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**Conference Paper**

## Regional sustainable development and the information society in Europe

38th Congress of the European Regional Science Association: "Europe Quo Vadis? - Regional Questions at the Turn of the Century", 28 August - 1 September 1998, Vienna, Austria

**Provided in Cooperation with:**

European Regional Science Association (ERSA)

*Suggested Citation:* Rosch, Andreas; Grossmann, Wolf-Dieter (1998) : Regional sustainable development and the information society in Europe, 38th Congress of the European Regional Science Association: "Europe Quo Vadis? - Regional Questions at the Turn of the Century", 28 August - 1 September 1998, Vienna, Austria, European Regional Science Association (ERSA), Louvain-la-Neuve

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# **"Regional Sustainable Development and the Information Society in Europe"**

Paper to be presented at the 38th Congress of the European Regional Science Association, Vienna,  
Austria, August 28 - September 1, 1998 (Paper no. 159, session F8)

by

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## **Abstract:**

This paper wants to put regional sustainable development in the perspective of evolutionary regional systems development related to the Information Society (IS) in Europe. It deals with the challenge of change from an industrial to an information society. At the moment we have the opportunity to shape so-called "new" or "information based" economies during their emergence so that they simultaneously foster environmental objectives. Examples for such economies are from all branches: agriculture, manufacturing, trade, high-tech, and entertainment. Their contribution to regional sustainability can be shaped within wide ranges in their present phase of development. But the precondition for influencing the environmental behavior of these economies depends on the regional creativity to get them started, modified, formed, and put into a compatible regional framework. One approach on the local or regional level to stay sustainable is the idea of a "learning region". Here regional science can benefit from manifold contributions from different areas of science, such as the learning organisation by P. Senge, the regional milieu debate (about innovative or creative milieus) by GREMI and other areas. These ideas are made applicable by using a framework explaining the evolutionary life cycles of regional development.

In our paper we will report the background and application of a new approach for regional science and management to build a cooperation between regional sustainability and the emerging information society.

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## 1 Intro: Regional Sustainable development and the need for an integrated systems view

How can we define regional sustainable development? There do exist various numbers of different definitions and understanding about what "sustainability" means to a region (see e.g. the starting discussion in Germany, ARL 1994). According to the Rio 1992 summit and Agenda 21 we regard "sustainability" in a broad definition as a complex phenomena including social, economic and ecological affairs. Sustainability must lead to an evolutionary possible future of a region. Nevertheless human well being should have the highest priority with changes in economy and technology being instrumental. In our view we will start with economy and technology crucially affecting regional sustainability. The industrial revolution was at first not perceived as such and only afterwards its social potential was developed. Now, with the beginning of the "Third Wave" (Toffler 1980) or information society, an information-based wave, the human dimension should be a main factor from the beginning. Human well being is often defined from the view point of "human needs and wants" with little regard for the environment. But ecological preconditions for human survival and well being define an ethical and technical frame for human actions which needs to be respected.

Numerous factors contribute to the well being or quality of life of a population in a region. Well-known examples of detailed treatment of this multi-scope problem include: Boyden 1976, the 1975 UNESCO

study for "Indicators on the Quality of Life" or the model based definition of urban attractiveness given by Forrester in 1969 as well as current reports on global development by the World Bank.

The research into human-nature interactions added a new element to this debate, the awareness of close connections between the social, the economic and the environmental "realm". Sack uses an "intellectual surface" of three interacting realms for his analysis of Human-Nature Theory: nature, social relations and meaning (Sack 1990). He derives close connections between these realms:

"We have examined arguments that claim meaning can shape nature and social relation; that nature can shape meaning and social relations; and that social relations can do the same for meaning and nature. Within this circularity lie the undercutting issues of reflexivity. Where then do we turn? Each position purports to tell us something about the causes for human alteration of the environment. But each can be undermined by another." (Sack 1990: 667).

An analysis that aims at application for regional development needs a finer classification than "meaning" does provide. In our studies (see Grossmann et. al. 1997, 1997b) we have relied on the image of four intangible spheres, the spiritual, cultural, social and intellectual, fig. 1 and three (tangible) carrier areas, knowledge, economy and environment. The spiritual includes attitude, ethics and meaning, the environment includes landscapes, the knowledge includes technological know-how and the economy includes agriculture and forestry. In that study the approach was to develop robust, favourable options for all of these with the means of an information society. The underlying idea was to make the most favourable options more probable by thorough elaboration of these options together with the population, the politicians and the economy.

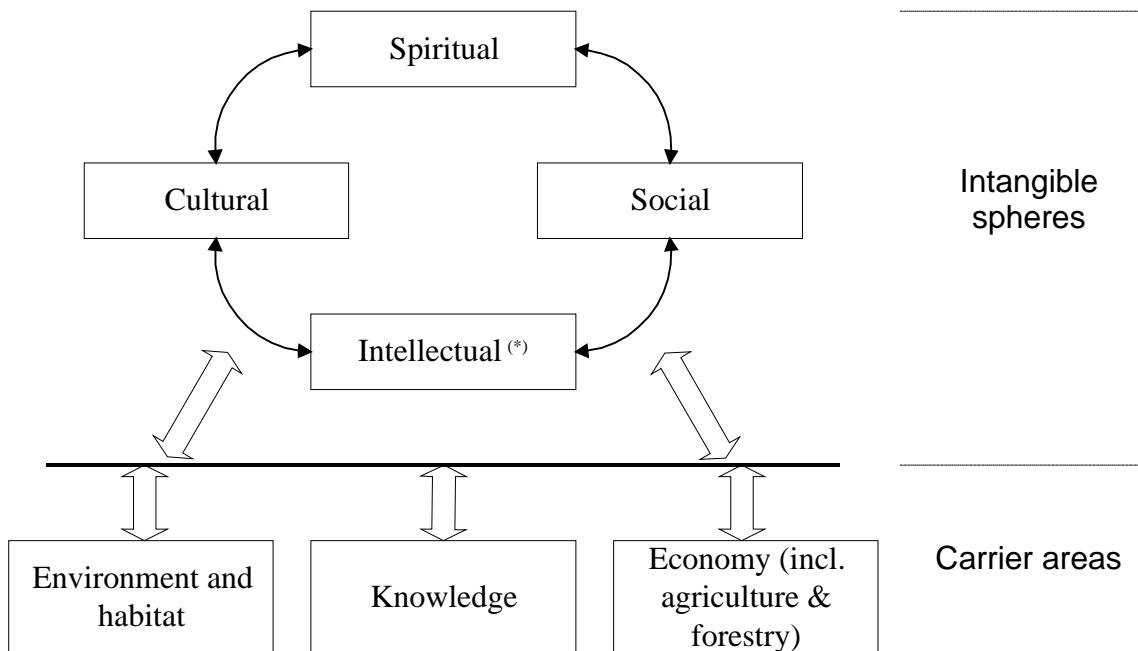


Figure 1: Four intangible human spheres and three carrier areas that determine sustainability  
(\*): see Slobotkin 1994

As in Sack's analysis, the four human spheres interact closely. For example, no relationship between a teacher and a disciple could exist to pass on cultural knowledge or spiritual wisdom if social bonds are disrupted. Also, a community is no longer really human if its cultural sphere is destroyed. The emphasis in medieval societies may have been on the spiritual and social spheres. Beginning with the era of enlightenment the intellectual sphere began to rise to its present strong position with cultural tides rising and falling.

The most noble and responsible regional policies should aim at supporting the emergence and continued existence of a regional synergy between these four human spheres because in much the same way as none of these can endure if one of the others gets severely damaged each of these does greatly benefit to regional sustainability if the others are in a fine condition. In order to better understand regional sustainable development we have the need for a more integrated systems view in a structurally changing world.

## 2 Global structural change to an information society and ISIS model

### 2.1. Basic Innovations and Long Waves: The Information Society

In order to understand depth and scope of the current global structural change the emergence of new "basic innovations" in the fields of information and telecommunication are broadly discussed. Some authors see the start of a new so-called "long wave" in technological development (Kondratieff - cycles, see Hall/Preston 1988: 16ff) and hence identify a new paradigm for regional development. What are "basic innovations"? In economic geography you can describe these innovations as technological breakthroughs which have high contribution to economic processes and the implementation of new market products (process and product innovations) (see e.g. Schärtl 1992: 201). They also produce new forms of services, markets and organisation of production. The emergence of several such innovations at one time can "trigger" the start of a new long wave and a global structural change.

You can see examples of such basic innovations going to shape long waves and corresponding "styles" in history: the development of steam power building machines for textile and steel manufacturing at the beginning of the 19<sup>th</sup> century or the production of automobiles and airplanes, the chemical industries and the electricity in the present century ("industrial age"). The end of this century is distinguished by the emergence of new information and communication technologies and on the other side biological and genetic engineering. These basic innovations all together trigger a new long wave. Long waves normally last about 50 to 60 years and cover several normal business cycles (Kleinknecht et. al. 1992). Some authors have described the start of a new "postindustrial" (Bell 1973) or "information" society.

The new potential in information and communication is transforming lifestyles, sparetime and recreation. An information society is here defined as one that uses information and knowledge extensively.

"Europeans can expect new job opportunities, new services and new markets to develop in the wake of the Information Society... ", ...."Nations can only compete in global markets if they use the potential provided by these new information and communication technologies" Bangemann (1994), (see Internet <http://www.ispo.cec.be/>).

Integrated research in regional science is necessary that brings together people, economy and environmental issues. In the Green Paper on "Liberalisation of telecommunications infrastructure and cable television networks of the European Union" its authors state:

"Europe is shifting towards an information-based economy, where networks and network infrastructure play as significant a role as did the rail networks in transforming the European economies in the last century." (Internet <http://www.ispo.cec.be/>).

The next step is the awareness that in the same way as railways changed land use and helped to transform agriculture and forestry in the last century, this new technology will change land use and life styles. Mitchell speculates on the future of cities where he outlines transformations cities might undergo (Mitchell 1995). Wuermeling (1995) elaborates a possible revival of rural areas due to information facilities. Radermacher (1996) mentions the environment in his visions. Toffler, already in the 1970s (in his book "Future Shock"), presented many visions on changes in lifestyles. He regards human evolution during the last several thousand years as a succession of three revolutionary waves. His "First Wave" is the agricultural revolution, the "Second Wave" the industrial revolution and the emerging information society is the "Third Wave" (Toffler, 1980). Other authors identify different classifications and see the beginning of a new "Fifth Kondratieff Cycle" (Hall / Preston 1988), but anyway all regard the end of this century as a major structural change that affects the global economy and society. How can we further describe this structural change? For that we want to take a closer look to the emergence of basic innovations and the people that are responsible for the innovations.

## **2.2. Basic Innovations und Economic Steps e 1 to e 7**

As mentioned above within a long wave lasting 50 to 60 years already J.A. Schumpeter had described in the 1920 and 1930s that there are other shorter business cycles and economic turns (see Schumpeter 1939). Not only at theoretical analysis in economics but also at practical business management you can distinguish between five to eight different steps of economic development at basic innovations (see e.g. the Bretam-Modell, Gaines 1995). For our purpose we want to combine several steps of this economic development and see what kind of people can be identified as regional actors in such steps. We use the ISIS system model for the economy (1). Changes, in particular ageing and obsolescence, are normal processes in the economy. The representation of ageing needs at least two states, new and old. Consultance on technological development uses six or seven stages of maturing and ageing instead of

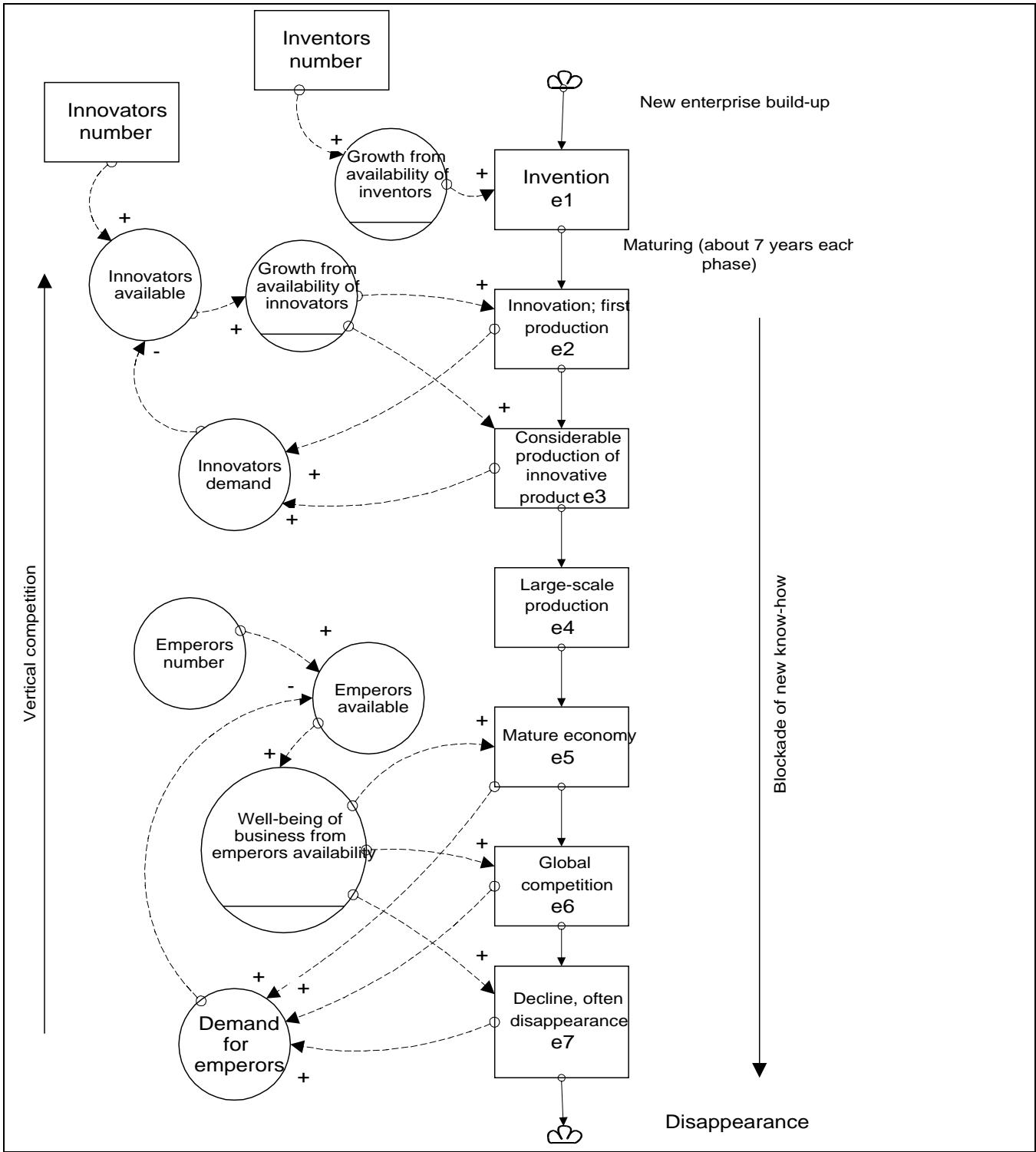
two, fig. 2, see also Gaines (1995). In each of these stages (or "phases") many companies disappear so that the number per phase becomes ever smaller. This is also true for very large corporations. For example, one third of the companies listed in the Fortune 500 list in 1970 had disappeared in 1981 (Geus 1988). The process of structural change and within that the economies (entrepreneurs and companies) are described in figure 2. There are always many inventions, e1, dependent on the number of inventors. Only a few mature to become real innovations produced and marketed on a somewhat wider scale, e2. Some of these are basic innovations (2), like the car in the 1920s or the cooling technology with a high impact on the economy and lifestyles. The step from invention to innovation is crucial. It needs outside money, management support and dedicated people - innovators - who have the persistence, vision and wit to raise money and to develop the invention into something marketable. For basic innovations, this may take many years or even a few decades.

If an innovation is successful, its production will increase further, phase e3, but it is still an innovative product or service. In phase e4 the production is even larger but the product is now well known and no longer innovative. In e5 the production is very large by volume, outside competition is high. Competition becomes global in e6 in a sector by now very well known. The production may become insignificant and eventually disappear in phase e7 like passenger ships in the 1970s due to competition by air traffic. Usually, basic innovations will not disappear, but will lose importance, appeal and financial clout. The process from phase e2 to phase e7 takes about 50 to 70 years for a basic innovation; that is, about 8 to 10 years per phase.

Different people with different capabilities and characteristics populate the economy at the seven stages e1 to e7. In the beginning, inventors are the crucial group. People with ideas and skills to produce and market a novel product, the innovators, will populate e2 and e3 as the new product becomes better known. About people at later phases, "emperors", see (3).

In the middle phases the product and the markets are becoming ever better known. Thus, average qualification of people can mean lower wages. Also, less people are needed because machines can ever more efficiently replace people. Lower qualification means lower payments, lower numbers mean lower overall income. Thus, the buying power declines leading to more difficult competition which tends to depress prices even more. For this sector, an exponential loop begins which can bring buying power of this sector to zero. The whole mechanism of extension and shrinkage of buying power and demand is called the "multiplier-accelerator" loop, see Senge (1976).

Figure 2: System - model ISIS for the economy (structural change from e1 to e7)



by Grossmann et.al. 1997

How can we influence such steps from e1 to e7? Can we introduce a lot of these ideas into regional planning and local economic development processes? We want to discuss later how these basic innovations and global structural change can be translated onto local level.

### 2.3. The tension between globality and locality

Before we can look at the implications for regional planning we have to ask the question what are the consequences of the basic innovation implementation to the local and regional levels? People at this time face the challenge of global structural change from an industrial to an information based society. This has different local effects according to the different location factors at different "localities". In the UK Cooke has started in the late 1980s to look at the different economic and social development of different regions what has been called "locality studies". He has researched about the specific local factors for regional development (Cooke 1986, 1989) and does not only see the specific industrial sectors as the main factor for development but also local history, employment attitude, quality of life, et. al. According to Krugman (1991: 38ff) beside the fierce global competition the local or regional labour market pool is an important factor for industry localization (including services) and regional development.

But what is a "locality" or a region? If you take a look e.g. at the trendy discussion on a "Europe of the Regions" we see complete different levels of local governments from German Bundesländer to Greek Nomos and local communities. We can only say that in this definition a region is a locality on *subnational* level but not a wider area on *supranational* level, like EU, NAFTA, etc. About "functional" regions see (4).

On the other side there is the phenomenon of globalisation. The effects of globalisation can be seen everywhere: the emergence of trans (or multi-) national cooperations (see Dicken 1986), the Internet and reducing costs of information transport, the global financial integration (O'Brien 1992). In a short summary we can talk about the globalisation of the economy, the financial system and the politics and culture (Fukuyama: "The end of history").

The basic innovations of modern communication technologies definitely accelerate the effects of globalisation. Daniels (1995) talks about the "Shrinking World" in the age of globalisation. We can see this in the actual linkage of all continents in the FLAG - project (Fiberoptic Link Around the Globe) or the IRIDIUM satellite initiative. You can see other examples of that globalisation process by the shift of production locations (not only manufacturing but also some services) to places of cheaper labour whenever possible. This production outsourcing has dramatic effects on sustainable regional developments.

Hence all changes of global structure have their relevance and reflection on the local level. In terms of systems theory the different levels of globality and locality reflect the "fractal" dimensions of structural

change at all levels. We will see later how the described change of economy form e1 to e7 is reflected on the regional and local level.

Some people say that in the emergence of globalisation we have a growing "erosion" of regional networks and reaction possibilites for local actors. In the age of global sourcing there is supposed to be the end of regional economies. In an extreme position you could talk about spatial fragmentation and the lost meaning of localities. In the end we would live only in an artificial and virtual space like in a virtual reality. O' Brien (1992) shows the lost meaning of national borderlines as global financial markets grow: "Global Financial Integration: The End of Geography". Castells (1994) describes the lower relevance of spatial perspectives in the information society by "Space of Flows": in the global structural change emerging through modern communication technologies the "Space of Places" is disordered into a "Space of Flows". The traditional, spatial local identitities and meaning of places lose their relevance or they continue to exist only in a rudimentary way. Latest research reveals a new way describing and thinking about an emerging "Geography of Knowledge" and of "Information". In that sense the information (amount, perception, access and self-use of information) plays a key part for innovation, regional development and hence for regional planning (Ellger 1996).

At the same time you can look at a *contrary* movement that distinguishes and emphasises definitely the locality as a spatial and regional identity, e.g. strong regionalism and localism fighting against being lost in a global identity. According to that the change to globalisation and uniformity produces in sharp contrast the concept (re)evaluating local and endogenous development strategies (3). For regional planning the meaning of the locally specific context becomes more and more important embedding (Grabher 1992) local people and companies into their specific geographical and spatial dependencies. Such a "locality" or "region" arises out of common built up "identity" by the local people and the landscape (Cooke 1989, Weichhart 1990). Together with the local and regional actors the results of global structural change have to be adapted into the regional planning and development strategy. Hence regional planning has to deal with the tension between globality and locality.

Danielzyk / Ossenbrügge (1996: 101) refer to the background of regulation theory about the contradictory phenomena of "global - local - interplay" or "glocalisation". This describes the simultaneous emergence of global networks and implications of global structural changes but accompanied by the (re)emergence of local and regional entities at the same time. How can regional planning face structural change and give some sustainable development advice to its region in a global world? In the following section we want to talk more about the implications to the regional level.

### 3 Structural Change and Regional Milieu

#### 3.1. The region as a complex system in terms of systems theory

A "region" in a systems thinking sense consists of interdependencies between different regional "areas" or lets say "realms". But planners tend to stress and consider only one part of the regional system according to their profession (e.g. traffic, economy, environment, etc.). Senge (1990) tells us that such isolated views on systems endanger the whole system organisation. A region for example is a complex system because there do exist a lot of feedbacks and interactions between these different "realms". Hence there is no simple or linear moncausality but more and more regard of the region as a complex system. There might be the opinion that a city or a region as a whole is a too complex system and shows chaotic behaviour.

Can we predict regional development and give some planning advice in spite of this? However systems theory helps us more to understand the region as a complex system. This system is not an absolutely chaotic or disordered one but still behaves according to specific rules of natural and social sciences. In that sense there is a "deterministic chaos" that has some special condition or levels of development. Scientific descriptions of such systems include geometrical structures and self-organized boundaries, conditions that are known as "attractors", e.g. the famous Lorenz or Shaw attractor (see Huber 1996: 18). Systems dynamic models in this field have many roots, e.g. J.W. Forrester's 1969 model Urban Dynamics, Holling's AEAM-approach or H. Odum's System Ecology. We need a model that combines social, ecological and economic issues because interdependent factors from these "realms" interact in the phenomenon of sustainability. According to the Fifth EU Action Programme on the Environment: "Towards Sustainability" this should not include only environmental issues but also regard the interdependence to other social, economic and cultural factors.

If we see a region as a complex system in the term of systems theory we have a human-being centred approach that people have the most influence e.g. by urban and regional planning on all these four realms of a region. How can we translate our model of basic innovations in the steps e 1 to e 7 (figure 2) on the level of sustainable regional development? The approach on regional milieu allows a new way to explain regional development processes.

#### 3.2. The term "Milieu"

In science as well as in humanities and arts the term "milieu" describes the living environments, the contingencies and the context that influence the living conditions. For example at chemical reactions the ph - value describes as an indicator the milieu in the same manner as certain parameters do in

biology or ecological system research for the living conditions of flora and fauna. In humanities and arts you can talk about the sociocultural and economic context and background as a "milieu" for the living environment of human-beings. In that sense the term "milieu" defines the context situation for social and economic actions and behaviour (for more discussion see (6)).

But what is exactly the relevance of a regional milieu determining the development process? How does it influence the economy and society within a (spatially defined) locality or region? In regional science some authors discuss the "residual" and less explicable indicator or component at regional development (Karl, H. / Nienhaus, V. 1989). That cannot be accomplished completely concerning only traditional location factors (like traffic infrastructure, industrial land supply, housing, unemployment rates, etc.). More and more regional scientists try to explain regional development with other influence factors like natural, cultural and social indicators (e.g. landscape view, spare and leisure time offers, social climate, cultural networks et.al.) . These indicators should play even the most important role in the regional development process (see e.g. Prösel 1995: 35) (5). The problem is that they are difficult to define, quantify or even evaluate by means of empirical research methods. Nevertheless we want to see if the "milieu" debate can give some contribution to that problem in the following sections.

### **3.2. The "Milieu" in the sense of regional networks**

In economic geography and regional science the academic discussion about networking has become more and more popular since the middle 1980s. (Regional) firm networks (industrial districts) und policy networks have been at the core of these debates. First we want to give a very short look at the regional network issue and then take a closer look at the creative and innovative milieus.

#### **3.2.1. The general term of "networks"**

The research on network structures between private businesses, public services, local government and intermediary organisations (in the sense of public-private-partnership, PPP) in a region has become commonplace in many different kind of sciences. Keywords are for example strategic alliances, joint ventures, cooperative regional development strategies, etc. Networks are defined as decentral forms of self regulation between market and hierarchies (Thompson et.al. 1991) (6). In terms of social science and organisation theory (see Handy 1993) they are more stable than markets but more flexible than hierarchies in the kind of traditional Weberian bureaucracy. Networks seem to be a well adapted organisation form at the conditions of structural change, high insecurities and complexities regarding markets and context situation. They are socially formed by personal and informal contacts of single autonomous actors, are based on reciprocity and mutual trust (Grabher 1992) and are a mixture of

competition and cooperation ("coopetition"). Each network participant can gain at least some information or advantage out of the network. Examples for (functional) regional networks are business networks (industrial districts) or policy networks.

### 3.2.2. Business networks (industrial districts)

The term "industrial district" had originally been used by Alfred Marshall in 1919 describing the high efficiency and economic success of industrialised regions in Europe at that time. These regions have shown a special kind of labour division between small and medium sized companies (SMEs) that have been highly spatially concentrated. The industrial district concept has been adapted by American, English and Italian economists in the early 1980s explaining the economic success of the so-called "Third Italy" region. One key feature of this success story has been the emergence of SMEs' *"flexible specialisation"* (Piore/Sabel 1984). The main characteristics of industrial districts are intensive entanglements between SMEs in a spatially located (urban or regional) area. In that context businesses can profit from urbanization and agglomeration economies and gain from personal face-to-face contacts promoted by spatial proximity. This helps to spread information in forms of innovation networks (see Camagni 1991, Maillat 1993). At an industrial district you face close contact and exchange of market and product information, personal contacts, employees, suppliers and buyers.

The cooperation between businesses can be explained by the ideas of Williamson (1985) that means businesses cooperate mainly to reduce just their *transaction- and information costs*. By close spatial proximity you save money and time as kind of location economies. On the other side there seems to be the "social embeddedness" (Granovetter 1985) of businesses into their networks becoming more and more relevant. This network describes the economic and social business environment. Following characteristics distinguish a regional network as an *industrial district* (see also Harrison 1992: 47):

- spatial proximity
- partnership of single independent businesses
- personal contacts and informal relationships
- common identity and values
- reciprocal trust to each other by knowledge and experience
- close business chains from suppliers - producers - buyers
- redundant entanglements
- cooperations but at the same time competition often in similar industries or markets ("coopetition")
- common language, local image and similar development policies by the network actors.

### 3.2.3. Policy networks

Beside the network paradigm concentrating on businesses we can see also a common interest in what some people call "policy networks" (Marsh / Rhodes 1992, Mayntz 1992, Bassett 1996). At the top of the agenda these policy networks deal with the problems of local economic development or urban and regional planning processes.

In the present period of global structural change and the (post)modernism of Western society there is a growing functional diversification of society that builds up partly autonomous subsystems (Luhmann 1984). The central hierarchical state policy cannot react to or influence the heterogeneous subsystems of society and complex single issues. In response to that development we can observe at some nations a political decentralisation process establishing local and regional policy institutions or networks. They care for some relief to growing demands towards state policy by advocating decentralised administration and local self-government, for example local policy parties, neighbourhood offices, local community groups, etc.

Political science research tries now to be more concerned with the issues of policy networking. Policy networks are able to allow (or support, foster) bargaining, negotiations and compromises between single local actors. In that process each partner has to get a satisfying advantage. Often there can be completely different partners at policy networks concerning urban and regional planning because of the complex issues. As we have pointed out above the region is a complex system. Policy networks can help to solve complex planning problems or else create new ones. For example these problems are in the area of local economic development, urban regeneration, traffic and infrastructure planning, housing, environment, local Agenda 21, etc.

Describing these networks Knoepfel (1993: 276) stresses especially the chance of policy networks (in contrast to the pure local administration) to bring together and mediate between public and private interests at local level. Some ideas that have a longer tradition in the US or UK concerning public-private-partnership and cooperation between political and business elites (see e.g. Bassett 1996).

It is interesting to see that traditional planning instruments (e.g. structural landscape plans) can often cause conflicts with new forms of more flexible policy networks and changing public mind and private developer plans. Of course we have to keep in mind problems of democratic deficit and legal status. There is the danger of too strong and negative "blockades" to structural change, too. Maybe some policy networks do not tend to solve planning problems but finally this refers rather to normative political criteria. Nevertheless we have to bear in mind which conclusions have to be drawn for

sustainable regional development processes. In the conclusion of this paper we want to raise the question about facing this challenge (e.g. regional management systems).

### **3.2.4. The creative or innovative milieu in regional science**

After looking very shortly at special business and policy networks the question about regional development processes has become more integrative to regional science when discussing regional milieus. The first European approaches into the creative or innovative milieu (7) research has been undertaken by the research group GREMI (Groupe de Recherche Européen sur les Milieux Innovateurs). Mainly French or Italian protagonists have taken the initial steps into that direction (Aydalot 1986, Camagni 1991, Maillat / Perrin 1992, and others). At the beginning they started to elaborate the relations between private businesses and regional institutions or organisations characterising the term "milieu". The central definition that has mostly been quoted so far (e.g. by Fromhold-Eisebith 1995: 32, Stahl 1996 u.a.) describes such an (innovative) milieu as follows:

"... the set, or the complex network of mainly informal social relationships on a limited geographical area, often determining a specific external 'image' and a specific internal 'representation' and sense of belonging, which enhance the local innovative capability through synergetic and collective learning processes" (Camagni 1991: 3).

There are two main functions of such an innovative or creative milieu:

- the *reduction of unsecurity* coming from the outside environment by local and regional contacts and
- the enhancement of *local learning processes*, which can trigger innovation in a region.

It is important on the other side to see the way of informal contacts in a regional milieu / network that gives personal and valuable information for new process technologies and products. One kind of informal networks influencing new developments can be the contact by social relations, for example via so-called "invisible colleges", that is by ongoing contact among former college or university members. In a regional milieu the membership to local private or public institutions, clubs, interest groups, etc. relates and leads to many other informal or social contacts. Often private and business contacts can merge.

## **3.3. Milieus and structural change**

### **3.3.1. Creativity and innovation ability as sustainable regional basis**

A sustainable regional development mastering economic and social structural change needs the ability of permanent renewal and learning processes. Out of this new process technology and product innovations distinguish the regional innovation ability.

The relevant innovation process is not only determined by traditional location factors but results from many steps of learning processes influenced by local researchers, entrepreneurs, politicians, et.al. embedded into their regional location (see e.g. Aydalot 1986). Generally you can (roughly) think of two

different phases in the innovation process. According to Senge 1990 an inventive and an innovative phase occur:

1.) the *invention*, i.e. the real first step to solve a problem and create new ideas. In that phase you need some *creativity* fostering inventions and according to that the right context conditions. Creativity cannot be "planned" but influenced by the circumstances. You never know at basic research whether there will be an application later on but it is important to have new ideas and concepts through creativity.

2.) the *innovation*, i.e. the promotion, actual realisation and implementation of new ideas into new technologies, market products, service applications, etc. For this you need the openness to *take risks*. This depends on flexibility and adaptability by the actors of possible innovations. In the end the innovation is the critical process with product innovations giving benefit and profit.

A lot of different factors have been mentioned that influence regional innovation ability: the endowment with capital and research&development institutions as basic ground, the intensity of competition, the size and industry of regional firms, but there are different results. For example not only the big companies have the best innovations but often SMEs with intense and close contact to other local suppliers, buyers, research institutions, etc. ("The hidden champions").

One German case study for example lists some factors according to the relationship between innovation and regional development (Meyer -Krahmer/Gundrum 1995: 180f):

- internal business characteristics: company size, organisation, strategic innovation (r&d) resources, attitude towards innovation by the management,...
- external business characteristics: market- and technology area, economic environment, cooperation possibilities with other institutions or companies, innovation and marketing strategies by the competitors,...
- locational (spatial) factors: traditional infrastructure and sociocultural factors in a region or locality,
- research and technology policy on worldwide, European, national or local level.

Models of product life cycles and economic industry structure themselves cannot fully explain the innovation and investment ability or disability in specific regions. Even more human factors like personal contacts and business networks with buyers, suppliers and technology transfer institutions are important to regional innovation ability. Therefore we prefer a more holistic approach in order to explain regional development processes. Hence we now consider regional milieus subjected to global structural change as outlined in section 2.2. How do the milieus and regional network systems change in the economy steps e 1 to e 7 and does this explanation help us to improve understanding of regional development?

### 3.3.2. Different milieus in the structural change e 1 to e 7

What different steps do milieus and regional systems take at the emergence of global structural change? Hall and Preston (1988) have considered global transformation according to a new (fourth) Kondratieff-long wave that has been triggered by new basic innovations. Some regions (e.g. Silicon Valley) could adapt this development earlier. The context situation of glocal structural change has its specific local implications and adaption strategies on each local or regional level. There are some typical patterns explaining how and which regions are able to react to this change in the operation of the existing milieu.

In section 2.2 we have outlined a model of global structural change. Within the idea of long waves cycles (lasting 50 to 60 years) we fit seven different phases or steps of economic development describing one long wave cycle. Now we link different regional systems or milieus to these economic steps e 1 to e 7 and some examples are given in table 1.

At e 1 the regional economic development is distinguished by creative inventors and the so-called Schumpeter types of entrepreneurs. They have a lot of new ideas and invent prototypes representing brand-new technologies or product markets. No one ever had these ideas before. The old well-established industries do not see this new development or ignore it and see no danger to their established position yet. The creative milieu is distinguished by dynamic new business start ups at a very information - based economy. There are a lot of personal contacts reducing information and transaction costs via active network relations. The traditional example for such a regional milieu is the Silicon Valley which transformed from e 1 to e 2 in the 1980s but has started in the 70s at e 1. At that time spin-offs of universities had led to small businesses at electronics and computer technology ("start-up garages and workshops"). They have been very small but flexible and showed a very dynamic development. On the other side the creative milieu at e 1 has provided splendid conditions by the living environment and sociocultural context. This context situation is very important for a learning creativity. The region at e 1 shows a very high "quality of life" concerning environmental and sociocultural aspects.

The next economic step e 2 sees those small inventive business start ups from e 1 that survived. They have now introduced on the market first processing technology and innovative products. They are still small and medium-sized companies which have their new markets. At that time the first signs of what Schumpeter called "creative destruction" can be observed. This endangers the old established economies and industries from e 5 to e 7. The innovative milieu has some very well working innovation networks ("knowledge landscape") that provide good and quick exchange of knowledge

between the local SMEs and the colleges, universities, and research&development (R&D) institutions. Most important at this stage is the research contact and application of new knowledge directly into the businesses. The strong contact between SMEs and universities has been widely described as technology centers, innovation centres (see Sternberg 1995) or “Science Parks” (e.g. Sophia Antipolis near Nice at South France). Other examples of localities or regional systems that represent examples at step e 2 are:

- Cambridge Science Park (UK) and in Germany:
- Wissenschaftsstadt Ulm ("Science City"),
- Technologieregion Karlsruhe,
- BIOTOP - Region Berlin - Brandenburg.

Table 1: Milieus and regional systems at structural change

Steps of economy	Milieu	Characteristics	Urban and regional examples
e1	Creative (Fromhold-Eisebith 1995, Butzin 1996)	Inventive, game learning, grass roots democracy, virtual teams, new ways of thinking and action	Silicon Valley at the beginning, dito Route 128
e2	Innovative (Maillat 1995 / GREMI)	concentration of new processing technologies and new products, many new start-up businesses, splendid living environment	Sophia Antipolis (France)
e3	Productive	pioneer benefits, business growth, development orientated policy	Third Italy
e4	Expanding	Well known businesses and products, established mass production, highest welfare, established regional planning,	Munich, Bruxelles, Milano
e5	Beginning stagnation	No introduction of new products or technologies, no more growth rates	New German Länder
e6	Defensive (Grabher 1993)	rationalisation, loss of income, reduction of productivity, businesses and jobs, leaving power for urban and regional planning	old-industrial areas: West Midlands, Valony, Lothringia
e7	Sclerotic (Läpple 1994)	hopeless sentiment, high unemployment, end of old industries and traditional welfare policy	Ruhr area

by Grossmann / Rösch, Leipzig 1997

At step e 3 the regional companies have a time of expansive growth. They have a strong market position and the entrepreneurs have now had several years of industry and technology experience (often: quality leadership, see Porter 1990). At this productive milieu the regional system achieves high growth rates and the regional development policy (e.g. by industrial site development and regional planning) faces a strong need for land use and experiences growth burden. On the other side there is also pressure from the innovative new established economy so far competing against the old established economies (e 4 to e 7) within the region and onto other regions due to concurrence of purchasing power

(see Grossmann 1997, 1997b). The "Third Italy" phenomenon has been described (see Piore/Sabel 1984, Harrison 1992) as being an industrial district in the 1980s and is now at the step e 3 being a productive milieu.

Subsequently during economy step e 4 the full growth comes to an end and regional companies act mostly with pure mass production. They deal with the prospect of cost leadership (Porter 1990) and do not strive for new basic production innovation any more. That means regional businesses might introduce new series of the same product model but do not invent or innovate radically new technology or products any more. The milieu thus is not creative or inventive. The established regional institutions of R&D have already had their best times and innovations. The regional welfare has reached its highest level. This is a phase of very high profits because the burden of development costs is relieved; the product is well known and easy to sell. But it is not yet possible for many other companies or regions to compete in this market. For example in Germany so far economically more successful regions and productive milieus in the South like Munich or Stuttgart and in other European countries areas like Milano and Bruxelles belong to that regional type. The regional development planning of these regions is well established and acknowledged.

The step e 5 is distinguished by first evident signs of structural decline. The local economic development according to that stagnating regional milieu tries only to keep up production levels and businesses in the region. First crisis symptoms are the concentration of specific industries within the region that have started to be established already at the economic step e 3 and the reduction of SME number. Some regions still keep their former successful main industries e.g. automobile or textile industries. At step e 5 the stagnating milieu can no longer stimulate network maintenance of existing regional businesses, R&D institutions and policy networks. The essential preconditions for creativity, inventions and innovations have declined at such a regional system. A former innovative network has been burned out. For the first time the regions at step 5 start also facing environmental problems and the stress on "quality of life" factors. The New German Länder seem to have the status of a stagnating milieu, because after the special situation of vast growth they cannot get new markets for their products and cannot establish the basis for SMEs (German: "Mittelstand").

If a region has reached the economy step corresponding to e 6 there is a highly defensive position of preservation with the established old industries and welfare level exposed to global structural change and competition. For that purpose the regional politicians, businesses and trade unions have built up an interest coalition and blockade network (Grabher 1993) that is distinguished by a defensive milieu. They can react very blocking to all attempts to disturb the regional system from outside and realize loss

of income due to global competition. A defensive milieu tries to prevent the decline of regional economics and knowledge (human capital). The problem of defensive milieu regions is the selective migration, i.e. the younger and well educated work force leaves such regions. Especially rural and old industrialised regions have to face these severe problems. The negative image and feedback on "quality of life" factor indices leads to a vicious circle of not only economic decline but also decline of whole regional systems. Urban and regional planning seems to be helpless concerning new ideas about local and regional development and future prospectives to defensive milieus. You can see examples for such defensive regions in Europe's old-industrial areas like in the West Midlands ("Black Country", UK, see Young 1991), the Valony in Belgium or Lothringia in East - France, et.al.

The last step of economy at structural change is e 7. The regional system is paralysed in a kind of "sclerotic" milieu (Läpple 1994). At this sclerotic milieu the old established industries start to die and so dramatically affect not only the regional economy but also the whole regional system and development (i.e. landscape planning, living environment, regional culture, social affairs, et.al.). For example you can describe the Ruhr area or other coal and steel production regions ("rust - belt" in the U.S.) as a sclerotic milieu which has met the end of its basic industries. These regions are distinguished by high unemployment rates and the disability to react to structural change by activities initiated from within their region (endogeneously). These regional networks are then impediments to development and therefore encrusted. That is why to talk about a "sclerotic" milieu. The regional networks cannot produce innovation anymore. Urban and regional planning has only the task to accompany the decline (e.g. by derelict land planning) but no proactive role.

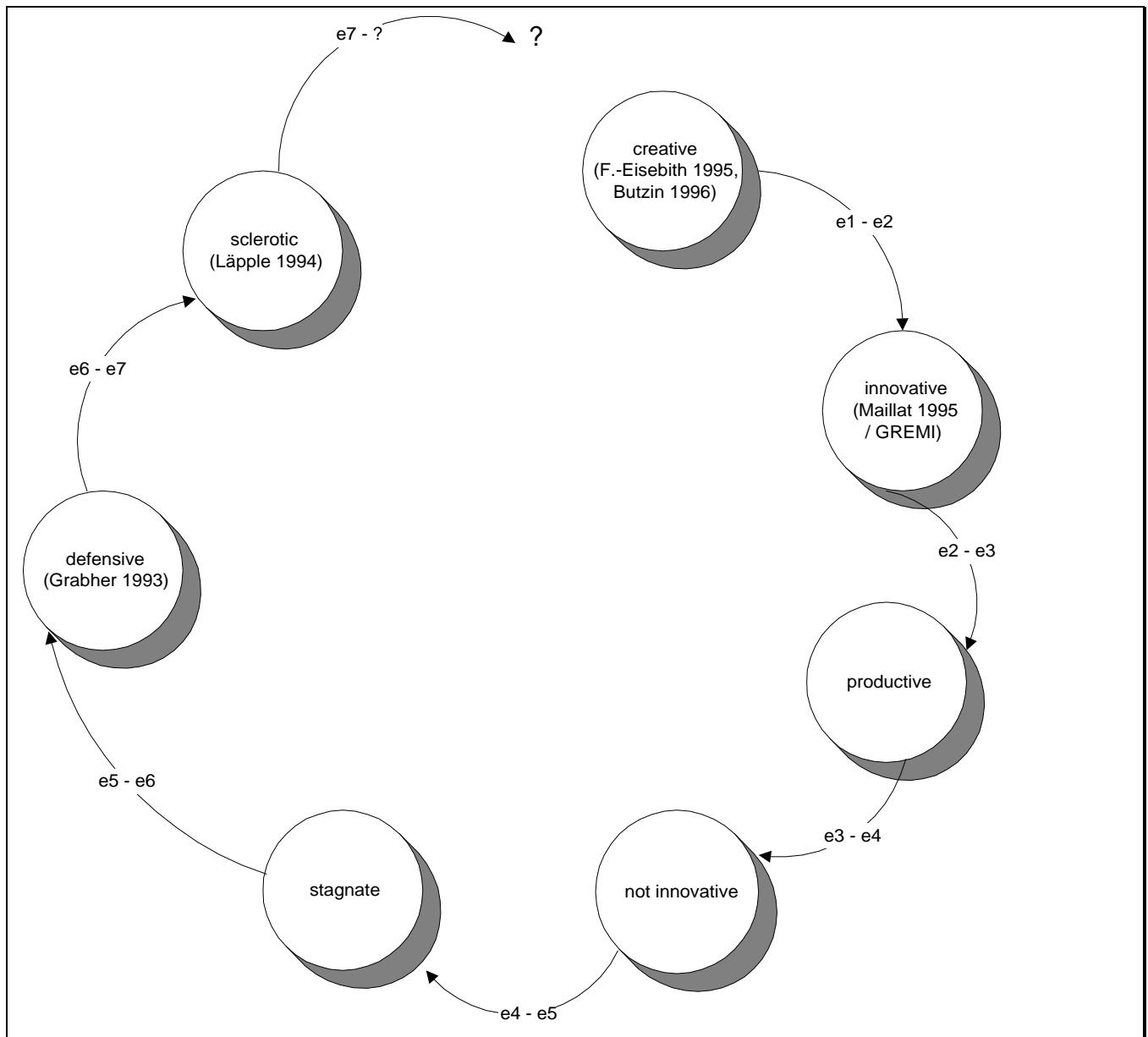
It is interesting that according to this model some regions which have suffered from economy step e 7 show some signs of revitalisation (e.g. new SMEs of step e 1 or e 2 out of the declined regional holding companies or revitalised landscape). Other regional systems with sclerotic milieu do *not* succeed at structural change and establishment of new businesses and knowledge. They "die" that means they lose economy, active population and finally identity.

### **3.3.3. Implication: regional milieus have a kind of "life cycle"**

It appears that regional milieus or regional systems also have a sort of "life cycle" which they follow. According to the ideas regarding a "product life cycle" (see e.g. Tichy 1991) region-based milieus have a dynamic development comprising creation, maturation, saturation and death. Now in contrast to the discussions and theory on long waves that have a macroeconomic view on global structural change the product life cycles hypothesis tries to complement this on a microeconomic scale. Both approaches

have the distinctive advantage of a clear *dynamic* view describing change over time. Combining these models we can accept the technological progress, now especially the new communication technologies for basic innovations, as a trigger for a new long wave but as well as an object of product life cycles. The new long wave is starting the change from an industrial to an information society and within this change we have a lot of new product cycles being created (especially at the computer and media industries).

Figure 4: The milieu life cycle (e 1 to e 7)



Source: Grossmann / Rösch, Leipzig 1997

Additionally we can apply the idea of life cycles on the regional level, too. Milieus and regional systems pass step by step a dynamic development over time. According to that application we can

combine the product life cycle hypotheses with the idea of regional system development cycles ("regional life cycles", see e.g. Butzin 1987, Tichy 1991). The milieu approach in this paper tries to take an integrated systems perspective towards regional development and to describe such steps. We think that this view is able to provide better understanding of structural change on the local or regional level. Hence we can define and suitably adapt our urban and regional planning strategies to the dynamic situation of our city or region. We have to take into account the regional development process in times of change as a complex regional system reaction process.

## 4 Conclusions: Regional policies for a sustainable learning region in the information society

a.) New planning paradigms for sustainable regional development must not reduce complex problems of urban and regional planning into single and specific problems (see e.g. Ehrhardt 1996: 8ff). This has been the case for a long outstanding tradition of urban and regional policies. For example planning of traffic, infrastructure, housing and utilities had been centred at the beginning of planning for the industrial societies since the middle of the 19<sup>th</sup> century.

Now in the information society things have changed - consequently the policy problems themselves - and so we have to adapt our processing forms and instruments of planning, too. Complexity is the current challenge for urban and regional policies. We must regard our city and region as a whole complex system of economy, society, politics and living environment that influences city and landscape planning. We need a regional management system that can act more flexible to the changing global structure. And we have to be aware of the global structural change triggered by new basic innovations of communication technologies.

One key function of such a management system shows that it brings together several different "professions" (e.g. traffic, housing, business, local economic development, water and health protection,...) into one *integrative* approach. One regional planner has not the capacity to deal with all these specific professions, but therefore he has to act rather like a "moderator" for regional development bringing together all the responsible people in his region. That means urban and regional planning in modern times has different demands and tasks from those at the industrial times before. Integrated planning means to see the complex consequences, implications and interdependencies in our regional system triggered by our planning process.

b.) As there is a growing importance of location factors "knowledge" and "information" in urban and regional development we have to focus on the learning ability of our regional people and partners. We could learn that the most promising regional development will be achieved by the creation of

economies at e 1 to e 3. Regional planning has to devise favourable options to that. Establishing a creative milieu as a learning region should be on the agenda of planning strategies. Combining active regional networks brings together all innovative locational factors for a successful "regional innovation complex" (see Stöhr 1986). The creative milieu fosters the endogeneous potentials that are especially the embedding of R&D and higher education institutions and their knowledge application in the region. Ellger (1996: 96f) talks about an information agglomeration within a creative milieu. Urban and regional planning is supposed to be a key part of that information agglomeration. Planning has the task to support such a creative milieu by giving the right circumstances (infrastructure, local economic development, landscape, natural and social environment plans for the region). This model of a creative milieu is distinguished especially by the support of a sustainable regional development, too. We have tried to implement some of these ideas at our regional case studies in Germany and Europe (see Grossmann et.al. 1997, 1997b) (10)

The creative milieu is a learning region with ideas related to that of a learning organisation (in the sense of Senge 1990). Indeed, the European Union has named 1996 the "Year of lifelong learning" as a priority goal for the European development. The main concept of the learning region has got acceptance and political support by EU Community Initiatives like ADAPT (Stahl 1996). It is important to give strength to all regional networks. Creative milieus vitally support the learning region and sustain regional development.

Urban and regional policies in an era of transition to an information society should have the idea of supporting a creative milieu providing preconditions for regional sustainable development.

## Notes:

- (1) ISIS = Information Society- integrated Systems Model, for further details see Grossmann et. al. (1997): 21ff
- (2) For more about basic innovations see Berry 1991 or Hall and Preston 1988
- (3) The leading people in the phases e5 to e7 survived because they are good at maintaining and defending an established industry in a very difficult environment on global markets. These people are here called "emperors" because they are capable of fighting each disturbance and threat to their company. This is a virtue which is quite different from the capability to innovate. In fact, new successful basic innovations would endanger the existence of the established industries. If an innovator attempts to improve on an established product which is in phase 5 or later with a very different design, then that means that he starts at phase 1 or 2. In an early stage production is still an art and somewhat experimental and thus much more expensive than production at the proven phases e5 to e7. Thus, established production tends to suppress real innovations. The top managers in phases e5 to e7 are highly paid. Few production sites survive until this phase and most are big. Thus, the top people here cannot be very mobile. They are also not in a position to demand a nice environment - any environmental restrictions or improvements may endanger their production sites.
- (4) At the sense of practical planning you can describe a region on behalf of the functional principle. That means "the region" constitutes itself starting from its specific entanglements and relations (e.g. those dealing with traffic, industry locations, local identity, social milieus). You can see this functional principle at the regional classification for example out of local labour markets and commuting regions. Another principle would be to define a region or locality just out of

- the administrative borderlines. We do prefer in this context the open functional principle of actual economic and social entanglements and networks building up a region and will come to this later when we talk about the regional milieu.
- (5) Endogenous development in this context does not mean discussions about development strategies describing self-development with complete dissociation from global economy already in the 1970s but more like the concept of the new growth theory (see e.g. Krugman 1991) accepting the international division of labour, capital and goods.
- (6) In the following sections milieu denotes the sociocultural context situation and basis for human-beings and their actions. These actions determine the nature and landscape (in ecological terms), too. In contrast to an isolated view of single entrepreneurs, politicians, and local people influencing the local and regional development, the research takes a closer look at the whole context and interdependencies (systems theory - the region as a system of single, connected, actors). People do not act isolated in space. We must rather give an integrated view of regional development considering specific economic, social and ecological systems situations (systems analysis - for the analysis of social systems see Luhmann 1984). In terms of social science for example the regional milieu consists of several subsystems and (partly informal) networks within a region providing a spatial framework for information and communication. As it was already said this seems to be very important for regional development
- (7) E.g. Prösel (1995: 27) talks about the "social competence" of a region, that is very important to the regional economic success story. The "socio-topography" is supposed to be the key factor in regional development
- (8) See also for a general overview and introduction on "networks" in the definition of social science at Thompson (1991)
- (9) Regarding our distinction between creative or innovative milieus see under section 3.3.2. in this paper. In European literature French, Italian or English authors use mostly the term "innovative" (e.g. Aydalot 1986, Camagni 1991, Maillat / Perrin 1992), whereas in German literature "kreativ" is used in the same way as "innovativ" (e.g. Fromhold - Eisebith 1995, Butzin 1996)
- (10) Both authors work now at several regional case studies: Andreas Rösch works on an ADAPT-project in Bavaria including partners in Wales and Italy (see for more information <http://www.ku-eichstaett.de/GGF/Sozio3/tele21.htm>). Wolf-Dieter Grossmann is responsible for the EU project MOSES (Modelling Sustainable Regional Development in the European Information Society) comparing and looking at partner regions in Austria, Germany, Israel, Spain, Suisse and UK (see <http://www.ufz.de/spb/agrzm/moses.html>.) This paper relates very much to common work of both authors at the UFZ Leipzig last year and has been presented in Rösch/Grossmann 1997

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