Gunnar Törnqvist

Department of Social and Economic Geography
Lund University
Sweden

PROXIMITIES IN A KNOWLEDGE BASED ECONOMY

Essentially, transportation and communications technologies deal with technical solutions to problems associated with moving material, people, and information. These problems have always challenged human ingenuity, and history is full of examples of technological innovations that drastically changed the geographical scope of action. New conditions have been created for extracting natural resources, for producing goods and services, for controlling and managing human activities, and for the individual's personal needs. The connection between new technology and increased mobility is obvious. Reduced distance friction has led to an increase in transportation and the swifter flow of information. It is more difficult to analyze how new technology has affected and will continue to affect the location of physical infrastructure, economic activities, and thereby our settlement patterns. Connections that have been found to date are not definitive. The field has been relatively free of contradictory visions, expectations, and misgivings.

Napoleon Did Not Travel Faster Than Caesar

A considerable degree of distance friction formed the basis for earlier local self-sufficient communities and regional isolation. Natural resources tied production to places via vertical links. Overland, the transport of goods depended on how much human beings and animals could carry and pull. Beyond seeing and hearing range, information could only be transmitted by messenger. The best transportation routes were by sea and navigable rivers, as the existing roads were scarce and primitive.

Over the centuries, the opportunities for humans to master geographical space changed very slowly. The fact that Napoleon did not travel any faster than Caesar was not just a figure of speech; it was a reality. Until the end of the eighteenth century, the Roman military roads built before and immediately after Christ were, in many places the most accessible ones south and west of Limes, which demarcated the border between barbarians to the north and east and civilized people to the south and west. This border stretched the length of the Rhine and Danube Rivers.

During the nineteenth and twentieth centuries, the change in what we might call the *technical range* had a radical and revolutionary effect on social progress. However, even before then, progress in terms of the ability to transport people and goods over long distances changed in

leaps—improvements that seem modest compared with those that the industrial revolution had in store.

Henri Pirenne, the Belgian historian, has described “three logistical revolutions.” The first one took place during the Middle Ages, when transportation links began to tie previously limited trading systems and cultures together. With better ships, such as Venetian crusade ships and Hanseatic merchant ships, trade expanded between ports around the coasts of the Mediterranean, the North, and the Baltic Seas, and along Europe’s large, navigable rivers. As political territories grew, it became easier to stop robbery and plundering along the traffic routes on both land and sea. During the second logistical revolution, continents became linked. Caravels made it possible to carry cargo across oceans. The main focus of long distance commerce moved from the Mediterranean and Baltic Seas to the coasts of the Atlantic Ocean and the North Sea. The evolution of transport technology was not the only reason for the improvement of trading conditions; as uniform modes of payment, a credit system, and banks began to facilitate transactions, the need for better ways of transferring and managing information increased. The third logistical revolution began with England’s industrialization at the end of the eighteenth century.[1]

Technology that Distorts Time and Space

With industrialization, technological expansion leapt forward more and more rapidly. Steamboats made it possible to transport large quantities across oceans quickly and regularly in any weather. During the nineteenth century, the global competitive situation changed completely, none the least when it came to food production. Railroads made it possible to link large territories with reinforced steel.

The next burst of expansion regarding the transport of people and goods came with the automobile. Its advantages had nothing to do with increased speed and greater range, but rather with its ability to adapt to individual travel needs. By contrast, aviation, which evolved into the fastest means of transport, is characterized by distinct nodal network features; these features make it accessible at only a few points that are usually far away from each other.

While the sweeping importance of the automobile and aviation for social progress became apparent in Europe immediately following World War II, this concept did not gain a foothold in Scandinavia until the 1960s. When problems with increasing automobile traffic in congested city centers and on overcrowded highways later became acute, railroads experienced a renaissance. Crowded air space has also contributed to large-scale investments in rapid rail connections along major thoroughfares.

Writers in the early part of the nineteenth century described the railroads’ destruction of old conceptions of time and space. As the railroads shortened travel time, places came closer to one another. For the first time, local times around Europe confronted one another. Prior to the era of the railroad, time was “local.” Astronomical time prevailed. In the 1840s, all British railroad companies introduced uniform *railroad time*. Mail trains were equipped with clocks; as they passed through the stations, the time was called out. Until the end of the century, railroad time only applied to rail traffic and its timetables. The denser the railroad network became, the more places and regions were affected, and the louder the cry to exchange “local”

time for standardized time. In 1880, railroad time became the universal standard time for the United Kingdom, and in 1884, an international conference coordinated national standard times and divided the world into the time zones that still apply today.

While time was standardized in large areas, the railroads broke up a homogeneous, coherent countryside. A pattern of discrete points linked by more or less straight lines was placed on top of a continuous geographical space. In 1840, someone wrote, “Railroads only know departures, stops, and arrivals as places that are usually far away from each other. With the interjacent space, which they disdainfully intersect and to which they condescend with barely a passing glance, they do not establish any connections.”[2]

The distortion of time and space that travelers in the nineteenth century experienced seems minor in comparison to the imbalances that people today have become accustomed to. With the medial range that will be described below, time differences as great as the difference between night and day confront one other. Air travel rearranges biological clocks, putting us out of synch with the local schedules around which are lives are organized.

The cost of transporting goods has been reduced relative to other costs that firms competing with one another try hard to lower. Transport times have decreased, in part, as a result of simplified terminal management and the fact that automobiles, rather than ships and trains, are transporting more and more freight. One consequence of this development is that a growing segment of the manufacturing industry has become “footloose” and capable of wide-ranging relocation. A second consequence is the unprecedented growth of transport. Goods are transported between producers, suppliers, wholesalers, retailers, and consumers, to all appearances without any apparent consideration for distance and the possibility that there might be substitutes closer to home. Crowding and traffic jams in big cities and on highways are the price we pay for this increased mobility.

At the Outer Limit of Mobility

Even more dramatic than the development described above is the history of the medial range, by which we consider the medium as a channel for information transfer. Until the beginning of the nineteenth century, the only way to transfer signals over greater distances, besides sending a message by hand, was through optical transmission using beacons and smoke signals. Early *telegraphs*—the transfer of text and symbols—were also optical. The first working electric telegraph was demonstrated in the United Kingdom in 1837. The electronic transfer of signals was required if rail transport was to function at greater speeds. Beginning with the United States, Samuel Morse’s invention made it possible to record electrical impulses on a strip of paper. The signals traveled via a telecom network and cables. The first transatlantic cable came into use in 1866. By the beginning of the 1870s, Europe, America, Africa, and Australia were part of a network. Then came the radiogram, which made the transfer of information possible without cables, and the teletype, which converted signals to text.

The *telephone* translated speech into electrical impulses on one end of a line and converted them back into speech on the other. In 1876, Alexander Graham Bell applied for a patent for his invention. Before the turn of the century, there were expanded telecommunications networks in many places in the industrialized world. From its beginnings as a communication

tool in the business world, the telephone soon became every family's personal possession. *Cell phones*, which are spreading at a furious pace now, free individual subscribers from the constraints of a network.

With *computers in networks*, there are almost no limitations on the transfer and storage of information, whether in the form of text, pictures, or sound. Computers can be hooked up together in specially built networks or in an ordinary telecommunications network with the help of a modem. On a large scale, companies and other organizations have expanded the internal networks to connect several workplaces. From a technological standpoint, it does not make any difference how far away these places are from each other. The same type of network can be used to link independent, yet collaborating groups of companies, thereby blurring the traditional firm concept.

The range of this new information technology seems limitless. Telecommunications is a prerequisite for steering and controlling the complexities of the modern transportation system. With a network of computers, tasks such as orders, reservations, and financial transactions are accessible simultaneously in places that are far away from each other. In great part, companies have the new technology to thank for making it possible for them to direct and manage plants and offices all over the world, and make quick adjustments based on the actions of competitors.

It is hardly an exaggeration to say that information technology has revolutionized capital markets. Not only are companies connected via the technological network; stock markets and stockbrokers all over the world are intertwined. Woven together, networks open up endless possibilities for firms, stockholders, and currency traders to invest and redistribute securities and currency. The new information technology makes it seem as if managers, brokers, and employees are in the same room at the same time. Therefore, it is not so surprising that, in the course of a few days, global stock markets can turn over as much money as global trade does in a whole year.

Paul Virilio, the French city planner, is one of many people who have advanced the theory that continuously accelerating speeds are the guiding principle behind social changes. In his book, *Vitesse et Politique,* he views technology as a destiny and technological development primarily as an unavoidable incitement to change. The entire history of science and technology is a story about acceleration. Technological development has led to, or shortly will lead to the realization that distance no longer has any significance.[3]

The lack of friction and restrictions has advantages, but it also creates many problems. For instance, it is often pointed out that financial markets, with the help of electronics and telematics, now often react much too quickly and rashly. Opinion polls, which mirror occasional swings in the electorate, can influence long-range political decisions. The "social friction" that is part of negotiation, discussion, and conversation disappears with automation and remote control. Without friction, it is more difficult to make wise decisions, and the experience of individuals is less valuable. The ability of individuals to control, detect errors, and inform declines. With less friction, uncertainty, surprise and risks increase.[4]

Against the background of the technological development described above, it is easy to imagine that physical distances are unimportant, and that *geography has been played out*. Today's opportunities for transporting and communicating should make production and fixed settlement less tied to places and limited regional milieus. Without a doubt, it is also true that decreased distance friction has led to freer location choices, many more alternatives, and greater mobility. However, this freedom has been used to only a very limited extent to spread out activities. In fact, it is easier to demonstrate that this freedom has facilitated concentrations. If this is true, we face a paradox in social progress. At the same time that distance is losing its traditional meaning, the geographical concentration of people and activities is increasing. Two circumstances may help us understand the significance of this paradox: *the growth of a network society* and *agglomerative advantages*, which influence the localization of activities associated with industry, research, and service.

The Territorial Field of Tension

In modern societies, tension exists between global and local forces. Two apparently incompatible developmental trends point in different directions (Figure 1). *Globalization* points to an increased dependence on the outside world. Global networks, extended spheres of interest, and increased mobility provide us with a glimpse of a flow society of global proportions. *Regionalization* points us in another direction. It assumes that human beings and activities are and will remain strongly tied to a local and regional environment. This sense of local ties is fundamental and in striking contrast to a world characterized by wide horizons and increasing mobility. The tension between global and local forces is not new. History is full of examples of cultural, economic, and political forces that have changed directions. However, as a result of the rapid changes that have occurred in Europe since 1989, these tensions have now become acute and are the subject of a lively debate and an extensive body of literature.

The basic underlying assumption in our argument is that a field of tension between the developmental forces creates pressure for change. Three territorial variables exist within this field of tension. Sovereign *states* are still considered to be the most important territorial variable, as most of the world's organized political activity is carried out within their framework. They establish the frames of reference for economic, social, and intellectual life. They are bearers of human identity. The developing *European Union* provides us with a familiar and highly topical example of supranational integration. *Regions* that have their own conscious identities are considered to be territorial units smaller than most states, comprising limited areas that are approximately equivalent to a district, neighborhood or province. In addition to these variables, there are autonomous *networks*, which, in different ways, have withdrawn from the traditional territorial, political, economic, and social frameworks. It is here that we find large companies, other types of organizations, and production systems. We also find formal agreements and informal cooperation within the academic world, and cultural ties and social relationships that cross state borders.

The oval shapes in the diagram may also be seen as four competing spheres of interest—sovereign states that are jammed between supranational integration, autonomous networks, and powerful regions. The tension among them emerges when we discuss the basis for political power, democracy, and legitimate sets of rules. It also affects the opportunities available to

the public sector. Questions related to environmental issues, resource planning, defense, and welfare are also clearly affected by the tension among these spheres.

There is a further thought underlying the positions of the four spheres. Adopting the sovereign state as our point of departure, we assume that supranational integration points *unambiguously* to an extension of the territorial sphere at the European rather than the global level. On the other hand, increased regional consciousness will also lead unambiguously to a stronger regional level. The notions of "Eurocracy" and "regionalism" have also been raised. Further, the development of autonomous networks is not as unambiguous. Numerous studies demonstrate that the global network developed within business, higher education, research, and the arts is dependent on local and regional ties simultaneously. The expression, "local embeddedness of transnational networks," is now used to describe this relationship.

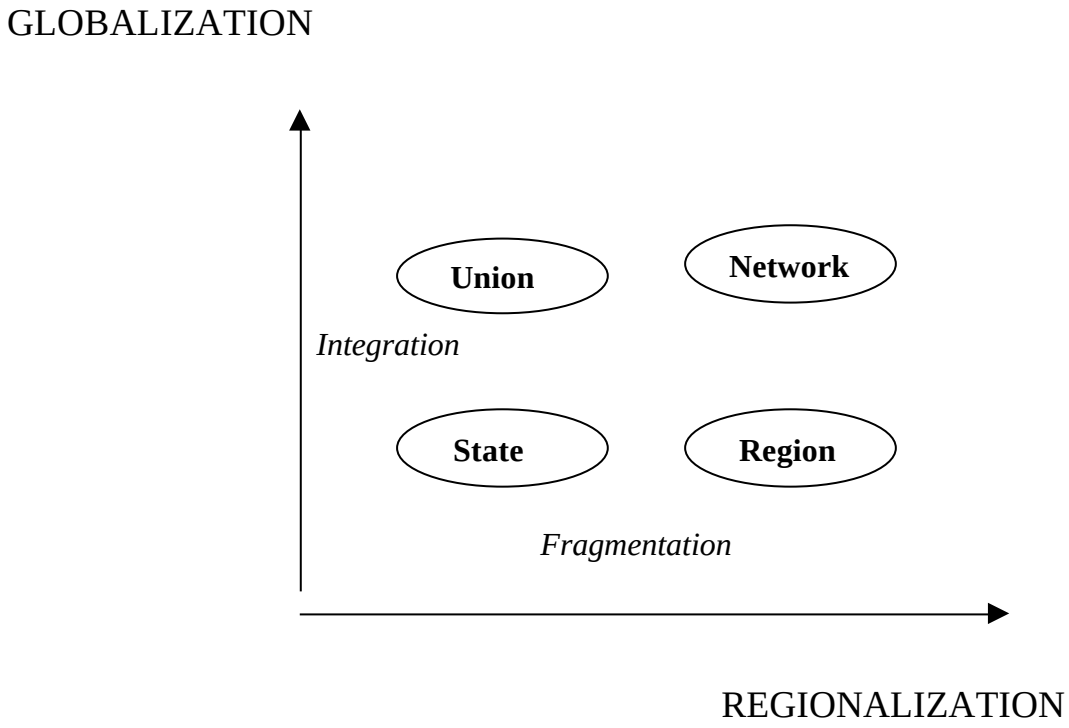

Figure 1 The territorial field of tension.

Before discussing the challenges posed by the developments of recent years in Europe, we must remind ourselves that the tensions described in the figure are by no means new in Europe. Our history suggests that these tensions have tended to create more or less constant pressure for change. What is new is that current challenges have changed direction. Beginning with the Middle Ages, expanding states have always challenged earlier regions and networks and prevented the development of widespread integration. Here and there, we now find ourselves in a situation in which the state is the territorial unit that is provoked.[5]

The Network Society

The network has become a concept in time. A *territory* is a contiguous part of the earth's surface. A boundary delimits the territory from its environment and demarcates those who belong from those who do not. The word *territory* is also used to define a "political space" or a "power sphere." *Network* (see the oval in Figure 1) illustrates the geographical space as discrete points (nodes) bound together by lines (links). The network discriminates between nodes that are hooked up to the net and those that are not. The tension between the two concepts will be apparent when networks that are important to our welfare become autonomous in relation to the individual territories in which democratic control is confined.

Existing networks are physical, institutional or socio-cultural. *Physical networks* comprise constructions, lines, and channels for transporting materials, people, and information, and include highways, railroads, waterways, airways, and telecommunications cables. These are physically tangible and figuratively "ground" the entire flow of information and contact in the terrain. Since the end of the hunter-gatherer society and the creation of fixed settlements, these networks have come to constitute our principal geographical space. In the physical space, the nodes are stations, the only places in which access to the network is granted. The properties of the network are particularly apparent when the nodes are comparatively far away from one another, such as airway and naval networks, and less apparent when they are closer, as in road networks and telecommunications systems. Physical networks are intimately related to wider patterns of settlement. Cities and places can, at an aggregate level, be viewed as nodes where channels of transportation and communication come together.

Manual Castells, the Spanish-American sociologist, has coined the term *network society* to characterize the world at the dawn of the new millennium. His conception draws attention to the fact that many of society's most important functions are organized as networks. Networks constitute a new "social morphology" of our societies, and the diffusion of "networking logic" substantially modifies the operation and outcomes in processes of production, experiences, power and culture. Further, he maintains that not only do networks infringe on national hegemony, but also on other collective power spheres, such as political parties and labor movements. Work is losing some of its collective identity and, through extreme specialization, is becoming more and more tied to the competence of individuals.[6]

What is happening is that different types of networks are becoming more important at the expense of territories. Tension and the risk for conflicts of interest between the power that protects territories and those interests that are tied to networks are increasing. The enormous growth of institutional networks is one of the most obvious examples. Business and scientific networks, to name two of the most important spheres of activity for our future prosperity, have broken out of traditional political and social frameworks.

When firms break out, it is no longer just a matter of adapting to market expansion and distant sources for raw materials. Through overseas installations, purchases, mergers, cross holdings, alliances, and cooperative agreements, a complicated fabric of cross-border networks, with changing owner relationships and fluid homeland loyalties, has developed. Today's new stateless organizations can only be partially controlled and influenced within territorially defined, national decision-making systems. Using new strategies for cooperation and

specialization within networks, companies can take advantage of production opportunities in several different countries simultaneously. Currently, the difficulties of pursuing economic and labor market policies within national borders are among the biggest challenges to the sovereign state.

How far-reaching, then, are the *autonomous networks* that have broken out of their traditional national networks? Data is available for transnational firms, that is, companies and corporations active in several countries. For example, according to the United Nations World Investment Report for 1993, 37,000 transnational companies controlled one third of all privately owned production facilities in the world. As of the1998 report, the number had increased to 52,000. Included in this figure are companies of different sizes representing not only manufacturing firms but also trading and service companies. In all likelihood, these figures are on the low side. Add to them a huge swarm of transnational relationships between entities that formally belong to different companies and corporations.

It is only natural that the scope of cross-border activities is, to a great extent, related to the size of nations. Big countries with significant domestic markets can contain broad networks within their borders. On the other hand, companies that are growing in small countries tend to develop their overseas operations early. Let us use Sweden, a small, economically advanced country, as an example. Of the 37,000 companies that the United Nations recorded at the beginning of the 1990s, 3,500 were regarded as being "Swedish." When it comes to breaking out of the national framework, Swedish industry, in proportion to its size, can be considered unique.

In the mid-1990s, Sweden's twenty largest companies, together, had a turnover of more than one billion Swedish kronor (SEK) at plants around the world. This figure is more than double the value of all of the country's exports, or half of its entire GNP. These companies had a total of 775,000 employees, which is more than the total number of individuals working in Swedish manufacturing industry, according to official statistics. At the time, between 69 and 97 percent of the employees of the manufacturing, timber, pharmaceutical, and construction concerns that made up this group of twenty were located at overseas facilities.

The importance and expansion of research is still discussed primarily as a matter of national concern. At the same time, however, research and development are being managed more and more in international networks outside of the individual countries' control, in spite of the fact that, in many places, these countries still finance significant portions of this R&D. Science has freed itself from national frameworks and operates more and more within network structures that, in many respects, resemble those that existed in the Middle Ages. In an *archipelago* of universities and research institutes, a network of cross-border relationships ties places together. Today, more than ever, the scientific world is part of a powerful communications system. Research and knowledge development are built on the diffusion of ideas and the dissemination of information. During the creative process, pieces of information are combined in new, often surprising ways. This information is conveyed to others through teaching. The scientific networks and the research community are used not only to transmit ideas and approaches; they also act as monitors, and convey critique, and recognition.

Geographical Clustering

Globalization and regional rebirth go hand in hand within the modern economic development. There is indeed a rise of the *regional* in lockstep with the rise of the *global*. This connection has been tested and verified by researchers in a number of OECD member countries.[7]

It has long been known that agglomerative forces exert considerable influence on the location of different types of production. Activities derive benefits from being close to one another, particularly in certain regions and places. Alfred Marshall, the British economist, was one of the first to call attention to the importance of the neighborhood for industrial development. At the beginning of the twentieth century, he pointed out that specific areas, characterized by an "industrial atmosphere," were scattered around industrialized countries; related and similar industries were concentrated in these areas. He referred to this phenomenon as "industry is in the air." Agglomerations form an archipelago of scattered islands. Marshall advanced three main reasons for this type of concentration and the ensuing creation of an industrial atmosphere in a specific place or region.

Agglomeration—geographical clustering—of related firms produces external effects because a permanent labor market is created for skilled individuals in a geographically delimited area. The area becomes attractive to both employers and a specialized workforce. The second circumstance that speaks for agglomeration is the increased availability of specialized input commodities and services. Third, agglomeration generates competence.[8]

Jane Jacobs, the Canadian economist, received considerable attention in 1984 when she published *Cities and the Wealth of Nations*, in which she advanced the opinion that countries are not appropriate territorial units for understanding how economies function. Every country is a blend of regional economies. Rich and poor regions lie side by side. Without a national compensation policy, regional inequalities would be unacceptably large. In spite of the regional policy that has been introduced in many countries, the economic disparities between regions are much greater than the differences between national averages. According to Jacobs, the geographical unit that would give the best insight into how economies function is the city and its surroundings. Functional city regions are the natural units in a larger economic landscape. In regions, economic activities are packed into a remarkably small area. The economic landscape between cities is surprisingly empty.[9]

Paul Krugman, one of the leading economists of our time, picks up on one of Alfred Marshall's trains of thoughts in his book, *Geography and Trade*, first published in 1991. According to Krugman, countries play a role in international economics solely because they have governments whose measures affect the geographical mobility of commodities and factors of production. Through political decisions, national borders can act as barriers to the trade and factor movements. In reality, however, there is no inherent economic significance in drawing a line on the ground and saying that what it separates are two different countries. The best way to understand how the global economy works is to look at what happens *within* national borders. If we want to understand why growth vary between countries, we should begin by studying differences in regional and local growth.

In Krugman's opinion, the concentrations of firms that can be observed in all industrialized states originate in Marshall's trinity: *the consolidated labor market, access to input commodities, and the transfer of knowledge.* It is likely that all three occur in a city or in a small clump of cities, an area that is so small that people can change jobs without having to leave familiar surroundings. In this area, goods and, primarily, services that are difficult to move can be delivered and regular face-to-face contacts can take place.[10]

Terminology that demonstrates Marshall's timeliness is clearly evident in more current geographical literature. Successful regions and places are said to occupy "Marshallian benefits." In the most trivial landscapes, "intelligent regions" can break the pattern. "Neo-Marshallian islands" can be found in the waters of traditional industrialism. They are lying there like "raisins in a cake," to use another image. The successful regions and local units that are discussed extensively in literature vary in size and, in some instances, are extremely different in character. There are cities, parts of cities, research parks, development centers—or technology corridors—local production complexes, and industrial zones along side of municipalities, Italian regions, American states, and German Länder. What they all have in common is the fact that they constitute *smaller parts* of national territories.[11]

Where are these Neo-Marshallian islands or nodes, as they are also called? There is probably no country in Europe that, through its industrial history, has not been home to areas with Marshallian benefits. Several have been singled out as excellent typical current examples. They include the Cambridge-Reading-Bristol axis, the southern part of the Paris region, Baden-Würtemberg, Grenoble, Toulouse, Montpellier, Sophie-Antipolis near Nice, and Santa Croce Sull'Arno in Tuscany. Arnaldo Bagnasco is said to have been the first person to draw attention to a "third Italy," the other two being the industrial triangle in the northwest and old-fashioned Mezzagiorno in the south. The "third Italy" is home to small-scale manufacturing that is technically advanced and highly productive. Generally speaking, this area includes the Emilia Romagna region, parts of Veneto, and the cities of Bologna, Carpi, Sassuolo, and Arezzo.

In a surprising number of cases, the seed for a successful accumulation of enterprising spirit can be traced to a seemingly trivial historical coincidence. Success can often be attributed to single individuals, whose early initiative ignited a spark that set off a chain reaction and the beginning of a long process. However, regional success is seldom derived from conscious, systematic planning.

To all appearances, one of the peculiarities of industrial areas is a contradictory combination of competitiveness and cooperation. Firms act like rivals in matters of research and development (R&D), and renewal and effectiveness, but often cooperate when it comes to administrative services, the purchase of raw materials, and financing. Reciprocal support is common, and technological innovations spread quickly between companies. "External effects," believed to compensate small companies for their lack of large-scale benefits, often spring up in a neighborhood.

Modern theories on the business firm tell us that competitiveness can only be built on heterogeneity: by firms having control over something wanted by others, or by firms being

able to do something that the competitors cannot do as well, as fast or as cheap. Development is not to be expected in a world of uniformity and homogeneity. “Little progress would be made in a world of clones.”[12]

Up to now, this section has dealt primarily with the agglomerative forces that have long been active in a traditional industrial society. However, what is most interesting for this account is the fact that the trend for activities to concentrate in only a few regions is even more evident in *the emergence of a knowledge based economy*. Here, for the first time in history, human intellect and scientific knowledge are direct productive forces, not just vital elements of the production system.

Earlier periods of modern history have been characterized by a relatively slow transition from agrarian to industrial forms of production and living conditions. Changes in technology, production, and socio-economic, political and cultural conditions, which are occurring at a rate unparalleled in human history, characterize the social and economic transformation we are now witnessing.

Trade between industrialized countries has changed. A growing proportion of traded goods comprise high value-added products, the value of which can be attributed to a high degree of intellectual skill and advanced technology. The content of work and the composition of employment in modern societies have changed dramatically. *Science, research,* and *higher education* are seen as strategic features of this new economy.

In many countries, scientific work and education are the most expansive employment sectors. At present, the view that universities are a major driving force underlying technical and industrial development is widespread. In public debates on these issues, a widely held notion maintains that there is a fundamental relationship between research and education on the one hand, and the international competitiveness of firms and, thereby employment and prosperity on the other.

In connection with my speech I will illustrate the distinct concentration tendencies in the knowledge based economy. Using maps of the United States and the European Union—two comparable quantities in several respects.

Figure 2: Number of students according to regions/1996. Thousands. **USA**

Figure 3: Number of students according to regions/1996. Thousands. **EU**

Figure 4: Employees in high-tech industries according to regions/1995. **EU**

Figure 5: High-tech employees per 1,000 inhabitants/1995. **EU**

Figure 6: Number of patents according to regions/1996. **USA**

Figure 7: Patents per 1,000 inhabitants/1996. **USA**

Figure 8: Number of patents according to regions/1996. **EU**

Figure 9: Patents per 1,000 inhabitants/1996. **EU**

Terms of Social Communication

In order to understand today's distinct tendencies toward geographical concentration, it is necessary to touch on some of the conditions that apply to social communication, that is, what we have known for a long time about the laws of "human interactions." In a very recent report, for example, American researchers Edward Leamer and Michael Storper hold up "geographical clustering" as one of the most striking features of the new millennium's economic geography. As divisions of labor and specialization in research and knowledge development have become more pronounced, the need for coordination has increased significantly. "The finer the division of labor, the greater the coordination needs." This is where today's extreme focus on direct personal contacts becomes so important.

"We argue that the Internet will produce more of the same—forces for deagglomeration, but offsetting and possibly stronger tendencies toward agglomeration. Increasingly the economy is dependent on the transmission of complex uncodifiable messages, which require understanding and trust that historically have come from face-to-face contact. This is not likely to be affected by the Internet, which allows long distance 'conversations' but no 'handshakes'."[13]

In light of the revolution that has taken place in relation to *technical range*, it is easy to forget that *human reach* has not changed to nearly the same extent. The physical and psychological capacities of human beings do not appear to be substantially greater today than they were several generations ago. Indeed, without technical assistance, our actual physical performance would probably be somewhat lower. As we have seen, technical innovation has created fantastic new opportunities for humanity. However, it is questionable whether our capacity to process information has increased to any great extent. What evidence is there that our capacity to feel and perceive is any greater than it was a century ago? What is there to suggest that the present generation's capacity for identity, concern, and trust is markedly different from that of our forefathers?

The concept of reach has been used in phenomenological research, and in Sweden it is associated with the Irish geographer, Anne Buttimer, in particular.[14] Torsten Hägerstrand, the Swedish geographer, wrote the following about this concept: "Something which is in reach cannot just be understood in purely physical terms. Economic, intellectual, and emotional dimensions must also be taken into account. In visual terms, a person may be said to be embedded in an entire 'reach space,' which stretches in all directions—sideways, back to the past, and forward to the desired but not yet attained. The actual contents of this space will depend not only on the individual's own capacity and biography, but also on the assets that are available in the surrounding environment and the recipients to whom they could be distributed." [15]

Experience domains and *communities* are concepts used to denote areas within which human beings are united by a common language, religious communion, shared history, common memories, and mutual trust. The French and German equivalents of these concepts are

sémiophère and *Lehrgemeinschaft*, respectively. It may be appropriate to think of these concepts as territorial categories—places, regions, and countries. However, one could also maintain that cooperation, a sense of belonging, and loyalty may develop in networks. Nevertheless, a number of arguments suggest that place, neighborhood, and region will continue to play roles as important as those of experience domains and communities. One of these arguments is related to stability, the second to the importance of the physical environment, and the third to our need to conduct conversations.

While technical range supports rapid change, human reach, personal contact networks, and imagined communities create remarkably resistant structures that are passed on from generation to generation through upbringing and education. This educational inheritance is stored in texts and images in our libraries and archives. Buildings act as concrete memorials. The passage of generations takes time. Human reach supports local ties and regional identity. Our daily pattern of movements and tightly knit social network reinforce the importance of neighborhood. For those who are *residents* in an area for a while, place and neighborhood become experience domains. It is not just social and cultural ties that create these domains, but the physical environment as well. This is borne out by descriptions of natural landscape, towns, and cities in our literature. It is likely that experiences of place have the greatest impact on our senses during childhood and youth. In recent years, questions dealing with the preservation of regional identity and a sense of place have once again attracted interest.[16]

Towards a Geography of Creativity

It would appear that we are approaching some of the reasons for one of the great paradoxes of our age. Modern computer-based information systems enable us to handle an infinitely large volume of information. With the aid of telecommunications systems, this information can be transferred at the speed of light to almost all of the corners of the earth. At the same time that new technologies are creating fresh opportunities for handling and transmitting information, the need for deliberation and direct personal contacts has increased. A growing number of staff in both the private and public sectors is devoting a greater proportion of their time to meetings and other types of contact work. In spite of the costs in terms of money, time, and effort associated with travel, short- and long-distance contact trips have increased markedly in recent years. Activities that are dependent on face-to-face contacts are not only to be found in major cities; they have also given rise to a substantial expansion of rapid transport systems.

However, the actual features of the various forms of communication cannot alone explain this development. As a result of a far-reaching division of labor and specialization, society has become increasingly complex and difficult to fully comprehend. In today's society, knowledge is fragmented, and large groups of specialists each have their own bits of information. Meetings become a way to bring together these diverse pieces of information in conditions of *uncertainty* in order to form totalities that can provide the basis for decision-making.

Well-structured, routine information may be transmitted rapidly and efficiently by means of telephone, fax, and computer networks. Nowadays, this type of information transfer is a requirement for the management, regulation, and control of complex transport and communication systems. For instance, this type of information is used to order tickets, check-in passengers at airports, and carry out banking business instantaneously between computers

in the same building or on different sides of the world. This type of information is also used to control manufacturing processes, while companies and government authorities use it to administer units that are spread out geographically. Information flows are often one-way and follow well-established, formal channels. Uncertainty is limited (Figure 10).

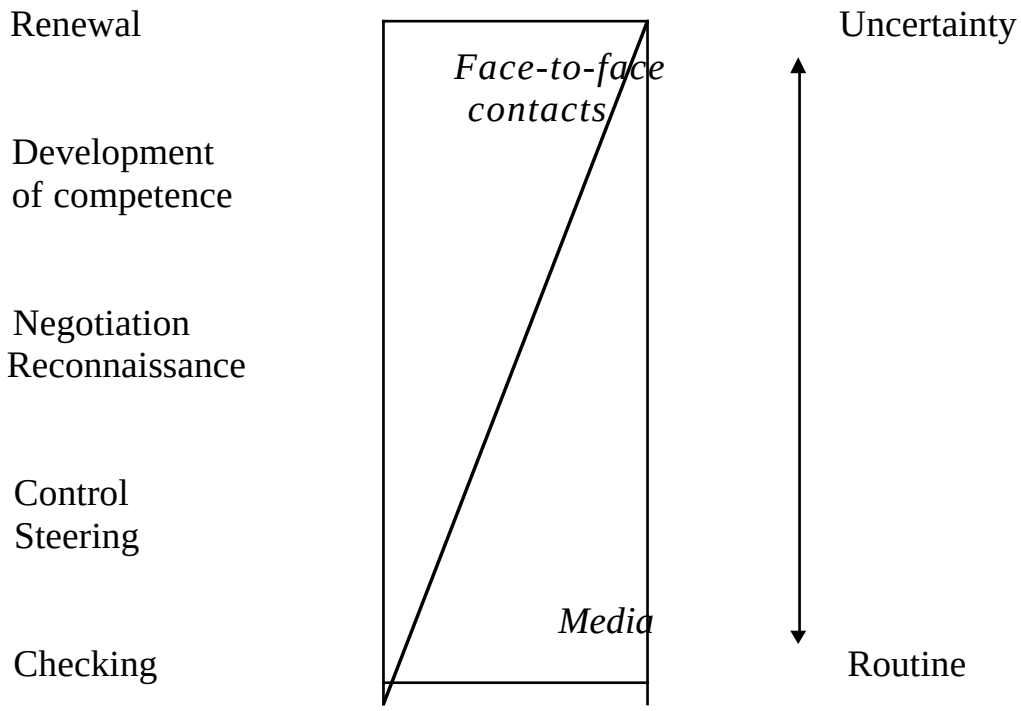

Figure 10 Purposes, characteristics and forms of information transfer.

Media are not as useful when we seek to tackle questions that deal with *uncertainty*, *unpredictability*, and *surprise*. Some information is associated with negotiations, orientation, and observation. Other information provides the basic elements of processes that lead to knowledge and innovation. Extensive research programs have shown that these types of information circulate primarily via face-to-face contacts and group conversations. Research also shows that the media are best suited to transfer information *within* already established social networks in which uncertainty is limited. They cannot replace direct personal contacts between unknown parties and *between* networks in which uncertainty is substantial. Social communications in creative environments may serve as an example.

A creative environment of the type proposed may take the form of a geographically unified and delineated area—a neighborhood, a town, an area, a district, or a region. History is full of examples of environments that, from time to time, have served as the cores of different types

of innovation. As has been demonstrated, however, the environment does not have to be restricted in this way. The diverse units of a company can create business cultures in the form of a network, which may for a while provide a home for an innovative process. Large technological clusters and development blocks may operate in the same manner. Researchers who are geographically spread out, but brought together in a narrow, specialized interest community, may also be viewed as a creative milieu.

Creative processes—irrespective of whether they apply to technical development, research, or different forms of artistic creation—place special demands on the regional or organizational environment. *Competence* exists in all kinds of creative milieus and is based on inherited knowledge, tradition, and experience. The development of competence takes time. Once it has been built up in a specific environment, it is then possible to transfer it to other areas. Creative processes are based on *communication* among individuals and areas of competence. It is not the information that computers handle that is most important. The strategic information, which is a precondition for renewal, is *not* well structured and homogeneous. It does *not* follow well-established, formal information channels. It *cannot* be described as an even flow. Nor is it volume that is important. Rather, it is a matter of distinguishing between the relevant parts of a considerable flow of information. Only someone who has the competence to distinguish between what is important and unimportant is able to carry out this process, which requires direct personal contacts in continually *new* combinations and *unexpected* constellations. It is both the ability to combine and the capacity to link fragmentary pieces of information into new surprising combinations that are important in this context.

With regard to innovation, it is in the nature of things that contacts, which may subsequently prove to be strategic, are not initially predictable. A *meeting place* is required for more or less random contacts. These meeting places often lie outside the formal organizations, in contexts where professional and commercial competition cannot block the free exchange of information. In the archetypal renaissance city, meeting places were built into the physical environment. Vienna and Paris had their cafés, Manchester its Chamber of Commerce, Silicon Valley its bars, and innumerable districts their churches and chapels. In well-functioning science parks, it is often possible to find places where people gather. The importance of tight social networks, associations, choirs, and club meetings should not be underestimated.

Many factors interact in a creative environment. In order to release *synergy effects*, several of these factors must be in place and be able to influence each other in a mutual relationship. It is both this interplay and the need for simultaneity that place enormous demands on the geographical and institutional environment. It should be culturally diverse, rich in original competence, and possess good internal and external communications networks. A substantial synergy effect requires diversity and variation. Standardization, uniformity, and homogeneity do not appear to provide fertile soil for creative processes. Many of the examples in the literature give the impression that the genuinely creative milieu is almost chaotic. It is important to observe that creative processes and far-reaching innovation take hold, above all, when unique competence and intensive communication coincide with instability and uncertainty. Stable periods of time and carefully regulated and planned environments are seldom creative.[17]

The Regional Archipelago

What emerges is a picture of Europe as an fragmented space. Taken together, this picture depicts a landscape of an *archipelago* of self-aware regions that do not border one another, but rather are tied together by different types of networks. A number of different circumstances have interacted to create this situation. Modern transport systems have characteristics that fragment geographical space. Strong agglomerative factors are behind the concentration of activities. Firms and organizations involved in research and development are through their facilities tied to places and embedded in regional environments where people live and work.

However, without connections to cross-border flows of knowledge, capital, and ideas would commercial undertaking, research, and cultural activities in these milieus be threatened by stagnation. Networks grow without obvious consideration for national borders. The play between global forces of change and regional ambitions that is so important to our well being is possible because of links that tie together a kaleidoscopic world of home bases and creative places. *Regions and places do not disappear; they become integrated into international networks that link their most dynamic parts.*

The Veneto region in northern Italy and the global company Benetton represent just one of many examples of how the *global network* and *narrow territoriality* can complement one another. In 1955, Giuliana Benetton bought a knitting machine and began making sweaters for friends and relatives. Her three brothers bought wool and sold textiles directly to shops that banded together to sell only Benetton products. Small companies in the area were connected to the operation. The number of neighborhood subcontractors and shops around the world grew. Today, the business employs around 30,000 people in 650 companies within a fifty-kilometer radius of the little village of Pozano Veneto. The company owned by the Benetton siblings has 6,000 employees and annual sales of SEK 13 billion. About 7,000 shops are tied together, by contract, in a network that spans more than 121 different countries throughout the world.[18]

Not the least, universities function as strategic liaison centers between global networks and local milieus. Connections travel in two directions. Universities connect a place and a region with knowledge centers around the world. They act as footholds for international connecting links. At the same time, universities mobilize local and regional competence and creativity, and also participate in other ways to create attractive living conditions.[19]

A city possesses two characteristics that make it strategic from a geographical perspective. Over the course of time, the settlement pattern appears to be the most stable spatial system in European social life. Basically, the population, production, and all forms of transportation are linked to this pattern. In a vast panorama, cities can be presumed to be the primary bearers of Europe's diversity and variation. They represent *geographical continuity* in the territorial changeability described earlier. The second characteristic that can be ascribed to a city is that it offers an *interface* for interaction between different geographical levels and spheres of interest, where the upper level represents the global and the lower level the local.

Today's most successful cities combine technology, methods of organizing work, global financial integration, and not the least, the conditions for social communication. The connection can also be described as the interaction between physical, institutional, social, and

cultural networks. In the city, or rather a city region, the nodes in these networks lie close together. When networks can interact easily with one another, the conditions are good for cross-fertilization, also known as synergy effects.

One of a city's most obvious geographical advantages is that it invites two kinds of proximities. It offers *territorial proximity*, synonymous with closeness and neighborhood, and it also offers *proximity in networks* in relation to other cities. People, installations, and settlement can, with the help of well-developed transportation and communications systems, be within reach and accessible to each other without having to be close together. The nodes in institutional networks attract each other. Administration and governing functions within industry, the financial world, research, special interest organizations, and public administration are all concentrated to big cities. Clusters of specialized services develop there. From big cities, mass media can spread news, culture, and entertainment. As a result of the conditions of social communication, dense milieus have always offered *meeting places*, which are vital for renewal and artistic creativity.

Global networks would hardly be possible to the extent that they are today if it were not for an almost limitless technological range. On the other hand, it would be difficult to understand local rootedness without knowledge of how the human reach binds and limits.

---

[1] HenriPirenne: *Economic and Social History of Medieval Europe*. Paul, Trench and Trubner, London 1949; Henri Pirenne: *Medieval Cities: their Origins and the Revival of Trade*. Priceton University Press, Princeton 1952.

[2] W. Schivelbusch: *Geschichte der Eisenbahnreise. Industrialisierung von Raum und Zeit im 19. Jahrhundert.* Carl Hanser Verlag, München, Wien 1977.

[3] Paul Virilio: *Vitesse et politique.* Hachette/Reclus, Paris 1984; Paul Virilio: *L'espace critique.* Hachette/Reclus, Paris 1977.

[4] Nordal Åkerman Ed.: *The Necessity of Friction: Nineteen Essays on a Vital Force.* Physica-Verlag, Heidelberg 1993.

[5] For a more comprehensive discussion see Christer Jönsson, Sven Tägil and Gunnar Törnqvist: *Organizing European Space.* SAGE Publications, London, Thousand Oaks, New Delhi 2000.

[6] Manuel Castells.: *The Rise of the Network Society*, The Information Age: Economy, Society and Culture, Volume I. Blackwell Publishers, Oxford 1996; *The Power of Identity*, The Information Age: Economy, Society and Culture, Volume II. Blackwell Publishers, Oxford 1997; *End of Millennium*, The Information Age: Economy, Society an Culture, Volume III. Blackwell Publishers, Oxford 1998

[7] See e.g. Christopher Harvie: *The Rise of Regional Europe*. Routledge, London 1994; Jan deVet: Globalisation and Local & Regional Competitiveness, *STI Review*, 13 1993, s 89-121; Philip Cooke: *Co-operative Advantage of Regions*. Unpublished paper, Centre of Advanced Studies, University of Wales 1994

[8] Alfred Marshall: *Industry and Trade.* Macmillan, London 1919.

[9] Jane Jacobs: *Cities and the Wealth of Nations.* Penguin Books, Harmondsworth, England 1984.

[10] Paul Krugman: *Geography and Trade.* The MIT Press, Cambridge, Massachusetts 1991.

[11] Among a lot of books and papers se Ash Amin, Nigel Thrift N. Eds: *Globalisation, Institutions, and Regional Development in Europe.* Oxford University Press, Oxford 1994.

[12] Peter Maskell & Gunnar Törnqvist: *Building a Cross Border Learning Region. Emergence of the North European Øresund Region.* Copenhagen Business School Press, Copenhagen 1999.

[13] Edward E. Leamer, Michael Storper: *The Economic Geography of the Internet Age.* NBER Working Paper No. 8450. Accepted for publication in *Journal of International Business Studies.*

[14] AnneButtimer: *Home, Reach, and the Sense of Place.* Uppsala 1978.

[15] Torsten Hägerstrand: Att skapa sammanhang i människans värld - problemet, *Att forma regional framtid.* Publica, LiberFörlag, Stockholm 1978.

[16] Se e.g. Gunnar Olsson: Identitet och förändring, eller om hemlängtan som ontologiska transformationer, *Regional identitet och förändring i den regionala samverkans samhälle,* Acta univ. Ups. Uppsala 1978; Anssi Paasi A.: *The Institutionalization of Regions: A Theoretical Framework for the Understanding of Regions and the Constitution of Regional Identity,* Fennia 164, 1986; Kay Andersson, Fay Gale Eds.: *Inventing Places: Studies in Cultural Geography.* Longman., London 1992.

[17] For a more detailed analysis of the creative environments, see Gunnar Törnqvist G.: La Créativité: Une Perspective Géographique, *La Géographie de la Créativité et de l´Innovation.* Université de Paris-Sorbonne, Paris 1989; Gunnar Törnqvist G.: *Towards a Geography of Creativity* in Shachar A., Öberg S. Eds: The World Economy and the Spatial Organization of Power. Avebury, Aldershot 1990.

[18] Christian Zaar: Syskonen Benetton driftiga som få, *Dagens Nyheter,* 18 dec. 1994.

[19] Kerstin Cederlund: *Universitet-Platser där världar möts.* SNS Förlag, Stockholm 1999.