norwegians are working on the same project today. Last week, Else worked with Jenny in Texas and Toshi in Tokyo while Jens Espen worked with Hans Espen in Denmark and Margaret in England. The new century -- the new millennium! -- has seen an explosion of experimental classes like this, classes where students use technology and share teachers to spread knowledge. Right now, most of these projects are limited to experimental schools located in wealthy nations, but it won't always be that way. Next year, new students will join the class, six children from Kenya and Malaysia who to replace six students who are leaving middle school for upper school. These new students will use computers provided by local government. They'll study with the same three teachers that all the other students share.

The class isn't perfect but it is a successful experiment that points the way to new opportunities in education. Older children

help younger. Children with one kind of expertise teach others. Teachers use software as well as direct supervision. This experimental world classroom can become an important resource for the future. It's clear that technology won't replace books or playgrounds or personal interaction. It's equally clear that used skillfully, information can be cultivated successfully with the aid of information tools that effectively supplement existing techniques and traditional classroom teaching.

## **One Way or Another, the Future Finds Us**

Two historical events create a background to my thoughts. Both were attempts to reject new technology and the alternative futures it would bring to preserve a comfortable, successful past. The first was China's "Great Withdrawal" from the world (Boorstin 1985: 186, 199-201). The government essentially decided that everything worth using, worth knowing, worth having was already in China. In 1433, when the first edicts were passed, the Chinese had an enormous fleet of over 400 major warships and many other ocean-going vessels. By 1474, the fleet was reduced to 140 ships. In 1525, coastal officials were ordered to destroy all remaining ocean-going vessels. In 1551, going to sea in a ship with more than one mast was defined as an act of espionage, punishable by death. China reached its historical high point as a great Pacific nation that traveled the waters of Asia, Africa and even the Americas. The end of Chinese power was visible when China closed itself to the world.

Daniel Boorstin (1985: 201) describes the paradox: "Fully equipped with the technology, the intelligence, and the national resources to become discoverers, the Chinese doomed themselves to be discovered." China would be discovered by colonial powers bent on political and economic domination. The second historical event took place in the early 1600s. The Tokugawa shoguns sealed Japan off from the rest of the world (Beasley 1990: 22), promulgating the Sakoku (closed country) policy that strictly limited the contact of ordinary Japanese with international knowledge. Japanese were forbidden to travel outside Japan and the little knowledge that managed to seep through arrived in brief, clandestine meetings, crossing barriers of language and culture (Blomberg 1994: 200-203). China's isolation was built on arrogance rather than fear. Japan's withdrawal was a form of cultural hygiene intended, in great part, to guard Japanese society against the effects of new knowledge and new technology. The knowledge was Western knowledge. The technology was gunpowder. Japan had gunpowder weapons prior to the rise of the Tokugawa, but the samurai ruling class turned away from gunpowder technology to maintain a rigid social order and the role of the samurai within it. The Chinese used gunpowder only for fireworks, festivals and ceremony. The Japanese forbade its use. The effects were equally problematic.

In the 15th and 16th centuries, China was arguably the world's largest, most powerful and best organized empire (Kennedy 1988: 3-10). Japan, too, was powerful, though fragmented. Here was wealth, knowledge, civilized energy. By cutting themselves off from transforming effects of technology, China and Japan cut themselves off from progress. It's a reverse study in Schumpeter's theories on progressive change (1981). China and Japan avoided the disruptive power of technology at the price of their future growth.

The implications are startling. Prior to the Great Withdrawal, China had some of the best and most advanced clocks in the world (Boorstin 1985: 58-63, 76-77; Gimpel 1992: 150-152; Landes 1983: 23-24; Needham 1965; Needham, Ling and de Solla Price 1960: 6). Control of clocks and calendars was control of cognitive authority and legitimate authority (Boorstin 1985: 60-61; Gimpel 1992: 150; Needham, Ling and de Solla Price 1960: 6). China turned its back on this technological lead for many of the same reasons that modern nations have avoided the power of information technology. The fate of the clock in China somehow mirrors the technical and economic fate of China itself.

The mechanical clock was among the early forerunners of the computer. A timing mechanism is the heart of every computer. An early lead in mechanical timing devices was, in fact, an early lead in information technology and China turned its back on technological leadership while the Western powers were still in the Dark Ages. The immediate result of the refusal to develop advanced technology was military disadvantage. When the Western powers arrived in Asia, they came with the tools of modern warfare and an overwhelming ability to manufacture and deliver them. The Western powers used military force to exercise a dominant role in Asia.

This domination began a transfer of wealth from Asia to the West, to Europe and later to the United States. The first stages of this transfer began at around the same time Europeans arrived in the Americas. The flow of wealth that began in those years determined the shape of world culture over the next five centuries. World War II marked the end of an age of imperial conquest and we have seen the end of the colonial era in the aftermath of the Second World War. A new flow of wealth began in the 1970s, it has increased since the end of the Cold War and it has grown as nations divert resources from military spectacle to economic productivity. This flow will affect the future of Nordic cities.

## **The Flow of Wealth and Power**

For all but the last 500 years of human history, the great stores of the world's wealth were concentrated in Asia, measured in human capital and in goods. During the past five centuries, the world's wealth has been concentrated in the West. Today, the great concentrations of human capital, financial power, manufacturing power, and informed power are once again accumulating in the East. This subject is the theme of an ever-increasing number of books and papers (Ferrandez-Armesto 1995; Friedman 1987; Kennedy 1988).

There is a natural order to this shift. Wealth follows the concentration of energy. The most important long-term source of energy is human capital and the world's largest pool of human capital is concentrated in the East. For the relatively brief period of the past five centuries, the West used technological power, policy and finance backed by military might to dictate the management of human capital. The West was thereby able to control the world's wealth. This era is coming to an end.

During the last two decades, we have witnessed a transformation. The post-industrial society linking manufacturing economics to a new way of structuring work has given birth to the information society and a knowledge economy. (Bell 1967; Friedman 1996; Negroponte 1995; Olaisen 1996b; Quinn 1992; Zuboff 1988) The flow of information and the flow of ideas join the flow of human energy to become

the governing flow that controls the shape of world. As we move from the post-industrial era into the knowledge economy, that flow becomes a flow of symbolic energy and formative energy.

Several things are happening. One of them is a change to the nature and flow of work. Johan Olaisen (1996b: 13-14) analyzes the meaning of work in post-industrial society by developing Daniel Bell's "two main themes. First, ... that the character of knowledge was undergoing significant transformation. Second, ... that a professional knowledge elite was emerging to manage the new knowledge. The thesis that we are moving from an era of empirical knowledge and practical expertise to an era of theoretical knowledge and technical expertise means that industrial output depends on knowledge-based solutions to an increasingly greater degree. At the same time, we are moving from definitive production concepts to sensitizing production concepts. Developing and using these concepts requires the expertise of what Bell labeled the professional knowledge elite." This knowledge elite is distributed globally, an issue to which we will return in considering the restructuring of the city environment.

All the world is being linked point to point. This development is so pronounced in the industrial world that the central issue is no longer linkage but scale and density of linkage. As the manufacturing base takes a new shape, virtual human presence is reshaping the way the world works. In the 1960s, artist Nam June Paik (1964) began to predict the new flow of information. By 1976, he was writing about an "electronic superhighway." He compared the development of the new information infrastructure to the Tennessee Valley Authority in the United States in the Depression era (Paik 1976: 46-47). Today, urbanologist Manuel Castells writes about the changing economy and the changing role of cities in the terms of a space of flows (Castells 1989: 126-171). Castells believes that we no longer live in a situation determined by the space of places. We live in an environment determined by the space of flows. These flows are flows of information: money flows as information, technology flows as information; knowledge flows as information (Friedman 1995).

It has always been possible to consider human interaction in terms of the flow of time and the flow of events. Cartographers, information designers and scholars have long represented the space of flows (cf. McEvedy 1961; McEvedy 1967; Tufte 1983; Tufte 1990). Today, many see this space as more than a metaphor. We push information from place to place through physical cables and transmission points, making the space of flows a physical reality. In the future, some predict that the space of flows will dominate physical reality as we find ways to deconstruct and move physical objects through that space. Today, this is fiction (Stephenson 1995). In the future, nanotechnology may make the space of flows a fact (Drexler 1986).

The city has always been an informative point in the space of flows, a pool of information. Athens, for example, was not defined as a city in simple geographic terms. The city was more than a condition of buildings and boundaries. The city was an idea, and Athenians defined their city as a dialogue among voting citizens (Ahlin 1995). (The political question of those who were not franchised -- women, children and slaves among them -- parallels the issue of those who lack access to the information superhighway.) The issue we will consider today is the definition of the city as a space of meeting and dialogue.

The earliest cities were transfer points for the wealth of nations. Nordic cities fulfilled political and economic roles in the well organized Nordic nations, particularly when Denmark and Sweden controlled Baltic and north Atlantic empires. While the post-imperial Nordic nations have far less military power in relative terms, they are far more wealthy both relative to the rest of the world and in absolute terms compared against their own past. The region is defined by industrial power and vast natural resources managed from urban centers. Urban power is balanced by a large rural population and the whole is governed under the social democratic tradition. The future world will be different once again.

In the new world, a highly literate, well educated population will be a resource as important as gas and oil, wood or fish. Natural resources will remain valuable. People will be more valuable. The opportunity and the challenge facing the Nordic nations will be finding a role for its people in a world redefined by the Pacific powers. How should local resources best be used? What resources can and should be exported? What jobs will exist? What will happen to economies whose citizens fulfill contracts in Tokyo, Kuala Lumpur or Santiago de Chile? What about telecommuters who live in Bodo in far Northern Norway while working for a company based in Lahore? These questions -- and a thousand more like them -- are important national issues. To answer them, we must solve the riddles of city life.

## **Premises and Definitions**

Let me set forth three premises before considering information technology and the shape of Nordic cities in the future.

\* The use of information technology will continue to grow and spread. This is evident, clear, and obvious.

\* This growth will shape dramatic changes in economics, social patterns, and cultural patterns. These changes will come about at today's rate of growth in the diffusion of information technology. The feedback effect suggests that changes already under way will further multiply and increase the rate of change as people adopt and adapt to the new technology. This creates an attractor condition that leads still more people to adopt the technology. This growth will continue steadily into the foreseeable future.

We seem to be seeing an increase in the rate of diffusion, an economics of increasing returns (Aley 1996: 23-24; Arthur 1990; Lewin 1993; Waldrop 1992)

\* The cost of information technology will continue to drop. As a result, even more people will have access to information technology and to the goods and services that information technology produces and distributes. At this point, it is useful to consider two definitions. The first concerns the nature of communities. A community can be a body of individuals, a state, a physical place, a commonwealth, people with common interests living in a particular area, people with common interests living in diffused and spread areas, people with diffused interests interacting for any number of reasons. Definitions of community may be considered in terms of overlapping concerns. Merriam-Webster's, the standard dictionary used by American academic editors, defines community in this way:

- 1 a : a unified body of individuals: as a: STATE, COMMONWEALTH  
 b : the people with common interests living in a particular area; broadly : the area itself <the problems of a large ~>  
 c : an interacting population of various kinds of individuals (as species) in a common location  
 d : a group of people with a common characteristic or interest living together within a larger society <a ~ of retired persons>  
 e : a group linked by common policy  
 f : a body of persons or nations having a common history, or common social, economic and political interests <the international ~>  
 g : a body of persons of common and esp. professional interests scattered through a larger society <the academic ~>  
 2 : society at large  
 3 a : joint ownership of participation <~ of goods>  
 b : common character : LIKENESS <~ of interests>  
 c : social activity : FELLOWSHIP  
 d : a social state of condition. (Merriam-Webster, 1993: 233).

The second definition concerns information. If we consider information as an interaction in the space of flows, we can also see information as a central aspect of community: Merriam-Webster's defines information as:

- 1 : the communication or reception of knowledge or intelligence  
 2 a (1) : knowledge obtained from investigation, study, or instruction  
 (2) : intelligence, news  
 (3) : facts, data  
 b : the attribute inherent in and communicated by one of two or more alternative sequences or arrangements of something (as nucleotides in DNA or binary digits in a computer program) that produce specific effects  
 c (1) : a signal or character as in a communication system or computer) representing data  
 (2) : something (as a message, experimental data, or a picture) which justifies change in a construct (as a plan or theory) that represents physical or mental experience or another construct  
 d : a quantitative measure of the content of information; specifically. : a numerical quantity that measures the uncertainty in the outcome of an experiment to be performed (Merriam-Webster, 1993: 599).

### Cities as Nodes in the Space of Flows

In 1945, Vannevar Bush outlined a concept for the Internet in an article in *The Atlantic Monthly* (Bush 1945). While the idea was treated with respect, it was considered a subject for the remote future, along with similar ideas by scientist-futurists such as Buckminster Fuller. Policy-makers of the era saw that ideas such as these were feasible, but -- like floating cities and supersonic transport -- serious consideration of their implications would be left to the future generations who would benefit from them.

Bush launched the idea of the Internet in the same year that Arthur C. Clarke proposed the idea of the geosynchronous communication satellite (Ochoa and Corey 1995: 292). Both ideas would reshape the structure of telecommunication. So would Marshall McLuhan's idea of the global village (1964), and Nam June Paik's proposals for multi-channeled, individually directed media (1964) and the electronic superhighway (1976). The global village of the Internet is now a reality. McLuhan's vision describes the everyday, international reality of groups and organizations linked by dense webs of interconnected systems carrying information for knowledge, transportation, business as well as for coordinating and linking activities at far-separated physical sites. Paik's proposals are common place today.

Paik's students of the 1960s and 1970s are already the older generation to the inhabitants of the MTV world and the world of interactive telemedia. The world was once a series of nations, mini-states, empires and cultures fragmented by borders and by differences in language, culture, currency, consciousness. Until the last few years, the difficulty and cost of communication was one of the key factors leading to the problems of international interaction and cooperation. The world was, in part, fragmented by the inability to communicate readily on an immediate, interactive basis with the ease and low cost of a cross-town phone call or a cross-the-street visit. The world is still defined by important differences of opinion, politics and culture and many of the problems in human interaction take place in the families and organizations where we interact on a daily basis. Nevertheless, the new technology also gives rise to new possibilities, and the world has now become a global village for information, commerce and culture.

There are persuasive statistical arguments against predicting the future (Paulos 1996: 14-26, 95-98), but reasonable predictions can be made on the basis of factors that have already been established. One of the factors affecting us is that many of the central decisions influencing the future of Nordic cities will not be made here. The future of our cities depends on key transformations in the world economy. Those transformations are shaped by decisions made in places such as Brussels and Beijing, Tokyo and Washington.

It may well be that the balance of power will not shift to Asia. Some believe that "the 21st century, not the twentieth, will turn out to be the period of America's greatest preeminence." This is because information is "the new coin of the international realm, and the United States is better positioned than any other country to multiply the potency of its hard and soft power resources through information" (Nye and Owens 1996: 35). Even so, Japan, China, Russia, India and the other Asia-Pacific nations will have the world's greatest pools of human and financial capital, along with manufacturing might, military strength and major natural resources .

Whether Asian, or Asian-American, the world economy will be shaped by the Pacific nations. Denmark, Finland, Norway and Sweden will not be among them. Even in a thriving Europe, Scandinavia will be a small region, and Europe itself -- no matter how successful -- faces the challenge of remain competitive in a world of Pacific powers. How, in a world shaped by the Pacific nations, will the Nordic nations preserve their social values, economic advantages and standards of living?

## Visiting a Virtual Community

When I turn on my computer every morning at the Norwegian School of Management, I log onto an email program. This program permits me to enter a sequence of virtual communities, one after the other. These communities are shaped around the type of interactive forum known as a discussion group. A discussion group or list is an e-mail network to which any interested party can subscribe. The members are linked by the mechanism of a list-server -- a computer that serves the list -- and list software. Some are limited to subscribers who meet certain professional, political or personal criteria.

Some discussion groups are moderated. Many are completely open, maintained by members who join and leave the community through self-selected instructions directed to the server computer.

One concrete example of a discussion group is a list call called Design-L, "Basic and applied design (Art and Architecture)." This list is served by a computer at Pennsylvania State University. The group is focused on design, architecture and urban issues. Several hundred people around the world communicate with each other on Design-L. Our ideas move back and forth on a daily basis. Until recently, I didn't know any of the others on list. Now, as a result of the list, I've met one of my colleagues for dinner when he came to Oslo to speak. I've taken part in off-list conversation and dialogue with several more. I don't work closely with any of them, but we share a common space in which ideas move back and forth.

This is a virtual community. Members of this community don't generally live with or work with anyone in this particular corner of cyberspace. A few may perhaps work with one or two other members of the community. Even so, we all see many of the same names nearly every day. It is a useful common space and we share it in the same way many different people may share a library or a city block, each going about their business, commenting, speaking, interacting.

## Virtual Cities in a Physical World

If one takes the idea of cyberspace to its farthest limit, we can imagine future cities as diffuse pinpoints of light on four-dimensional time-space matrix maps. It may even be impossible to say where the parts of a city are ... in this imaginary world, they won't be held together by streets or sewage systems or physical infrastructure, but rather by lines of interaction linking cybernetic cottage industries. This vision of the future city is unlikely to become a reality.

Human beings are physical creatures, and the nature of the physical body provides good reason for cities to exist in physical space. Cities are places for people to meet and work and play together, to sing or eat or dance, to exchange ideas in person rather than across a screen. Cities will continue to exist. How they may best exist is the focus of this inquiry.

We gather in the physical realm to eat. Children meet to play and learn in physical places to conduct the work of childhood. Manufacturing requires plants. All these things require cities with places in them. It is also true that cities will be -- in part -- diffuse, virtual cities and virtual communities located side by side with their physical counterparts, or, more accurately, overlapping them, wrapped around them and linking many of them together. Physical cities and virtual cities will coexist. Given that human emotion and human reason are born in the physical world, it is in the history and the idea and the reality of the physical cities that virtual cities find their meaning. Virtual cities will, in most important ways, serve physical cities.

Where virtual cities will differ from physical cities is in their ability to create growing neighborhoods of linked skills. It will be possible to imagine amazing new cognates for the kinds of industry-rich urban regions that once depended on physical proximity. Recent studies increasingly confirm the value of the kinds of regions have been artfully described in classic studies such as Jane Jacobs's *Cities and the Wealth of Nations* (1984). The *Economist* (1996) notes, for example, that the city regions of Europe are powerful engines for prosperity. The healthy city regions of the large single market contribute to an astonishing cultural diversity that tends to enliven rather than homogenize Europe. Virtual cities will extend the possibility of city regions in intelligent ways. We see the first traces of the virtual city in the form of today's active virtual communities.

Another avenue into the virtual city is the virtual organization. A virtual organization may consist of individuals at different units of the same company who work together on a specific project or it may be comprised of several individuals in linked companies. It may also be employees of several organizations working in unison. The members of a virtual organization work physically at different points around the world. A virtual organization is, essentially, a group of people working on a project. They may each have specific responsibilities. They may even rotate and share responsibilities, handing the project on to people in the next time zone. In this way, a project may move around the world on a daily, weekly and monthly basis, until the project is completed. When the project is completed, the organization disbands. This is, in many ways, very much like the project group or task force of the past. The difference is that information technology makes it extremely easy to assemble such teams, to pass work among members, to form and disband. That ease will make such teams more possible and make their work more effective. As a result, more of this kind of activity will take place in the future.

How will it happen? How will we understand it? Janne Ahlin, former rector of Architecture at the University of Lund, has a motto: "There are more than enough good answers. What we need are a few good questions." This is the best way to approach the issue of the restructured city. Every time we think we have a good grip on the problem, we find we've had a good grip on a handle that opens a door behind which we see seven more handles. We have to grab each of them in turn to see what doors they will open.

What I wanted to do in raising specifics is to outline ideas worth thinking about, and to put interesting notions forward. Rather than focus on specific models, I'd rather consider the large issues. One is the question of whether we can consider a city not as a physical space, but as an agglomeration in the sense that J. M. Roberts described. Since the earliest days, there has been a relationship between knowledge, human interaction and the development of wealth that takes place as cultures meet human needs. If we consider the act rather than the place, some cities may now be seen as an act rather than a place -- a space defined by the flow of interactions and acts.

Even the physical plant of modern cities may be considered in terms of act and metaphor (Ahlin 1990).

The quality of advancing civilization has usually been marked by urbanization. Distributive technology now makes it possible to work together at great distances using computer, telephone, telefax and other means. We have the ability to agglomerate with people at different points of the world on a regular basis. The price of gathering via remote technology has dropped to nearly nothing. For those of us who work in large organizations with dedicated IT systems, the price of interactive telecommunication has become a surplus compared to the costs of previous methods of communication.

The flows of space will continue as long as people eat vegetables, drink wine, wear clothing or drive automobiles. Automobiles may have a limited future but vegetables, wine and clothing look like they're here to stay. So, too, is our need to meet and work with other people. We will need meetings in the flesh as well as meetings of the mind. Since we will continue to agglomerate, we must study the future of cities in two ways. One considers places in space. The other considers interactive nodes in the space of flows. Both will develop as technology makes new ways of agglomeration possible.

### **Public Choices, Private Meaning**

Nordic governments realize the importance of information in the new international economy. Denmark's policy is perhaps the most advanced, with a political action plan by the Ministry of Research and Information Technology (MRIT) on the role of information in education, public service, business, research and government affairs (MRIT 1995):

1. The electronic service network of the public sector.
2. Utilization of data and protection of personal data.
3. Security.
4. A better health service providing faster treatments.
5. The 'global village' of research.
6. New ways in the educational system.
7. Cultural network Denmark.
8. The mass media through new channels.
9. Disabled persons in the information society.
10. Information technology - a means to improve traffic management.
11. Network of companies.
12. The world's best and cheapest telecom services.
13. Open network of society."

According to this report "...With the fusion of the telecommunications and computer technologies ... geographic distance tends to lose its importance altogether. Many production processes are made dramatically more efficient. Entirely new requirements to the qualification of employees are often the consequence of these trends. The basic conditions of cultural development and education are radically changed.

"In the global perspective, the Info-Society is certainly becoming a reality that we cannot dismiss. The only question is how we will respond to it" (MRIT Denmark 1995: unpagged). The Danes welcome the information society. The designation of a government ministry for information technology and research demonstrates high priority. The fact that this ministry now has jurisdiction over the telecom system suggests conscious planning for the present and future structures of the information age (MRIT Denmark 1995: unpagged). The Danish government is developing the national advantages of information technology and recognizes that the best way to make progress is through communication and contact on an international scale.

Other Nordic governments are also shaping policies, short-term policies on research and the basic ground-work for long-term policies at the highest level. In Norway, a number of committees from different cabinet departments have been at work (Steihaug et al. 1994; Totland 1994; Totland 1995). In Sweden and in Finland, policies are being put forward by the central government offices (Regeringens 1995/96; Programme 1995)

### **The Informed Democracy**

The Scandinavian debate now centers on several key issues. The technology that can help to organize and shape the wealth of nations can also endanger the democratic way of life by creating "a two-tier society of winners and losers" (MRIT Denmark 1995: unpagged). The Danish solution is a political policy of "free access to information and exchange of information... that should: support democracy and give the individual the opportunity to exercise his influence ... support personal development ... support the individual in his working situation and in his leisure time ... support openness in the public sector, making it more transparent, contributing to the promotion of efficiency and rationalization in public institutions and enabling them to provide better services [and] sustain the disadvantaged of society" (MRIT Denmark 1995: unpagged). Political actors in the other Nordic nations have addressed the problem, but have not yet begun to adopt a combined policy solution linking technology to telecom policy to education policy and economic decisions.

For urban societies, many trends will act, interact and counteract to shape the future. Mahbubani writes that "History teaches us that trade and investment bring not just money and goods, but also ideas." This will mean new societies and new ways of understanding cities, since, inevitably, "a fusion will take place" (Mahbubani 1995: 108).

In earlier civilizations, Roberts notes that that the seemingly opposite effect takes place as "... accumulated culture gradually became a more and more effective instrument for changing the world. One change is quickly apparent: in different parts of the world, men grew more rapidly more unlike one another. The most obvious fact about early civilizations is that they are strikingly different in style, but

because it is so obvious we usually ignore it. The coming of civilization opens an era of ever more rapid differentiation - of dress, architecture, technology, behavior, social forms and thought. The roots of this obviously lie in pre-history, when there already existed men with different life-styles, different patterns of existence, different mentalities, as well as different physical characteristics. With the emergence of the first civilizations this becomes much more obvious, but is no longer merely the product of natural endowment as environment, but of the creative power of civilization itself" (Roberts 1987: 61). It happens that agglomerating creates centers, and these centers naturally lead to both results: shaping of similarities and heightening of differences.

What makes the difference? Much has to do with what economist Joseph Schumpeter famously hailed as the "process of Creative Destruction" (1981: 83). This is the power of economies and technologies to transform the world. This power destroys by rendering technologies and ways of life obsolete. It creates by making new opportunities and ways of living possible. Much of the difference also has to do with individual choice, individual choice multiplied by the millions and hundreds of millions of individuals as they determine the future through cumulative effect of their daily actions and decisions. These decisions are in many ways as powerful as the decisions of elected political leaders. In some ways, the aggregate weight of multiplied individual action is far more powerful. This is precisely where the power of information can make a difference for the future.

## **The Context of Knowledge**

Gregory Bateson (1984: 41) once said that "information is any difference that makes a difference." The power to make a difference defines the difference between information and knowledge. Roger Bacon, the 16th century scholar and a founder of the scientific method, noted this difference in his Religious Meditations, Of Heresies, where he wrote that, "knowledge itself is power" (in Mackay 1991: 21). Peter Drucker respects that difference, too, and describes the transformation of information into knowledge: "Knowledge is information that changes something or somebody -- either by becoming grounds for action, or by making an individual (or an institution) capable of different and more effective action." (Drucker 1990: 242)

Choices that establish the grounds for action are the key to transforming information into knowledge. Here lies a difficult problem. We can't always choose until we know; we can't always know until we find ourselves in the appropriate situation that requires our knowledge; we can't always orchestrate the proper situation until we've chosen. Johan Olaisen (1996b) effectively describes this situation in his analysis of the philosophy of science applied to information science. Olaisen's analysis outlines the challenges that every thinking person repeatedly confronts in the course of assembling the knowledge of daily life. Olaisen states that one must navigate sensitively through four domains. The first is the domain of what we know that we know. The second is the domain of what we know that we don't know. Navigating the third domain is more problematic, since it requires us to work with what we don't know that we know. Navigating the fourth is the even more difficult, the domain of what we don't know that we don't know (Olaisen 1996b).

Thus it is that the questions of information technology applied to cities have moved from a focus on technological issues to human issues (Ingwersen 1993). So has the public discussion of information technology. Debates have run from broad social and institutional questions to specific industrial questions. All of these questions affect life and work in the urban environment: Will the new technology mean the end of universities as we know them? How will the new technology change public libraries? Will desktop computers make checking accounts redundant? How will the development of advanced expert systems change the travel industry?

Professional issues will be equally visible: Will desktop banking replace tellers? Will diagnosis systems make physicians even more mechanical than they generally are today or will they supplement medical skills and enable physicians to focus on human beings? What is happening to the middle managers who are losing status and losing their jobs as information technology links top leaders to the factory floor and empowering front-line service workers? Will there be a future for secretaries when voice recognition and desktop publishing enable executives to handle correspondence and information management at the touch of a button?

Denmark's information policy states an ideal condition of democratic participation (MRIT Denmark, 1995). This kind of policy is as necessary for the welfare of society as for the individual beneficiaries of the policy. "Information is data endowed with relevance and purpose. Converting data into information thus requires knowledge. And knowledge, by definition, is specialized. ... The information-based organization requires far more specialists overall than the command-and-control structure we are accustomed to. ... Because of its flatter structure, the large information-based organization will more closely resemble the organization of 150 years ago than today's big companies or big government agencies" (Drucker 1990: 202-3). Information will restructure societies in many of the same ways.

We know that technology and innovation change the ways we work and finally reshape entire societies (Gimpel 1992; Pacey 1992; Roberts 1987; Schumpeter 1981). Our own evolution and the evolution of our tools is an interactive process (Petroski 1994.) Some, like Michael Schrage, go so far as to say that "humankind is really coevolving with its artifacts; genes that can't cope with that new reality will not survive into future millennia" (Schrage 1995: 172). This possibility frightens those who see technology in control, who feel that we are losing control as our inventions reshape the world around us (Postman 1993; Rifkin 1987). Others simply address the issue of innovation and information in a more even way, suggesting that both the wild optimists and the fearful pessimists tend to exaggerate.

Even the most even-handed view must respect the powerful changes that the new technology occasions in the world (Penzias 1989; Roszak 1986). Technology is, without question, an important source of renewal in society, and in many ways, invention and technological innovation have been key sources of human progress, political progress as well as economic progress (Schumpeter 1981). The power of information technology is shaping new communities on an international and even global basis, communities open to a wide variety of uses and interpretations (Rheingold 1995). The issue, is not whether nations and individuals will be affected by these changes. The issue is how they will be affected, and how political leaders will address the challenges that emerge (MRIT Denmark 1995; Jagland 1995; Westvik 1995).

The most intriguing challenge at this moment in history is the way in which individual information users interacting with the new



technology can also take part in shaping the changes to come. In this critical aspect of information technology, the information user and the information scientist will face common challenges.

## **The Parts of a City**

Imagine an economy in which no one needs to walk farther than their living room to work. Now look down the hill from Voksenasen into Oslo. Is this a world where human beings can live and work? Not at all. This is a beautiful place for people with cars, a reasonable place for people who are close enough to the train, a terrible place to spend one's entire time. Looking down the hill from Voksenasen, it's impossible to see more than one restaurant, overpriced, distinguished by poor food and bad service, patronized by those who happen to come for the view. There are a handful of stores, all invisible from Voksenasen. There are no bookstores, no cafés, no cinemas, nothing, hardly, that defines a city or city life. In short, this is an area as bereft of services as the smallest fishing village in the Lofotens.

What this area does have, however, is proximity to Oslo. Imagine, though, a world in which we don't go to town every day for life and work. We lose identity, we lose human contact, we lose the rich web of interaction that defines daily experience.

Think, now, of a new way of developing cities. What makes some of our Nordic cities so livable is not their bigness, but their smallness. Copenhagen, for example, is a city of many small areas, each with identity and services. So, too, Helsinki. Stockholm has been less successful, and speaking as a visitor to cities rather than an urban planner, it seems to me nonetheless that Stockholm has been planned to much and served poorly thereby.

What I've wanted to do today was to paint a broad picture, a large background for the new ways of planning that cities must face, ways of encouraging natural growth, ways of encouraging neighborhoods rather than what one sees looking down from Voksenasen. There are two ways one can look at this area. One is to see a beautiful suburb with a great view of Oslo, a fabulous place in which the rich and privileged of Norway can raise families, park their cars and walk in the nearby woods. The other is a view that will surprise those who live here, but it is my view. I think of this neighborhood as a high-priced slum, a cold, inhospitable area in which one is trapped among houses closed to each other and closed to a sense of community. An area in which there is nothing to see other than the view down to the fjord and nothing to do that remotely resembles urban life. I like a cottage in the woods when I go to the woods. In a city, I like to meet and to be with people, and I see none of that here. One of the things I like so well about working at a place with other people is the rich interplay of life between my colleagues and students at the Norwegian School of Management and my colleagues around the world. If I worked in a home office at Voksenasen, I'd have none of that and nothing to see, touch or do when I walked out my door except get in a car to go somewhere else.

That's not a model for the future I'd like to see. In that sense, one would do better, far better, living in a small city or even a village where a social life exists that permits us to meet the world and our neighbors both.

It's interesting to set these issues against the background of social policy and culture. The Nordic social democracies have distributed wealth and education in a remarkably even way. This region is atypical in comparison to the rest of the world. In most of the world, rural areas and tiny urban points without an industrial base are poor. In Scandinavia, rural areas are not poor. Much of our population lives in rural areas and hamlets or towns so small that they are villages in the original sense of the word. Nevertheless, they are wealthy and well educated. In a cheerful irony, the Nordic nations have given the word village its original meaning.

The 14th century Middle English word village comes from the Old French word ville, a word that meant farm rather than town or city. That word descended from the Latin word villa, a country estate or the rural or suburban residence of a wealthy person. That certainly defines the rural areas of modern Scandinavia, a place where farmers and fisher folk are far more wealthy than most of the world's inhabitants. In this talk, I've tried to present the background of issues against which policy decisions must soon be made. In doing so, I feel that I'm peeling an onion in which each layer of the onion has more layers inside it and each layer contains far more layers than the one before.

## **Models for the City**

So far, I see a number of models for the information age city, and I must admit that not all of them are pleasing. They work for the business of work, but not for the business of living. Just as information systems are among the major developments of our time, two of the many inventions that define life in the post-industrial society are information-based machines.

One of them is the computer. The other is the modern airport.

The airport is one model for a kind of information age city, not quite like anything that has gone before (Friedman 1991). It is the radical descendent of primal ancestors, much as the computer saw its protozoan form in Charles Babbage's computing engine. The first cities began as crossroads. These emerged into the city hub, where railway stations emerged as the early cognates of the airport. These early forms of transportation-information hub preserve in fossil form in the patterns of urban life -- but the airport is related to them as the modern horse is related to its dog-sized, three-toed ancestor. The railway station was the metaphor of the Victorian city: it is to the contemporary airport as the steam engine is to the computer. Its principles and its effects are so radically divergent that it is another kind of device entirely.

Today's airport is only partially connected to the environment around it. It is directly connected with other airports with which is linked in an increasingly vital network. It is estimated that over two billion people will fly annually by the year 2000 in Europe alone. That statistical sleight-of-hand counts person-trips instead of people, but it makes clear that a new civilization is forming in the skies, housed in the atmospheric shell of an Earth that is about to seed the planets and the stars with life. The way we think about and organize ourselves through airports will become an organizational principle for much of our future. This is not a good thought. You can move through an

airport, but you don't want to eat there and you wouldn't want to live there.

There are other models, and most of those models resemble the places we like to live today. These are models of cities with neighborhoods. These are models of small cities or even villages in farm communities. In short, these are models of effective, reasonably prosperous communities in which we come to grips with and perhaps even solve the urban planning problems we have not yet solved today.

What's interesting about the new structure of the city in the information age will be the new forms of work and play that are open to us. In an era in which we must drastically reduce the use of material resources to ensure planetary prosperity -- perhaps to ensure survival -- this is a welcome opportunity. Equally interesting is the possibility that the exploding information age makes it possible for us to consider new solutions, hybridized answers that bring old values and new opportunities together. We can do this and see these opportunities played out on a world-wide stage.

What is unique to the Nordic nations is the fact that we still have the resources of time and wealth to address these issues.

The cushion of resources will not last forever. The window of opportunity will close early in the next century. The time to think broadly, to educate broadly, to look beyond the common place is now. Our populations are literate, but we waste our literacy on tabloid newspapers. We have more channels than before, but we use our channel access to support what several speakers at this meeting have called the three Vs, "villa, Volvo and vof-vof." That won't do, and that's not the meaning of any democracy that can hope to last longer than the brief Athenian democracy or the Roman Republic.

In a world full of questions and possibilities, situation is not without hope. Against this backdrop, good questions are a good place to begin.

## Here and There

In his Stockholm office near Sergelstorget, Bo Granholm put the finishing touches on a report as he telephoned his client, Gunnilla Larsson. Larsson's secretary answered the phone to explain that Ms. Larsson was in a meeting. Granholm copied the report and pasted it into an email document, sending it with a note to request a quick look-through with any comments or changes.

When Gunnilla Larsson returned to her office, she found Granholm's note. She called him back as she pulled the report up on her screen. Granholm's voice mail service explained that he was at lunch and requested that callers leave information to permit a return call. Larsson said she called, and said that she'd answer the email immediately. When Granholm returned, he found the notes and changes. He made the corrections, punched a button and printed the report. He grabbed the report from the printer, signed it, ran it through the rapid binding device and called downstairs for a messenger.

Less than half an hour later, the finished report was on Gunnilla Larsson's desk in Gamla Stan. She called him to thank him, saying, "You know, this new technology is just wonderful! We got this project done just as fast as the one your office in Copenhagen did for us!"

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The stark differences in patterns of urban growth across the globe are graphically illustrated in the map above. It charts the population size of a selection of world cities with more than a million people from 1950 to 2025. By highlighting three periods of past and future growth (based on UN predictions), the uneven distribution of urbanisation becomes clear to see. Most large cities of Europe and parts of North America hit their current size by 1950.Â Urban Age is a worldwide investigation into the future of cities, organised by LSE Cities and Deutsche Bankâ€™s Alfred Herrhausen Society. Its 10-year anniversary debates are held in conjunction with Guardian Cities. Topics. As a history of urban forms, The City Shaped is full of a lot of interesting insights into how and why various planners (both public and private) have chosen certain layouts for cities, and how human patterns of usage both are and aren't shaped by the forms those planners have tried to choose for them.Â Kostof has a dizzying array of examples of how seemingly similar patterns can result in very different cityscapes, in the same culture and even in the same city.

Urban songs were shorter and sung faster than songs in forests, and often concerned atypical song types. Anthropogenic or man-made noise is most likely a dominant factor driving these dramatic changes. "The frequency of songs could convey information on the singer's ability to fight," say the researchers. "It becomes clear that if birds sing at a high pitch to avoid noise masking, they may be sending the wrong message to male competitors." But the heat that envelops cities and urban environments can increase temperatures by as much as 8C, and that helps urban birds get through the long winter nights using far fewer energy reserves than those in rural areas. And that means they can forage at their leisure rather than at the crack of dawn. *The Informational City: Information Technology, Economic Restructuring and the Urban-Regional Process*. Oxford and Cambridge: Blackwell Publishers. Like all Castells's pieces, this book covers a large scope and does so with a lot of detail. In broadest strokes, this book is an analysis of (the then) new information technologies and urban-regional processes as they occur in a larger historical context. [Wonderful on an academic level and harrowing at a social one is how prescient Castells is about the dual city, which in The Information Age becomes the Fourth World.] Per Saskia Sassen, immigrants come to New York because of the job opportunities in the informal economy. They live in "interstitial space" (216), either ethnically segregated areas or enclaves in white cities. As a history of urban forms, *The City Shaped* is full of a lot of interesting insights into how and why various planners (both public and private) have chosen certain layouts for cities, and how human patterns of usage both are and aren't shaped by the forms those planners have tried to choose for them. Kostof has a dizzying array of examples of how seemingly similar patterns can result in very different cityscapes, in the same culture and even in the same city.