# From the Dutch New Spatial Law via Development Planning towards Swarm Planning

## First contours of an emerging new planning paradigm

Rob Roggema
With acknowledgements to Piet de Plaa

Hotspot klimaatbestendig Groningen

# From the Dutch New Spatial Law via Development Planning towards Swarm Planning

## First contours of an emerging new planning paradigm

Rob Roggema
With acknowledgements to Piet de Plaa

Hotspot klimaatbestendig Groningen

# Abstract

With the introduction of the new Spatial Law In the Netherlands the government is aiming to prepare the country for a high spatial quality and climate proof future. The new Law may be, if used properly, the key in reaching those aims. Due to a very time-consuming process and the co-existence of regular procedures, development planning is less powerful in doing so. Learning from the emergence of self-organising complex systems, which are able to adapt to changes much easier, a new planning paradigm can be derived, which might be able to combine the aims of the new Spatial Law with a planning process which connects with the latest and future developments in society. This new planning paradigm, swarm planning, aims to direct the developments and creates the boundaries for an emerging region which is able to adapt to future changes in the best possible way. Swarm planning is giving an impulse to the adaptive system in order to make it more resilient and able to adapt better to future changes instead of aiming to create an end picture of the long-term future.

## Introduction

The world faces long-term issues, like climate change, sustainable energy en water supply. In this paper explores the way planning and design might offer solutions coping with these problems. First a short history of planning is given. The current situation in the planning practice is pointed out by discussing the new Dutch Spatial Law and development planning. Finally a new perspective is constructed, introducing swarm planning.

## 1.     Planning in a time perspective

Planning and design concepts are linked to the periods in which they are used [Roggema, 2008b] and also to the functioning political system.
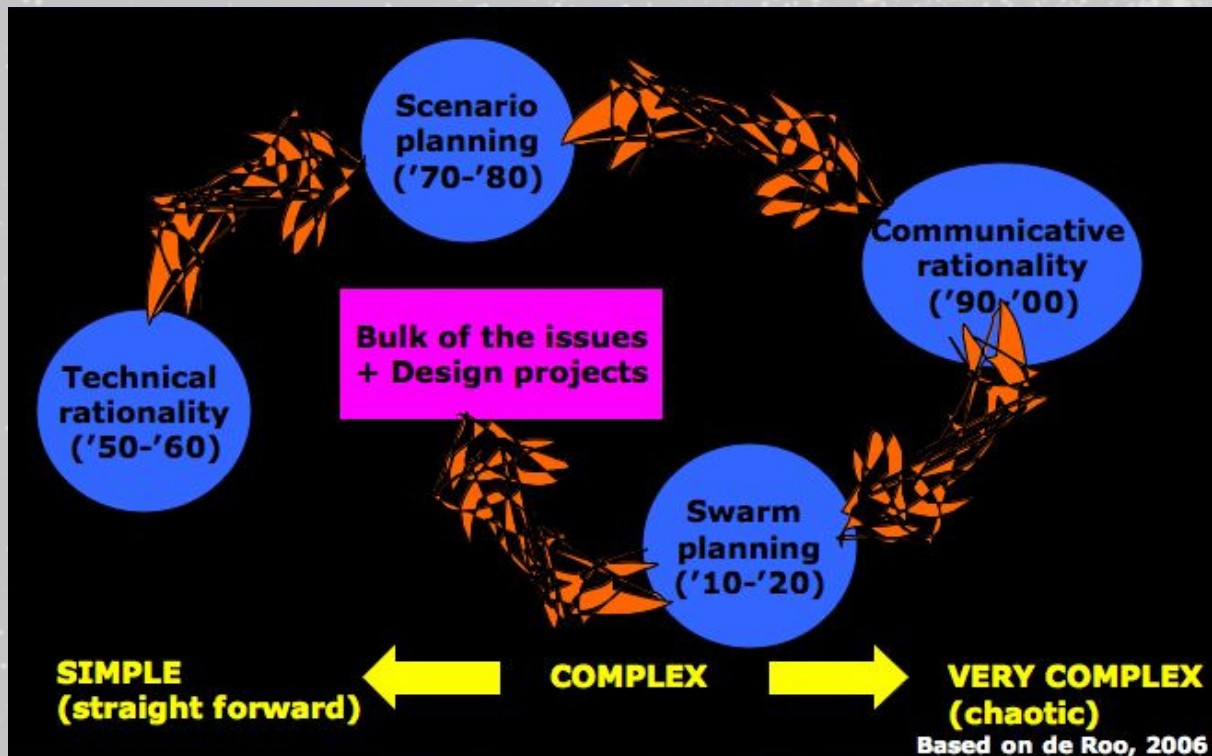


Figure 1. Compact history of spatial planning in the Netherlands in relation to complexity [after de Roo, 2006]

In the Dutch situation several phases can be determined [After Roo, 2006]. Figure 1 shows the transition of planning eras of the last 50 years, linked to the level of complexity. Starting in 1950-1960 the planning process could be characterised as a technical-rational and simple process. Blue print planning, reaching an end goal is common. As society evolved in 1970-1980, planning could no longer satisfy with only one solution: the complexity of problems and developments does not allow this. Scenario planning became a tool in order to develop several pathways to the future.

For example, this method was used in order to write the urban development plan (Verstedelijk-ingsnota, 1974-1975). The process was closed and rational, with no communication with sharehold-ers and governments. It focussed on the best possible content and aimed to facilitate the process of new urban developments away from the core cities, a clear end image of desired future developments [Bloemberg, 2005]. In this example, the result of scenario planning tries to find the best compre-hensive solution for the future by combining different alternatives (scenarios) as input for the planning process. In the recent society (1990-2000) a lot of groups are involved in the planning process.

Therefore, processes are very complex and regularly leading to fuzzy compromises. As an ex-ample the Fourth and Fifth National spatial policy plan may be used here [Bloemberg, 2005]. Starting off in the first years of this period (Vinex, 1998) with an intensive communication with other central governmental departments, municipalities and provinces, these ended with formal procedures and agreements to inform and involve stakeholders and citizens. This proactive way of planning involved many relevant organisations.

The process to develop the Fifth National spatial policy plan (Nota Ruimte, 2004) tried to in-volve even more stakeholders and citizens. This resulted in a very complex process, which took a lot of time, leading to repetitive steps in the process. At one point the process was rewinded, due to political changes. A lot of political debate took place between departments, in governance, with citizens and in the so-called polder talks (negotiations between involved socio-economic partners).

The last years of the 20th century a new model emerged: development planning. In this concept several stakeholder parties develop plans and realise them together. They work together in the design stage, the realisation phase as well in investments. The advantage is that, by working together, a more balanced plan is developed and the complexity of involving all kind of partners is reduced by incorpo-rating them. Still, the public is confronted with a − more or less − fixed image of the future. Because

today people become involved in another way than by existing action groups, an entire input in planning processes is being missed, even if partners work together from the beginning. A more process-like planning process needs to be developed in order to create the space for future changes and developments as well as influence by people who 'missed' the first phases in the process.

Clearly visible developments in recent planning examples include the introduction of the new spatial law in the Netherlands and experiences with development planning/area development. However, the question is if these recently emerged planning methods respond sufficiently to longterm problems and future changes in society, or that a new planning paradigm is required.

## 2.    A new Dutch spatial law (Nieuwe Wro)

The reason to design a new spatial law in the Netherlands lies in the increase of an encouraged sustainable spatial quality [Schoot, 2007b]. Spatial planning is a cooperative responsibility of the central government, provinces and municipalities. The motto is 'arrange decentralised planning if possible, centralise it when necessary'. The municipality is the first responsible institution for decision-making on spatial issues. Only if issues are of interest at a level lying above the local level (international, national, regional or intermunicipal), regional or national authorities are allowed to get involved. If the national or regional government decides to get involved in spatial issues they are obliged to explain why, and involvement depends on the problem, the scale, and the efficiency that can be achieved. Central and regional governments are able to steer beforehand and correct afterwards. They can formulate desired policies in so-called 'Structuurvisies' (Structure visions). This instrument is used to ensure commitment on the policy goals, but does not have a strong juridical base: The institution makes appointments with itself. The new law wants to stimulate the transition from a reactive planning system towards a proactive system, which is more focussed on developments and on what is happening in specific areas or projects: integrated steering before the planning process starts.

In this new system it is very important that is decided which interests are of a national or regional level and find sustaining arguments for it. Only then, a regional or national government is able to realise certain goals, which might be against the aims of municipalities. There is always the possibility of coöperation between the national or regional government and municipalities to realise commonly felt goals by formulating agreements in a covenant. The latter opportunity is not positioned in the centre of

the discussion about the new spatial law, which tends to be a debate on the juridical pros and cons of the new law and not on the chances the law offers to create arrangements.

## Structure vision

In a structure vision [Staatsblad van het Koninkrijk der Nederlanden, 2006, Schoot, 2007a, 2007b] the main aspects of spatial policy for a (part of a) municipality, a (part of a) province or (a part of) the country and the realisation of these aspects is described. The structure vision can be applied for neighbour municipalities or provinces.

The conclusion can be drawn that if a group of institutions really wants to formulate long-term spatial policies, they are able and aloud to do so. If they want to.

## Zoning plan

The municipal council is obliged to decide on one or more zoning plans [Staatsblad van het Koninkrijk der Nederlanden, 2006, Schoot, 2007a, 2007b]. In these plans land use (with regulations for usage and buildings) is laid down. The plan is valid for ten years and can be extended with ten years every time (under the condition that it still takes care of good spatial quality). The province and the central government are allowed to give a so-called 'aanwijzing' (directive) if no other possibilities are left to ensure the regional interests.
This means that the protection of the citizens against the consequences of climate change or the safeguarding and availability of sustainable energy resources or the safeguarding and availability of water resources can be the reason for a regional or national directive. The municipality is obliged to enclose these directives in its plans.

## Adjustment plan

The province is allowed to decide, after hearing the municipal council, on a so-called 'inpassingsplan' (adjustment plan) if a regional interest is involved [Staatsblad van het Koninkrijk der Nederlanden, 2006, Schoot, 2007a, 2007b]. This adjustment plan becomes part of the zoning plan of the municipality. If necessary for the realisation, a project decision can be made to facilitate the realisation before the zoning plan is adopted. The same procedure can be obtained by the central government.

## Coördination regulation

The provincial general council (PS) as well as the central government are allowed coordinate all required permits that are necessary to realise a certain policy or plan, in one procedure [Staatsblad van het Koninkrijk der Nederlanden, 2006, Schoot, 2007a, 2007b]. However, before coordination of the juridical permits takes place, the provincial and national council are obliged to do everything possible to ensure a smooth relisation of the plans and policies: a good communication with and between involved parties and the arrangement of sufficient budget to relaise plans and policies.

It seems here that for special categories and happenings the central or regional government is allowed to 'take over'. This might be the case for developments and problems which are not yet clearly visible on a local scale, but which require immediate action in a certain direction: adaptation to climate change, energy and water supply on the long term. Action should be taken, which wouldn't take place without involvement of the province/central government.

## Provincial regulation

If necessary for a good spatial quality, the province may set rules on the content of zoning plans in a provincial regulation [Staatsblad van het Koninkrijk der Nederlanden, 2006, Schoot, 2007a, 2007b]. It is possible to carry out rules for a part of the provincial area. Municipalities are obliged to decide on their zoning plans within one year, or a longer period if agreed on, after the general provincial council agrees on the regulation. The municipality needs to implement the content of the directive in a zoning plan within a certain period. If the municipality fails to do so the daily council of the province, the Queens Commissioner and his regional ministers (GS), may give a reactive directive after deliberations with the municipality council and general provincial council. The municipalities are forced by this reactive directive to realise the formulated goals by the province.

If the national spatial planning quality demands it, the central government is allowed to act the same way, by formulating a general governance rule ('Algemene maatregel van bestuur'). The central government is allowed to give a directive to municipality and province after deliberations with the municipality and provincial council and the Parliament. The Secretary of State is able to sustain subsidies in order to realise national spatial policies: the development of visions and plans and the preparation/ realisation of projects, which are of strategic importance for the national spatial policy. A general gov-

ernment rule can define the regulations.

In order to make an exploitation for an area the municipality negotiates with parties to put to-gether an exploitation agreement in which the obligations and rights of different involved parties is arranged. If negotiations on this agreement fail, the general municipality council is obliged to decide on an exploitation plan for land on which building activities are foreseen [Staatsblad van het Koninkrijk der Nederlanden, 2006, Schoot, 2007a, 2007b]. Part of this plan is a map of the exploitation area, a description of the work to make the area ready for building, the realisation of amenities and the public space, as well as an overview of costs and benefits in time. Every year the exploitation plan needs to be refreshed. An overview of the differences between the old and new law, as far as the provincial involvement is concerned is given in figure 2.

| Aim of the provincial instrument | Old lspatial law (BRO) | New spatial law (nWRO) |
|---|---|---|
| Definition of spatial boundaries (vision and policy) | Regional spatial plan | Structure vision |
| Spatial standards: influencing and steering munici-pal policies | Pre-negotiations (Art. 10 BRO) | Pre-negotiations (Art 3.8 nWRO): prenegotiation, Perception, reactive directive |
| | Approval: possibility of disapproval of zoning plan | Reactive directive |
| | Declaration of no objections | Reactive directive |
| | Directive power | Directive power |
| | NIMBY-authorise | Provincial project decision |
| | | Provincial regulation (general rules for spatial quality) |
| Development oriented planning | | Adjustment plan (zoningplan conducted by the province) |
| Actual maintenance of public space | Zoning plan | Zoning plan required for the entire area |
| Vertical integration | Provincial Planning Committee | Provincial Planning Committee |

Figure 2. Differences between the old and new spatial law [Dijk, 2006]

## Conclusions

The new spatial law does not prohibit governments and involved parties to realise good spatial quality, nor does it prohibit the inclusion of long-term developments in day-to-day practices.

The new law seems to be suitable to reach integral, long-lasting goals. It enables governments on a regional scale (or even at a higher level) the possibility to persist on the realisation of projects and measures, which are relevant for the longer term and a larger area than the municipal borders.

The new law describes several possible instruments:

1. Collaboration between the national/regional government and municipalities to realise commonly felt goals by formulating agreements in a covenant;
2. A certain group of cooperating institutions are able and allowed to formulate (for a certain area) the main spatial aspects to be realised in the coming 100 years. This is a matter of will;
3. The province and the central government are allowed to give a so-called (directive) if no other possibilities are left to ensure the regional interests. This means that the protection of citizens against for example the consequences of climate change or the safeguarding and availability of sustainable energy resources or the safeguarding and availability of water resources can be the reason for a regional or national directive. The municipality is obliged to enclose these directives in its plans;
4. For special categories and happenings the central or regional government is allowed to 'take charge'. Developments and problems, which are not yet clearly visible on a local scale, but do require immediate action: adaptation to climate change, energy and watersupply on the long term. Actions required were not to be taken without involvement of the province/central government;
5. If necessary for a good spatial quality, the province may set rules on the content of zoning plans in a provincial regulation. It is possible to carry out rules for a part of the provincial area. Municipalities are obliged to decide on their zoning plans within one year after the provincial regulation is agreed on by the general provincial council;
6. The minister may subsidise projects and development of visions, which are relevant to reach

long term and regional spatial quality and sustainability.

The discussion on the new spatial law tended to be a debate on the juridical pros and cons of the new law and not on the chances the law offers to create arrangements. The general conclusions presented here were not in the centre of the debate in the spotlight, but may be of high importance if long term and regional solutions are to be taken. Overall statement would be that the new spatial law should be able to encourage and stimulate realisation of these solutions. Yet, the dominance in the debate of jurisdiction and political power balances prohibits a clear view on these opportunities.

## 3.    Development planning (or area development)

### 3.1    Why development planning?

The currently used planning methodology of 'toelatingsplanologie' (allowance planning) is organised in a way that the spatial planning is done by the government and the realisation is left to other parties like individual investors or project developers. This planning approach aims to ensure that spatial maldevelopments, as undesired by 'society', are not realised and that citizens and vulnerable functions are protected. Procedures take care of a minimal quality of governance and legal security. However, this system has also a static character and is in certain ways unable to meet demand of the high-dynamic network society [Castells, 1995; IPO, 2001]. The malfunctioning of the system of 'permission planning' resembles in the following ways:

1.    There is more planning than realisation of plans, because municipalities are more often concerned with protection of existing functions and are less anticipative on dynamics in society. Therefore, the developed plans become less actual and easier to replace by new plans;

2.    It is difficult for municipalities to steer adequately, because the instruments, which support development planning, are minimal. Private contracts and purchase of agricultural land are the two instruments that municipalities may use;

3.    The system turns rigid, because the number of procedures increases and the system becomes inflexible. Beside that, procedures take a lot of time and this makes it hard to anticipate on new developments [WRR, 1998];

4.    Control is difficult in practice, because it costs a lot of time and the control organisation may sometimes malfunction. Citizens and vulnerable functions are less protected than meant [Klaassen, 2000].

Spatial planning became rotten due to a bureaucratic habit, malpower and a lack of vision. It does not mean anything anymore [Wouden et al, 2006]. This results in an increasing split between the content of spatial plans and the actual spatial developments [RPB, 2004]. Moreover, the power to save valuable spatial qualities, like the open space of the Green Heart, the central green space inside Randstad Holland, and the beautiful and mystic 'divine light', which occurs often in the Dutch peat-

meadow landscape, has disappeared [Wouden et al. 2006]. The spatial and societal context is irreversibly changed [Wouden et al. 2006].

Spatial planning lost powerful partners, as with public housing, where the basis could be found for a comprehensive and integrated spatial planning. Central directive steering was possible then, but in the current timeframe the market decides on how and where housing is realised, instead of spatial planning.

Secondly, the infrastructure that is financed through the benefits of the gas depletion, is planned without clear logic. As a matter of fact, these investments in infrastructure take place without spatial planning due to a rigid line between the gas revenues and the investments. Infrastructure means huge spatial impacts, without spatial order. In the old days spatial planning functioned as the important coördinator of sectored policies, but today less and less needs to be coordinated. Housing as it was immediately after WW II does no longer exist, agriculture contains its own dynamics, infrastructure is planned in a money-driven way and nature designs itself. Coherence is developed without a role for spatial planning.

In the third place, governance has become more complex. Especially the EU regulations decide to a large extend what is and is not allowed spatially in the Netherlands. What is allowed in nature reserves and what is not allowed there? Where are fine particles making new housing (im) possible and do housing coöporations work honestly in competition with others? These questions and issues influence the spatial quality in the Netherlands directly.

Additionally, within the Netherlands the tasks between the different governmental layers have become increasingly vague and are replaced by cooperation alliances, which may lead to fuzzy responsibilities and/or a competence quarrel between governors.

Finally, citizens and entrepreneurs became more mobile and less steerable by spatial planning. Beside this, citizens nowadays know better what they want and are less predictable. General perception of beauty no longer exists and fashion changes more rapidly than before. The built environment becomes inadequate sooner, at least in the minds of citizens. On top of that, decision-making procedures in spatial planning take a lot of time and due to this spatial planning resembles an era that once was. It is difficult to develop a coherent vision on urban development for the next 50-100 years on a national scale. Before the final decision on this is taken, the vision is restored or broken down.

To conclude: spatial planning is not prepared to solve problems of today's society, due to a lack of partners, a complex governmental setting, unpredictable citizens and a lack of power to develop future visions [Wouden et al, 2006].
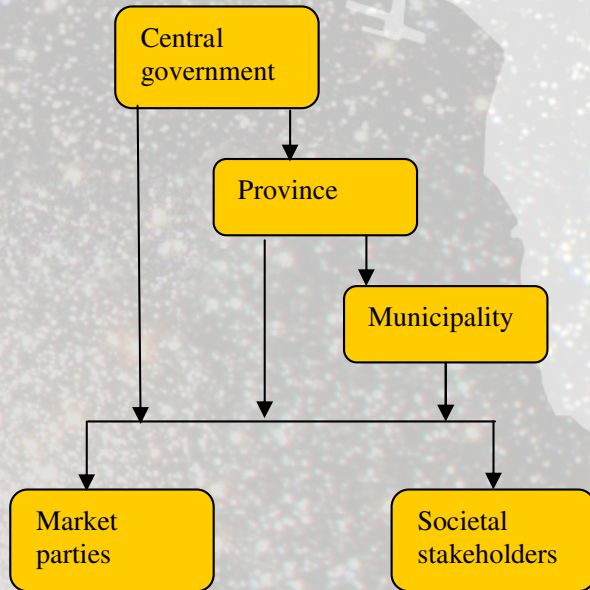
The success of a spatial concept depends on the attitude to enclose external influences [Witsen, 2006]. The power to absorb and the speed and the way new societal values and desires are integrated in spatial planning, are a dominant factor in spatial planning. However, these desires and values are individually formed, due to an open world with an overflow of information. A universal truth is absent; society is no longer 'makable'. Quality depends on time, place and individual, and therefore spatial plans are required to prove their effectiveness and indicate their legitimacy. Under these uncertain circumstances the power s away from national spatial planning and national spatial issues are absent in the public debate. We don't care anymore.

The leading coherent story could be available [Hajer et al. 2006]. The Netherlands should be prepared for an extended urbanisation, protection of agricultural land and it should become climate-proof. Hajer et al. call it 'Delta planning'. But the question remains if a centrally constructed story does not work contra-productive and increases dissatisfaction by citizens [Witsen, 2006]? After all, the overall story of our current world is globalisation and this encourages the emergence of identity seeking. That is how the big story is brought to people's lives. And in the region this evolves as the most important playing field for spatial planning, where integrated area development can be situated in order to connect national issues with the local spatial programming in areas and qualities. This emerging symbiosis may be the key to success [Witsen, 2006].

According to the province of South Holland [Dijk, 2006], society becomes more international (global connections, which function without governance), less knowable (a decreased knowledge by governments and entrepreneurs about desires of citizens), far richer (citizens have increasingly high demands for prosperity) and more interconnected in networks (products become increasingly dependent on other actors). Spatial planning also finds its place increasingly in networks of public and private actors. A hierarchical steering principle dissatisfies more and more to solve problems adequately [VROM-raad, 2004]. A form of network steering (figure 3) should replace current hierarchical mechanisms. Interaction and exchange of participants are able to function far better in network steering. Development planning uses network steering as a central mechanism.

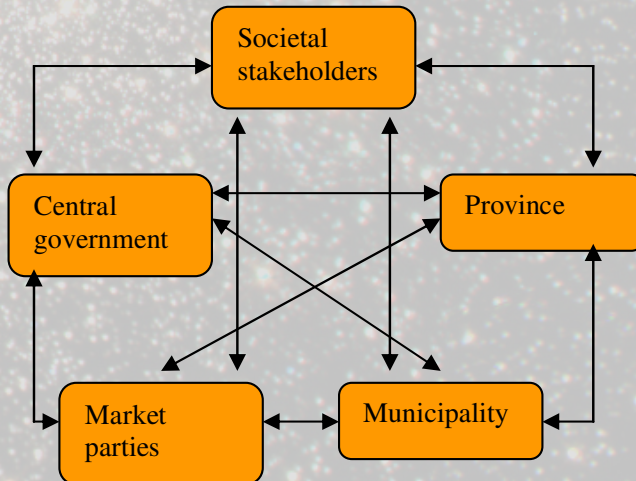From hierarchial steering



Towards network steering

Figure 3. From hierarchical steering towards network steering [After: Dijk, 2006]

## Area development

The planning system requires a transition from centrally governed generalistic measures towards a fit to purpose approach. The latter is a way of acting that can be compared with a 'do it yourself'- building package without any predicted person to take the lead [Rooy et al, 2006]. The wheel has to be invented every time, in search of the most appropriate working pathways, on the one hand taking into account complexity to go with it (every case is different, sectored dominances are moving, the urge for integral thinking), but on the other hand creating an understandable simplicity, a well-designed and nuanced process of governance (a network instead of one-liners as spoken by politicians). Citizens know far better what they want and do not want. The role of the citizens makes spatial planning more complex. Spatial planning is no longer deducing technocratic solutions after which everyone becomes happy, rather a matter of choice. What do we (..) want, how do we (..) want to live, what is the attribution of this plan to what we (..) desire. To what extend is this plan on earth?

## 3.2    What is development planning?

The inability of the current planning system to cope with dynamics of day-to-day society offers us a changing focal point [Rooy et al, 2006]: from generic rules towards specific spatial concepts. No fixed development pattern, but an open process based on arguments in projects at a regional level. No governmental monopoly, but changing societal coalitions. Spatial planning starts to develop more and more at the regional level. Daily life of citizens is happening at a regional radius, issues on water, housing, working, infrastructure and amenities become increasingly regional, because the municipality is no longer able to solve problems on its own. At this level the main issues are defined, new concepts are developed, the main changes and threats can be defined, and coalitions of interests can be combined.

As the central government decentralises responsibilities, money and policy space, the region ought to construct exchange of costs and benefits and specific financial constructions, such as a mix of investors from different governmental levels, as well as market parties. And finally, on this regional level, new juridical forms could be developed to realise plans with high quality and legitimacy.

A new kind of planning is required to incorporate these facts. This new planning is called development planning or integrated area development. The key ambitions of this new approach are: active,

stimulating, design and develop oriented. Only then it is possible to meet the needs of the highly dynamic network society.

The first description of what development planning is, has been done by the WRR [1998]:

- Generic spatial and national concepts (for instance: the compact city) are replaced by open concepts based on argumentation (for instance: city landscape). Development planning contributes to the debate on quality by sketching options with their spatial effects.
- The national policy becomes strategic and only on main issues, as regional policy is developed to design integrative in temporary co-operations.
- From shareholder (select group of involved partners) to stakeholder planning (with broad societal coalitions). The question might be raised here if in both approaches exactly the same groups play the most decisive roles.
- Spatial design and planning should be directly connected with spatial investments. This will increase the effectiveness of spatial policies.

The SER adds in the debate on the Fifth National Spatial Policy Plan that development planning is to be used to make use of existing economical en ecological qualities at the site. This urges a stronger cooperation on the regional or local area level between many different partners (public, private, societal), developing spatial plans together and from the beginning. The attitude should be open and encouraging societal dynamics to enter the planning processes and define the places where dynamics are placed and wanted best.

Statement of this paper: This general aim of creating long-term policies can be translated for energy and climate issues. The main question is where which type of dynamics is best, instead of exactly positioning future functions. In terms of energy: where can which type of energy be produced best, where can sustainable energy be yielded, where is energy supplied and most intensely used. In climate adaptation terms: where is the most intense change expected and where is the risk the highest. Defining the places where these dynamics should evolve at its best is not enough. The occurrence of these dynamics need to be facilitated in order to get started afterwards, for instance by giving an impulse at those specific locations, which lead to a swarm planning approach (see § 6).

The VROM-raad [2001] finds that a clear balance is needed between spatial transformations and the protection of existing values. Directing boundaries and spatial concepts stay necessary. During a development-planning project, which can be carried out best by the province, a regional vision should be developed, based on the qualities of the area. The integration of several initiatives and an integral investment program should be a central part of the project. Management should not focus on end solutions, but instead unleash creativity and expertise of all participants, leading to global end images. The province should take their responsibility in these processes by initiating developments and projects [IPO, 2001]. The province wants to act as an entrepreneur, working together with a lot of parties involved and negotiating on qualities and aims.

According to the province of South Holland it is time for a new way of spatial planning, which is flexible and dynamic enough to solve the problems of our time by combining both a high spatial quality of the plan with a high rate of democratic legitimacy. Without doubt, these arrangements are to be carried out on the regional level [Dijk, 2006]. A pro-active, development-orientated, multi-level and multi-agency practice is necessary, because people and entrepreneurs show a diminished commitment to the spatial order. The historic commitment is replaced by a dynamic of activities at a supra-local level, which hardly can be bound by governmental borders [Janssen-Jansen, 2004].

The ministry of Spatial Planning, Public Housing and the Environment [VROM, 2003; VROM, 2004] defines the following characteristics of development planning:
1.	An integrated area development in which vision and approach are one;
2.	A cooperative process, in which the start, the process and the results are common;
3.	Complementary participants: every party delivers what they are best at and leaves specialties to parties best equipped for these;
4.	Encourage a commonly felt vision on spatial quality in combination with less strict control by governments;
5.	Realise and finance a combination of projects. Attach spatial planning and spatial investments and combine profitable projects with ones with financial losses.

These themes are elaborated on in more detail by the Ruimtelijk Planbureau (Office for Spatial Planning) [RPB, 2004]:

1.      Dynamics in society

Development planning needs to prepare the society on the long-term dynamical developments and the spatial consequences it has [Innovatienetwerk, 2002]. System innovations create room for and offer insights on long-term developments, which require immediate action or offer views on future solutions, which are not yet available. The adaptation to climate change, the sustainable supply of energy and water are perfect examples of these long-term developments. However, in development planning these themes often are absent.

2.      Area in dynamic perspective

The characteristics of the area and governance need to be placed in a dynamic perspective. Existing identities and qualities are not only conserved, but also developed. Doing so, the areas might be given a greater meaning. However, in current times this increased meaning of specific areas is not yet supported by governmental attention. The consequence of this gap is a suboptimal effectiveness of policy at the regional level [Sijmons, 2002]. If no adequate governmental involvement can be offered, these tasks can be executed by a regional innovation network, which develops and realises innovations and changes [Vermunt et al. 2003].

3.      Open and unifying planning concepts

A spatial planning concept needs to be able to show imaginary desired development by a plan in words and images and needs to be able to define required interventions [Zonneveld, 1991]. First of all, open planning concepts are inviting and define the issue very roughly. They show only in which direction system innovation is to be found. Comment on this principle is that only a rough idea as to the direction of the solution is a bit vague. With the same openness in the concept – the question is defined generally - it might be also possible to introduce an impulse, welldefined, which is capable of starting the engine of the system in a certain direction. The intervention can be defined very specific and located, with a strong expectation of the impact of the intervention on changes in the system (the system innovation).

Secondly, the open planning process gives room to unpredictability and dynamics. However, including space for surprises and dynamics is not bad at all, but on the other hand an endless free space

of possible uncertain developments in the near future is not the best way to get to results. The danger is that, while giving space to uncertainties, repetitive changes are to be incorporated in the process as time goes by. At a certain moment the process almost starts 'asking' for unpredicted new developments; waiting for them and in the end reaching a result becomes hardly possible. The better way would be that in the planning process a certain period and room is included to define actions that are to be taken at this moment in order to enhance developments in the future.

In the third place, in an open planning process, the spatial concept can be elaborated on in different alternative ways; each alternative may be judged and the best alternative can be chosen. In fact, this approach is an old-fashioned way of planning: create several models or alternatives, judge the effects and choose the best one. A dynamic planning process takes as a starting point the future dynamics of society and needs to offer room for unpredictability by initiating a certain direction, which fits best in the broad band of future dynamics.

A spatial concept needs to be open but also unifying. If a concept is capable to unite different and contrary interests it might bring the entire region to a higher level [de Jonge, 2001]. Here, it concedes with complexity theory, in which a higher level of resiliency (an increasing overall fitness) may be reached if a system is brought to a higher level of complexity [Homan, 2005]. This higher level can only be reached by focussing on the coherence between spatial requirements and a select number of themes. On which items should the system innovation or new identity of the area focus? A direction needs to be defined, without defining the end-result or negotiate everything with all disciplines. The concept has to seduce the imagination by people involved, in order to bind them.

4.      Innovative process

A planning process needs to be open and innovative. In an innovative process the generation of creativity is a special feature to enhance a qualitative leap. This leap is translated into an imaginary design concept. This innovative process does not know any standards, there are no fixed procedures and it requires adjustments constantly [Innovatienetwerk, 2002]. On the contrary, it is a process constantly seeking the right problems, issues, challenges and innovative solutions. Therefore, the main task is to organise profitable conditions, like trustbuilding and to create a stimulating environment.

In order to create such an environment several methods may be used:

- Organise surprising interconnections between participants. Participation by a pluriform group, consisting of internal and external people who were already involved and outsiders as well;
- Joint fact-finding. Discover the problems and challenges together;
- Design the concept together in order to make the creative leap together and discover new solutions. One remark can be made here. The moment the concept is 'born' the process is back to the starting-point of a regular planning process. After this moment of joint concept developing the process becomes identical with processes we are familiar with: making a zoning plan, opening it for citizen involvement, trying to get the necessary permits and trying to start building as soon as possible. Moreover, the involved participants tend to behave like the controlling power of the old days: defending the original concept and constantly checking if changes on the concept are allowed. The only way to prevent this from happening is the introduction of a permanent atelier, which designs the required changes constantly and which every time facilitates these creative leaps (which might be impossible in practice) or defines one strong intervention by one group of partners involved, executing this intervention and giving the lead to a next group afterwards, which makes its own creative leap, defines the next intervention and executes this one. In brief, a more permanent dynamic process.
- The innovation process requires openness in three dimensions [Esselbrugge, 2003]: involvement of a lot of participants, use of diverse process resources and stimulation of a variety of perceptions. The participants should at least consist of networkers, experts, salespeople and obstructers. Very specific and detailed resources should be averted. Furthermore, the amount of perceptions should diverge at first and converge in the end. The question that may be raised here is whether the convergence at the end corresponds with the societal dynamics as described earlier. Convergence implies some kind of end-solution, which tries to describe a final optimal future. It might also be possible to live and work with several perceptions (just like real society does), which exist next to and through one another, and which function like Internet communities. This makes it even possible to have more perceptions at a time.

5.    Focus on realisation

A connection between the design and investments from the start of the process is beneficial for

the realisation of spatial quality. This enables a combination of different finance sources, for example to start a development fund, in which investment money from different sources (regular budgets, subsidies) is collected. In this fund more and less profitable projects are brought together. The long term must be made visible in these kinds of funds. Is it profitable to wait with huge investments or should these be made right away, because they will become far more expensive if we execute them in the future? Is it possible to execute the projects and invest later?

## 3.3    Conditions for development planning

Development planning is hardly a guarantee for success. Decision-making takes a long time and realisation of projects is postponed. Development planning is necessary to cope with a high pressure on the environment and societal dynamics, but requires a special effort. The development of innovations is essential, because existing solutions show a lack of creativity, effectiveness and beauty [Teisman, 1997]. In addition, existing cultural patterns in organisations lead to repetitive solutions developed by those organisations, even if the problems and issues are new. And if a debate is started on the applicability of these solutions, these organisations will tend to close the ranks and intensify believe in the existing solutions [Roggema, 2005]. Hypothetically, this effect increases if councillors take responsibilities for longer periods (as of the third term).

Many spatial problems and challenges ask for system innovations, due to a misbalance between spatial context and environmental pressure on the one hand and experienced values and sustainability on the other [Innovatienetwerk, 2002]. As incremental changes take place within policy sectors, a structural approach can hardly be discovered. Even if the problem is not clear yet, the solution is presented, mostly a well-known one from history. Fundamental choices are neglected, which often results in compromises. System innovations overcome sectors, they will unite more parties and require a creative jump. Innovation is not easily reached and the outcomes might be unexpected. This is a risk for any existing institution, because well-known thought and action patterns are broken through and the borders of existing procedures are at least met  [Innovatienetwerk, 2002]. The question is in this perspective whether the development planning approach is the right one. Development is difficult: many parties are involved and a lot of uncertainties are to be dealt with. It might be better to organise a planning process in which developments are a bit more top-down initiated. The characteristics of develop-

ment planning as described here are based on complexity theory. The overall fitness of a system can be increased if a large pool of elements (a lot of participants) are brought together, which co-evolve and reach a creative leap [Homan, 2005]. Still, the creative jump needs to be activated by some kind of intervention. System innovations are required in both areas with over- and under-pressure. In case of over-pressure, innovative solutions that overcome daily practice are required, in order to solve problems which appear when a high pressure on space and the environment exists. In the case of under-pressure, innovative solutions are also necessary to reach desired dynamics, which were absent before.

The province is able to play a central role in this process. It can bring the right partners together and give them room to act, spot and take up initiatives, give a voice to the outside world, act as a confident and reliable partner and communicate and secure the quality [Adviescommissie Gebiedsontwikkeling, 2005]. The national government has to act conform its own rules: decentralisation does not mean that the central government is absent during planning processes. Au contraire, the national government has its own responsibility in the regional planning process. In these processes negotiations take place and decisions will be made about the realisation of elements of national importance in relation to regional and local agendas. If the national government enters the arena when the finances of regional projects are arranged it often is too late to be really influential. Protection of national qualities and policies might become difficult [Witsen, 2006]. The fact that an innovative creating role is difficult may not result in the absence of the national government during important periods in the regional planning process.

## 3.4   Key factors

The success of planning depends on a widespread variety of key factors. It might depend on political support, the abilities of people involved, the design of the process or the content.

### Sense of urgency

Developments and trends in society are able to stimulate the innovation process, especially when a clear threat, or even a crisis or disaster is apparent, which emphasises the sense of urgency [Dammers, 2000]. One agrees that something should be done, although what exactly does not yet become very clear. A lack of political decision-making power has a contra-productive effect. If multiple

urgencies count up and are felt by public and private parties the chance of action increases, though there is never a guarantee, because the government seems to have enough time, while individuals and private parties are confronted with direct consequences of developments or threats [Rooy et al, 2006].

## Councillors

Within development planning several networks of separate governmental institutions are brought together at the regional level. At this level there is no governmental entity, which leads to a lack of political power. An overwhelming amount of regional designs misses realisation in the real world [Sijmons, 2002]. The appearance of political brave hearts is necessary: political leaders who have the courage to make these mistakes that incrementally bring the world forward [Dijk, 2006]. Political commitment depends on the people (their brains, heart and hands), the emergence of an enterprising group of people (unusual business), a public figure-head and leadership (which leads to followers at all levels) and trust-bringing interactions on a united course between public and private partners [Rooy et al, 2006]. The general political representatives need to be involved in an early stage of the process in order to define boundaries, but also to make decisions in a phased way, i.e. with a pluriform set of solutions [Rooy et al, 2006]. To reach consensus it may be applicable to use inventive political sessions, which go beyond the usual way of behaviour, like to concede on political regional conferences [Dijk, 2006].

## People's abilities

A creative leap will only be possible if people involved are able to develop meaningful relations with each other, give room to ideas from others, are capable to deal with contrary insights and are willing to increase trust. People who defend their interests frustrate the process.
The intensity of a conflict contributes to the adjustments that can be made on the boundaries of thinking. A temperate conflict encourages changes in thinking [Schön & Rein, 1994].

## Process

The role of participants may change during the process and need to be redefined from time to time. The traditional sequential process of design, interaction, decision and realisation needs to be replaced by a parallel one [Dijk, 2006]. The operational role of a central project management unit can

be placed best outside the regular 'mother'-organisation [Dijk, 2006, Rooy et al, 2006]. The project manager needs to have the ability to play chess on several boards at the same time and become friend with every partner involved. Development planning is also a very social process [Rooy et al, 2006]. The process, as much as the spatial lay-out, must be designed.

The focus and attitude of participants should be on the project or area, not on their own institution. An integrated open view, without preconditions on the regional issues is required [Dijk, 2006]. Negotiations should take place on the basis of the input of values and interest above positions and power [Rooy et al, 2006]. The government and other parties should be complementary, without the necessity to stay in their own perceived role [Dijk, 2006].

The involvement of private parties should be done as soon as possible in the process [Dijk, 2006, Rooy et al, 2006]. Their rules of play and habits are different and the differences in openness on budgets make processes often relatively laborious. Parties may find common ground on the interest in spatial quality [Rooy et al, 2006].
In the process it is advised to decide on the agreements first and act creatively on differences of insights. This may be reached by proposing package deals or develop innovative combinations [Dijk, 2006].

In Dutch practice it is hard to find learning organisations. A reflection afterwards is often neglected because of strong hierarchical structures. This makes it hardly possible to develop a learning system. Any temporary project organisation is seen by the regular organisation as something inevitable, which passes in time. Exchange between both is seldom. The primaries in governmental organisations are mostly denied and a strong culture of fear to take risks is, especially within provinces, apparent. To learn in such an environment is difficult [Rooy et al, 2006].

## Content

Dynamic processes urge the redefinition of the problem constantly by development of solution strategies. By sharpening the definition of the problem during the process, the issues and area is increasingly better defined. Governments should leave behind their power over the problem definition and should encourage other parties to communicate on it as well [Rooy et al, 2006]. The area-specific dynamics can be found by a design-oriented research, where the research is integral and where designs

are made discussable by imagination [Dijk, 2006]. The area-specific assignment and identity can be represented by design, encouraging the discussion on values. The designer should be without interests, with no power-based opinion [Rooy et al, 2006].

It is advisable to work with bandwidths rather than trying to reach the overall solution in an early stage. Definition and acceptance of this bandwidth, in which the final solution should be found, is important [Dijk, 2006].

Development planning and allowance planning should be mixed. Because if it is known by involved parties that in the end allowance of the activity needs to be given, creative thinking during the process is stimulated [Dijk, 2006].

## Finances

The realisation of ambitious projects depends on a solid financial system. Since in regular processes financing and planning are separated during most phases in the process, the ambitions are not achieved in a lot of cases. If the design of the concept is connected with the financing of the concept in an early stage, the chances to achieve ambitions will increase [Dijk, 2006].

The power over possession of land is important. The government should activate its attitude towards landownership, for example to exchange land between private and public owners publicly. Difficulty is that governments are not able to organise integrated budgets but have to negotiate on several smaller sectored budgets [Rooy et al, 2006]. The government lacks knowledge on finances, and sectored subsidies force sectored thinking and acting. Smart constructions should be developed, in which prejudices between government and private parties are left behind and a common financial system is organised [Rooy et al, 2006].

## 3.5    Conclusions

The existing planning system has a static character and is in certain ways unable to meet demands of the high-dynamic network society [Castells, 1995; IPO, 2001]. A planning system, which is active, stimulating, design oriented and focuses on development instead of protection, is better able to meet the needs of the highly dynamic network society. The breakthrough of existing fixed patterns in decision-making and the new and changing role of involved parties lead to creativity and innovations,

a great advantage of development planning. However, several remarks can be made on a couple of assumed advantages of development planning. In the analysis it turns out that development planning is time consuming and, as a lot of participants are involved, leads to possible struggles when it comes to decisions. Finally, the assumption that involvement of more participants in the planning process leads to a smoother procedure afterwards, might be misleading. The involved parties conceived a design to-gether, but not involved people, such as landowners, inhabitants of an area remain the right to object to the design once it is brought in a procedure. The conclusion can be drawn here, that a time-consum-ing process, which resulted in a, by several parties underpinned design, still has to cope with difficulties with objecting people and the inability to buy the required land.  The juridical procedure is only post-poned.

An alternative approach might include the following characteristics:
- Open planning concepts – the question is globally defined – should include an impulse, well defined, which is capable of starting the engine of the system in a certain direction. The inter vention needs to be very specific defined and located, with a strong expectation on the impact of the intervention on changes in the system (the system innovation).
- An endless free space of possible uncertain developments in the near future is not the best way to get to results. The better way would be that in the planning process a certain time and room is included to define actions that are to be taken at this moment in order to enhance developments in the future.
- A dynamic planning process better takes as a starting point the future dynamics of society a needs to offer room for unpredictability by initiating a certain direction, which fits best in the broad band of future dynamics.
- A spatial concept aims to enhance a higher level of resiliency (an increasing overall fitness) may be reached if a system is brought to a higher level of complexity [Homan, 2005]. This higher level can only be reached by focussing on the coherence between spatial requirements and a select number of themes. A direction needs to be defined, without defining the end result or negotiate everything with all disciplines. The concept has to seduce the imagination by

involved people, in order to bind them.

- After the moment of collaborative design and undergo the creative jump together, the process is back to the starting point of a regular planning process and becomes identical with processes we are familiar with: making a zoning plan, open it for citizen involvement, try to get the necessary permits and try to start building as soon as possible. Moreover, the involved participants tend to defend the original concept and check if changes on the concept are aloud. To preven this from happening a permanent atelier might be introduced or at one moment one strong intervention with one group of involved partners is executed and the next moment the lead is given to the next group, which makes its own creative jump, defines the next intervention and executes this one. A more permanent dynamic process.

- In an innovation process the amount of perceptions is increased. Instead of aiming to converge the perceptions in the final phase of the process it might be better to include several perceptions, which exist next to each other, through one another and function like internet communities. This makes it even possible to have more perceptions at a time.

- Existing cultural patterns in organisations lead to repetitive solutions developed by those organisations, even if the problems and issues are new. And if a debate is started on the applicability of these solutions, these organisations tend to close the ranks and increases believe in the existing solutions [Roggema, 2005]. Hypothetically, this effect increases if councillors take responsibilities for longer periods (as of the third term).

- The characteristics of development planning as described here are based on complexity theory. The overall fitness of a system can be increased if a large pool of elements (a lot of participants) are brought together, which co-evolve and reach a creative jump [Homan, 2005]. Still, the creative jump needs to be activated by some kind of intervention.

What else is needed?

The question remains if development planning is capable to meet the need of the highly dynamic society, is able to anticipate on longterm developments and is capable to reduce a time-consuming planning process? Probably, another approach, of strategic investments and a more impulse based planning system, is required.

## 3.6　Investment strategy

The question is if development planning will be the right tool as far as longterm issues and goals are at stake. Longterm developments like climate change or energy supply cannot be solved with existing strategies and do require a strategic look at investments [VROM-raad, 2006]. Four fields are determined by the VROM-raad. Strategic investments are needed in the fields of water management, energy supply, transport and structural strengthening of cities, regions and landscapes. Strategic investments are structuring the spatial order for the long term and are aimed to reach the increase of investments of citizens and enterprises. These financial interventions can be seen as the counterpart of spatial interventions as meant in swarm planning (see § 6), both are aiming to change future pathways without appointing an end view. The future is uncertain and investments in spatial structures are path dependent (once an investment is done it enhances future investments in the same direction). Therefore, it is smart to postpone the investment as long as possible. On the other hand, doing nothing will lead to problems anyway.

If national policies pay attention to longterm developments it becomes useful to realise strategic investments. Longterm options and challenges need to become part of the national spatial policy. This makes it possible to decide on strategically investments. If the options and challenges are clear it is possible to make decisions on postponing or immediate investments. Immediate investments require a quick decision-making process. What is discussed here on a national level can be copied to the regional level very easily. All four longterm issues play a central role on the regional level as well. Therefore, in regional planning and policy the longterm options and challenges need to be defined in order to develop a regional investment strategy.

A strategic investment is only possible if a diversity of possibilities is explored before the development itself takes place. If a certain issue becomes apparent the different policy options are ready, which makes it easier to make choices. The process of making choices can be phased on different levels of abstraction and it becomes possible to avoid and postpone a choice at a certain time. In this case the spatial possibilities should be kept open in the form of spatial reservations.

Strategic investment programs should become a part of spatial national planning. A structural fund needs to be available in which investments are connected to a strategic investment agenda. The aim of this fund should be that it increases in volume, for instance by connecting private and area
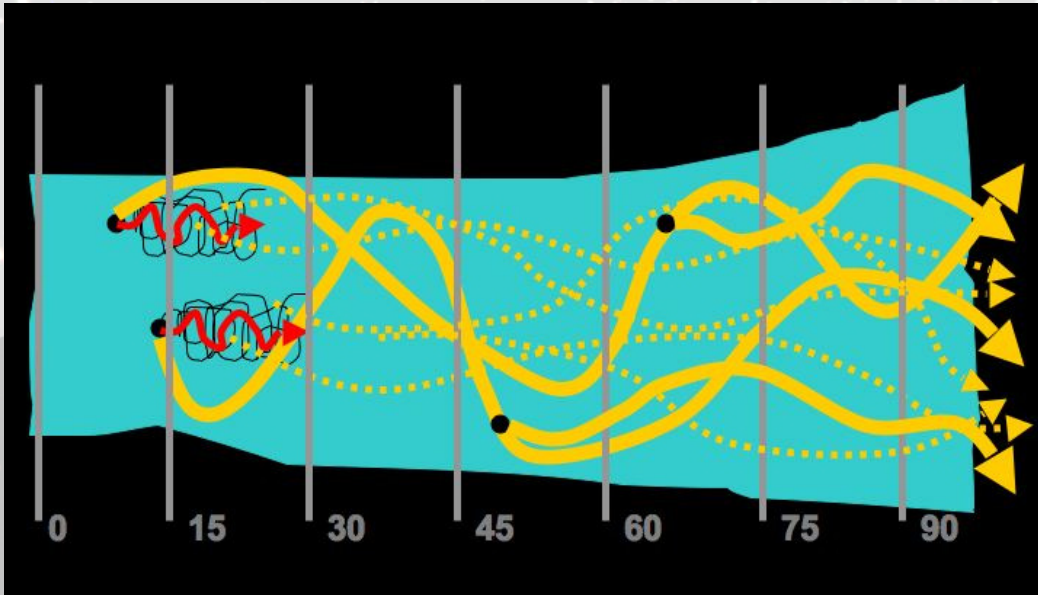
Figure 4. Strategic investments, swarm planning and development planning connected [Roggema, 2008]

specific investments to the fund. In this perspective the fund functions as an impulse. These strategic investments function like an impulse in an increasing movement in the direction of solving longterm problems. A development-planning project is such a possible strategic investment. It works both ways. On the one hand does the project start the cooperation in a certain area on a term of 25-30 years and on the other hand developments are started, which start new developments and generate the means, which might increase in the future and following projects. In swarm planning terms, the development planning project functions as the spatial-functional impulse, which is able to change future pathways in longterm problems like water management and energy supply. Thus, it does not create an end image of a future, which is unpredictable, but it starts the building of a system of higher complexity, which is more resilient.

In figure 4 the connections are made visible. The red arrows and black dots symbolise a development planning project, which is not only changing a certain area, but is also capable of starting the emergence of a spatial (yellow thick lines) and financial (small yellow interrupted lines) pathways, which are solving future problems because they were initiated decennia before.

# 4.    Developments in society

## 4.1    Megatrends

The near future will meet fundamental changes. Most changes are in one way or another connected with the emergence of the Internet. People are more connected to one another and at the same time more independent from hierarchical and institutional structures. The increasing tribal connectivity in social groups – Dutch, Chinese, Indian, Jews, Latinos, Gays or Muslims – spread in networks all over the world [Bakas, 2005, 2006], is made possible by internet. People create new forms of citizenship, which becomes more flexible and spread out. People live part time in one location and partly in another. People form communities on common issues of interest. Within those platforms people are loyal, but they may be part of different sub clubs at the same time. In this way a shareholder democracy develops, where public heroes take over power from institutional political leaders.

These loyal individuals are individual in consuming, but collective in social networks [Bakas, 2005] and family life [Bakas, 2006]. New citizenship evolves, in which power is shared among many different organisations. In society self-organisation becomes more important and this results in a diminishing power of the elite [Bakas, 2006]. This 'nobody in charge' society becomes less centrally managed and the exchange of products becomes increasingly virtual. The exchange of physical products lead to a change of ownership, if ideas, visions or opinions are sold both old and new owner posses it. Things are exchanged, while information is shared. The increase of Internet is the best example as it is shared by billions of people. In this new virtual, a-power like society the mind is more important than material. Greenfield says that in this century the human mind is the personification of a person's experience. The more experience a person gains and gives personal meaning to, the higher the status achieved and the more important somebody becomes [Greenfield, 2003]. Information technology enables people to shape their minds in the way they see fit and this leads to a collective ego. This implies the increase of soft power, in which respect for the aims and used means is gained, leading to voluntary participation instead of forced participation [Bakas, 2006]. The Internet enables people to create social and political platforms and bloggers turn Internet in a part of the real world. Internet becomes a tool in ordinary life and is used to broaden and increasing personal networks. Individuals combine the virtual en extended networks with a cosy environment at home. Because Internet enables people to ex-

tend their lives as far as they want, they conclude that the makability of the world and society is an idée fix. Key value in this new combined world of virtuality and close to home cosiness is authenticity. If you play a role or fake your life, you are not taken seriously. It's all about real, true marks [Bakas, 2006].

## 4.2   Endless connections

A broad range of information is continuously available to everyone. An increasing amount of interactions is possible and occurring. These interactions determine the direction society is taking. It is hardly possible to predict how it will evolve. Issues like climate change, that will have a major impact on the lives of people, are an illustration of how an increasing series of complex interactions, which are influencing each other, lead to visible problems: floods, drought, bushfires, deserts, melting permafrost, etcetera. The exact relation between interactions and effects is impossible to overview by individuals. People are gradually starting to understand how a single intervention can affect the entire system, requiring multi-layered thinking.

## 4.3   Towards an Internet society

In the Internet society, one is not only a consumer of news, adds or products, but also generator of information and able to deliver to the Internet in order to share it with others. This free space of exchange, where every consumer is also a producer, might influence the spatial design of regions. Adaptation to climate change and the sustainable supply of energy are issues, which might lead to serious problems on the long term. If the resources of fossil fuels are depleted, within 50 years, and the sea level and temperature are changed seriously within 100 years, society should have been adapted. These changes are fundamental and irreversible. Therefore, it is important to take measures now. These measures need to encourage desired longterm developments at short notice. Existing planning methods — which try to fix the future on a term of max 10 years — and the regular political focus of four to eight years, need to be connected with a further future (figure 5). This requires a new design paradigm. This paradigm — in order to be successful - needs to connect with societal developments. Thus, it needs to enclose the characteristics of the transition to the Internet society [Toffler, 2006] and Web 2.0 [Eye, 2007].
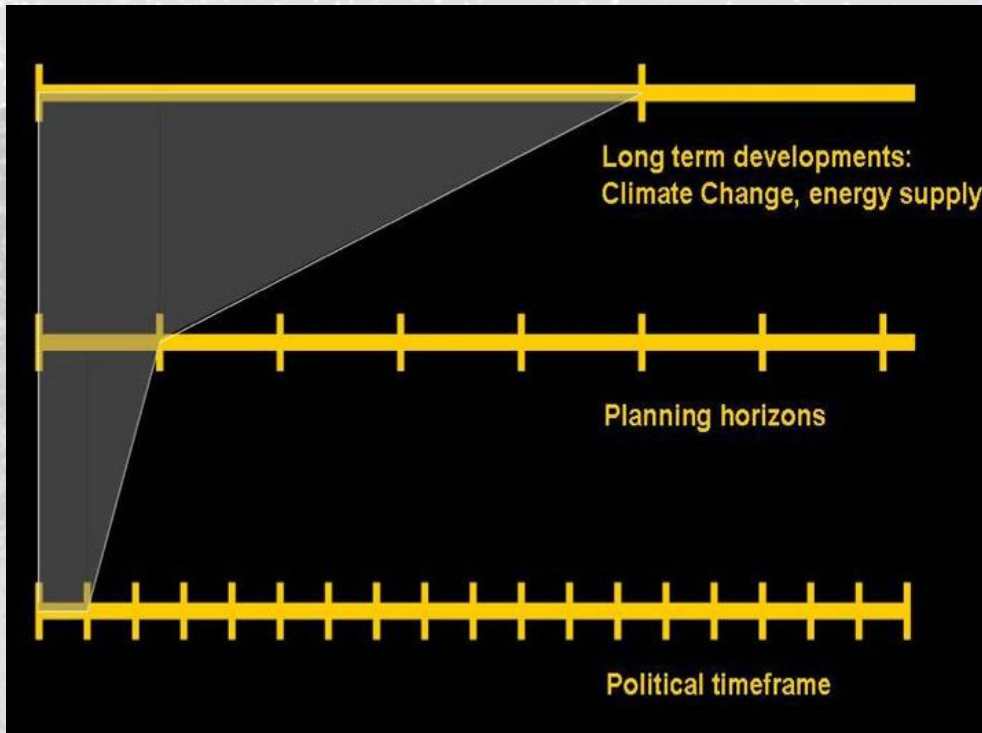
Figure 5. Connect long and short term [Roggema, 2007b]

## 4.4   Web 2.0

On the new web – Web 2.0 – everything is about connecting. Aslander [Eye, 2007] describes the new economy as the connection of people, ideas and information. In this new economy, there will be no place anymore for hierarchical structures, but flexible network organisation take over. In this new world it is more important to be a connector than owner of knowledge or goods. The Internet becomes a platform to exchange ideas – by means of web logs and on Hyves – instead of a set of providers and websites. In this new economy it is no longer about making money out of services, but the value you might add to something else is what counts: the economy of favour. Sharing means that you get an endless amount in return. Money is useful, it is also limited: you can use it only once, while knowledge stays forever and can be shared endlessly [NRC Next, 2007].

The Internet revolution is happening right now. After the transition from an agricultural society to an industrial one this is the next major revolution of mankind [Toffler, 2006]. The possession of land

and the power over workers was the power base in the agricultural world. In the industrial era the power over machines and access to oil became most important. This is changing radically. Everyone owns Internet. It is not important if you have power, but what attribution you can make. The free exchange of information makes the power of Internet providers minimal — if they are to be compared with the old factories. Not the possession is the key factor, but the immaterial, virtual additions to the net and the exchange of information is.

## 4.5    For example: a new energy-order?

The energy society functions as an old — hierarchical — factory. The ones that have the power over raw material, transport networks and power plants are in charge. If fossil resources decrease large energy companies want to become as large as possible in order to create an economy of scale. The aim is to keep the prices of energy within certain reasonable limits. This might be impossible in the future due to the depletion of fossil resources worldwide. If we sustain the Internet development on the developments in the energy society a new energy landscape lies in front of us. It is no longer only possible to consume, but also to deliver energy to the grid. Rifkin describes in his book 'The Hydrogen economy' [Rifkin, 2006] how this new landscape might function. Every household is able to produce energy. Sustainable options of small-scale wind or solar energy, but also more complicated alternatives as the use of geothermal sources, may be used to supply ones own energy demand.  If scarcity of fossil resources increases and the price rises, these alternatives become more competitive. Moreover, if the consumer is aloud to 'sell' his produced energy to the network, sustainable energy becomes really profitable. The production of sustainable energy on the level of one household mostly exceeds the demand. The delivery to the grid might be a profitable option to get rid of the excessive energy.

Two developments underpin the development of free accessible energy networks. Firstly, the needs to decrease the $CO_2$ emissions in order to slow down climate change, by increasing the use of renewable. Secondly, the free exchange of value representing services is stimulated by the societal and cultural development. Especially these intrinsique cultural changes will encourage the emergence of the development of a decentralised energy system, where production and consumption are connected on the local level. At the local and regional level this will result in the development of energy landscape units, which supply the grid with remainders and consume take energy from the grid if consumers demand it.

## 4.6 Conclusion

It may be concluded that serious changes are ahead of us. They can be summarised as follows:

- The makability of the world or a society is an idée fix;
- Climate change is an illustration of how an increasing series of complex interactions lead to visible problems. The exact relations between interactions and effects are impossible to over view by individuals;
- Required measures to cope with these multicomplex issues need to encourage desired longterm developments at short notice. This requires a new design paradigm, which needs to enclose the characteristics of the transition to the internet society and Web 2.0;
- The new economy is a connection of people, ideas and information. In this new economy flexible network organisations take over. In this new world it is more important to be a connector than owner of knowledge or goods. Not the possession is the key factor, but the immaterial, virtual additions to the net and the exchange of information is;
- If we sustain the Internet development on the developments in the energy society a new energy landscape lies in front of us. It is no longer only possible to consume, but also to deliver energy to the grid.

People add individual elements to a bigger world, knowing - partly unconsciously - that they are part of a system build out of billions of parts and consist of unpredictable interactions. They realise that it is impossible to make or create the entire future. The combination of added elements and values leads to an emerging future one way or the other. This longterm future emergence does not seem to connect with individual adjustments, but still, individual adding and interacting form the future.

It seems that people are only concerned about their short term happiness, look at the way they vote for instance, but the inside voice tells them that they are constantly shaping the future, only in a difficult to understand way.

## 5.    Paradox

Day to day practice show an increasing orientation on the short term. Immediate results, ad hoc decision-making and instant satisfaction seem far more important than longterm sustainability. At the same time it is absolutely necessary to start with measures, which are able to affect the future of longterm developments. This seems a contradictory development. The society is focussing more and more on short term and individually decisions, while a longterm focus is required to induce developments which aim to solve climate change and energy supply developments. The paradox is that aiming to solve long term problems, lead to a contraire reaction in society because society itself is short-term oriented, which make it hardly possible to reach the longterm goals. Reaching the longterm goals is even harder to reach because politicians are steered by the media, aiming to get ad hoc quotes, leading to ad hoc debates and ad hoc agendas. Longterm planning, longterm investment strategy or longterm decision-making becomes increasingly difficult.

## 6.    A possible solution

### 6.1    Away-from-the-average

A combination of continuous and ongoing interactions, multilayered thinking and understanding invisible connections will be required to deal with climate change, because the indirect consequences of any intervention need to be foreseen, in a way that the total system is able to adapt in time. By influencing a crucial part in the system at a carefully selected high-leverage point, the entire area changes and future effects of climate change can be made to become beneficial to spatial quality. Extraordinary creativity of a specialist nature [Ridderstråle and Nordström, 2004] is required to find these crucial interventions. These bright and away-from-the-average ideas will be able to help us to change the way we live in order to adapt to climate change. If we do not anticipate on longterm developments and stick to the way we are used to act -finding compromises and creating average solutions- unsolvable problems will appear.

## 6.2  Innovation shift

Because society evolves it is reasonable to assume that the planning paradigm will adjust as well. The shift that is taking place can be described as an innovation shift (figure 6). A government with strong and set procedures and rules will become inert. In those circumstances it is hardly possible for creati-vity and new solutions to emerge. What can be done on the basis of technique and technol-ogy as the solution to every problem reaches its limits. An innovation shift [Roggema, 2005] brings a new arena, where exceptional talents and imaginary creativity are the main values. The role of the government is still important but decreasing, namely to stimulate the emergence of ideas and guide a network-based organisation in which the idea-creating processes are embedded. Small, innovative companies - able to operate flexibly, and reacting directly to fuzzy questions and distinguishing them-selves with brilliant skills in solving such problems in a creative way - will become crucial for progress [Florida, 2005].

**Governmental dominance**

Measure
Uniformity
Knowledge
Calculator
Rational-
technological
Invisible

"Old fashioned government"

"The new government"

**Technique driven**

**Idea driven**

Imagine
Fantasy
Pencil
Differentiation
Constructed
Subjectivity
Visible

"Traditional companies"
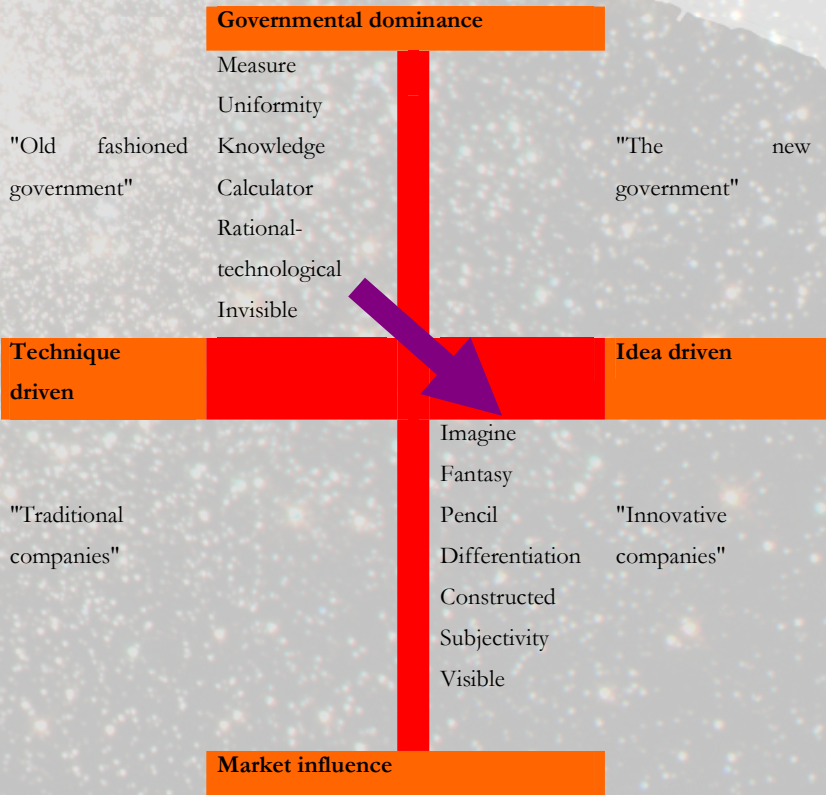
"Innovative companies"

**Market influence**

Figure 6. Innovation shift, Roggema, 2005

## 6.3    Swarm planning [Jacobs et al, 2005]

To prepare society -with its endless interactions- for the future, it is necessary to bring the regional spatial design system to a higher level of complexity, able to adapt better to future and unforeseen changes. In the long term a region of higher complexity is better capable to adjust itself to the new circumstances than an inert one. The resilience of the region improves as the overall fitness of the system increases (i.e. it reaches a higher level of complexity).

To reach this higher level of complexity two possible approaches are possible: self-organisation stimulation (§6.3.1) and pacemakers introduction (§6.3.2)

### 6.3.1 Self organisation stimulation

Slime mold cells collide into a larger organism dependent on the circumstances — a nice weather — and this organism starts to have a nice dinner. If the weather becomes colder again, the slime mold organism falls apart again in thousands of separate cells. The slime mold moves between an "it" and a "they", between a single creature and a swarm [Johnson, 2001]. The slime mold is not steered by a central power (pacemaker), a king or city councillors, or by a hierarchical system. The slime mold is directed by self-organisation and is dependent on the right circumstances, in which the cells start to produce a certain matter, which create trails. Because of these trails cells are able to join in clusters of cells, following the trails, made by other cells. They make a positive feedback loop, which encourages more cells to follow the trails and join the clusters into a huge organism.

These systems of self-organisation are able to solve problems by using a lot of simple elements. In these complex adaptive systems agents of one level show behaviour of the level above. An ant shows behaviour necessary in a colony and a city inhabitant shows behaviour that belongs to a neighbourhood. The low level rules are turned into a higher-level sophistication. This is what we call emergence. The system contains several agents interacting in multiple and dynamical way by following local rules without being steered by something higher, but showing one kind of macro behaviour. The adaptiveness of the system means that the system adapts over time.  The question remains how an adaptive complex system — a city or region — can be made more adaptive by pushing it in a certain — a more climate proof — direction. If we want to bring our regional spatial system to a higher level of com-

plexity, where the area becomes more resilient and shows an improved overall fitness, the first thing we need to define is what the agents of the lowest level are: people, buildings, streets? The second thing we'll have to do is define the tracks to be followed by the individual agents in order to become more sophisticated and develop in a more climate proof way. Probably, we are working on a daily basis on this emergent system by adding buildings; adjust the water system or change ecological infrastructure. Instead of building top-down a system an adaptive system is more resilient if dispersed bottom-up intelligence is available [Selfridge, 1959]. Not a single smart program, but the creation of a swarm of limited miniprograms (demons). "The idea was we have a bunch of these demons shrieking up the hierarchy. The lower level demons are shrieking to higher level demons, which are shrieking to higher ones". The lower level demons only have to recognise very simple shapes (ones and zeros, circle and line, street and building, etc).

What is necessary for a complex system to reach a higher level of complexity is a massive pool of material (demons, agents, genetic variation). The successful elements inside this pool pass through the next generation, because reproduction ensures that innovative genes find each other. Random mutation appears in the gene pool, which introduces complete new avenues. If time allows the gene pool to run trough enough cycles, an engineering masterpiece recipe will evolve (without an engineer in sight). The programmer decides on what the task was, not how to accomplish it. He sets only the parameters and the system evolves on its own. In the Tacker system [Jefferson & Taylor, Taylor, 1999] the simulation of ants is carried out. A certain goal and a few simple rules were given. The ants were given no skills at all and in 100 generations the population evolves a perfect score. The virtual ants developed a strategy in which they were uniquely adapted to their environment.

If these principles were projected spatially, the amount of slime mold cells and the length of trails were important parameters. At one certain moment the amount of cells and the length of trails is just enough to induce a turn around of the system into an organism. The slime mold cells are the investigators in the field and the trails form the institutional memory. If we put more cells (streets, people, buildings) in the system and give their work a longer track (by publishing results in bestseller books, founding their research centres), the result will be that isolated ideas and private obsessions transform very rapidly in a new view on the world, shared by thousands individuals. The question is which cells we need to give a longer trail in order to improve their impact in the region and to increase the adapt-

ability and resiliency of the system. Which trails need to grow long enough and get interconnected enough to create this higher level order.

A city is also a complex self-organising system. The city as a whole has a coherent personality, grown out and self organised out of millions of individual decisions. A global order built out of local interactions, without being planned. A city has its own life and is a living creature. Patterns of human movements can be discovered in the urban landscape, carved in the texture of city blocks. The city amplifies the patterns. Neighbourhoods make the repetitive behaviour of collective groups visible. Here, a small adjustment in behaviour can turn into huge changing movements. What is required is a huge pool of individuals and some simple rules. The same system can be applied at the regional level. At this level the individuals need to be defined as well as the simple rules, which are able to let the system turn into a climate proof region. This simple rule can be an impulse, a multidimensional design principle. Acting like a pacemaker, but in ths perspective not a powerbased king or a city councillor. This pacemaker is an impulse, which pushes the system in a certain direction and let it evolve from there by itself.

The vitality of cities have the ability for understanding, communicating, contriving and inventing what is required to combat their difficulties [Jacobs, 1961]. Vital cities are learning machines and pattern recognisers. Big cities did overcome to be places of diseases, because being a big city the invention of all medical science to overcome diseases only could originate in this big city.

Cities can be characterised as a bunch of problems of organised complexity, connected to each other with a lot of variables, interrelated into an organic whole. Looking at cities we've got to think in processes. A city or a building is connected to its environment and the circumstances it is amidst. The houses are always part of a process (i.e. unslumming, slumming, generation of diversity, selfdestruction of diversity). These processes are able to transorm and redirected by catalysts. These impulses can be understood by any person, who is normally not aware of the possible impact to direct him or her. To understand and be sensical on these processes in cities and regions one has to reason inductively. Starting with the individual inhabitants and not top-down. Understand the powers and processes, which identificate the city, using constructively bottom-up power of individual people who inhabit and use the neighbourhood. Understanding the inhabitant and his drivers will help to steer the system in a desired direction of for instance a climate proof region. Ordinary people have the awareness of

unaverage elements, which is quite consonant with the importance of these relatively small quantities. Large quantities of average are needed to create /produce the unaverage. This unaverage can be physical, economic or cultural: eyecatschers in a large average scene. Social unaverage elements are important as clues (as analytical means). They are the announcers how large quantities of average behave in combination with each other. The unaverage are clues to what is happening in the system. In this sense, unaverage clues, involving small quantities can be found. If ordinary people understand and are aware of the unaverage it might be possible transform this knowledge to processes, which lead to behaviour of a higher level.

City is nature and the two are not opposites. Natural processes form the city and the city resembles a complex order, like the intricate and unique order in nature. The people with an urban attitude want to shape the city and suburbanise the chaotic nature according to simple rules, standardise it and itches to erase it. The city loving creatures are the same who love natural processes and are unrespected by the simple suburbanising minds of order and simplicity.

What does a city, a region, a self-organising system require. What are the characteristicsof these self-organising, vital cities? Neighbour interaction, pattern recognition, feedback and indirect control [Johnson, 2001].

## Neighbour interaction

Local is the key term in understanding swarm logic: emergent behaviour in systems when individual agents pay attention to their immediate neighbours. Think and act locally, but their collective action produces global behaviour. Perceptual world is limited to street level. For ants: the bulk of information processing relies on the chemical compounds of pheromones — the semichemicals for the way they create a functional sign system. Chemical signs turn out to be the key to understand swarm logic.

Follow the sign system and the ants will be able to organise their colony in an extremely efficient way. The ants follow 10 to maximum 20 signs. Translate this principle to humans may be precarious. Think of the 1930's in Germany, hooliganism or the way how muslim youth is recruited: follow the signs in the sign system and the colony will be organised extremely efficiently and effectively. On the other hand it can also be extremely well-considered and useful, like mass-communication, the use of internet and msn (schoolkids-strike). If we would like to test the changes in the system which should

lead to a climate proof region it should be systained in a village, which starts following the signs, not consciously, but steered by internet. Looks like a social experiment with the matched objections. The use of advertisement and the creation of cool marks may be useful to be successful.

Build a system designed to learn from the ground level, where macrointelligence and adaptability derive from local knowledge:

1. More is different: critical mass necessary in order to assess its global state. There is a distinction between micromotives and macrobehaviour. The ants are ignorant about the higher aims. They create a trail without knowing that it is important to reach the higher aim;

2. Ignorance is useful: densely interconnected system with relatively simple (stupid elements) is better than a system with excessive complicatied components. Individual agents in the system that directly assess the overall system are a real liability in swarm logic. It seems that people (the elements) must be kept ignorant in order to reach a higher level. One smart guy in the system might ruin the entire aim. This sounds like large factories with under aged labourers (or soldiers in the army), who are kept ignorant to reach the higher goal. This does not seem to fit with current nor future times, in which individual people make their own decisions and are not under aged nor ignorant. Maybe we have to see those conscious people as the ones and zeros ─ the average, between which the unaverage exception may flourish, like Jacobs, 1961 says ─ unaverage small quantirties ─ or Ridderstråle, 2004 ─ with his extraordinary creativity ─ and Gladwell, 2000 ─ with the law of the few ─ describe. These exceptions are valuable and welcome in the system and might play a crucial role in bringing the system to a higher level of complexity. If they are able to push, give a push or an impulse the system starts to evolve. This comes close to the introduction of pacemakers ─ swarm planning as desribed in §6.3.3.

3. Encourage random encounters: random interactions exploring a given space without predefined orders. Because so many individuals are around in the system, the encounters inspire individuals to gauge and alter the macrostate of the system. Without it is impossible to stumble across new food recources and adapt to new environmental circumstances. Try to find the way in at tryal and eror manner will lead to unexpected solutions and this causes the adaptation of the system, which makes it more resilient and better prepared to adapt to climate change.

4. Look for patters in the signs. Pattern detection allows meta-information to circulate through the

colony. This means that information about signs is passed on about crucial elements. Only one sign at a time is not relevant, but 50 may be seen so. In a complex system elements are looking for the signs about signs.

5.      Pay attention to your neighbours. The interaction between neighbours is the primary mechanism of swarm logic. If there are more neighbours the amount of interactions increases and the society is better able to solve problems and regulate itself more effectively.

In cities these principles may function in the same way [Jacobs, 1961]. If a city block is given certain rigid instructions governing their behaviour they are dependent on signals from neighbouring blocks. If there are thousands of blocks, the exchanged signals will eventually define and self-organise city neighbourhoods. The cityscape comes to life in the form of upscale boroughs and slums, besieged by recessions and lifted by sudden booms. The interactions in cities and between the blocks take place at the sidewalk. There it is possible to interact and exchange. In the automobile era this is no longer possible. If the speed exceeds the possibility to interact the emergenceof weel-defined areas is no longer possible. Or should we comment on this statement, which dates from the sixties, that in current times the city landscape is the complex system we are talking about, where interactions take place at nodes in the traffic system, and well-defined functional shopping mall areas function as the new sidewalk of our times. Here the information flows and the freeway is the new infrastructure, which helps us to exchange the information. Moreover, future exchange and interaction will take place by Internet, with is new sidewalks, nodes and information flows. Therefore we have to find the kind and number of sidewalks and blocks of our time, whether it is virtual or regional organised. What and where and how many places of flow of information with (virtual) neighbours are in place in the region. Which are the new neighbours, the new sidewalks, the new communities, the new strangers and the new city?

## Pattern recognition

The patterns in cities remain the same over centuries. The same nodes can be found, identical functional zoning is visble and even in new developments the same structures will be applied. One way or another the patterns in the city are recognised. If this happens not consciously at least it is function in the subconsciousness. One knows undeliberately where to get 'the stuff', no matter what stuff you are looking for, you willl find your way in the city paterns, even if you have never been in the

city before. This is the collective memory, which is apparent in cities. This pattern recognition leads to specialised and emergent intelligent centres in cities, and this may be compared with the emergent intelligence of the brain. Can it be compared also with the Internet? Does Internet develop in the same kind of way an emergent intelligence? Johnson [Johnson, 2001] argues that there will never be anything like that. But if we look at the development of Internet techniques and uses it may be more or less the same as happened in cities. There is pattern recognition, for example by a feature, which is called 'what's next?' and which is connecting and organising centres of comparable information. These connections are found by watching traffic patterns and looking for neighbours, exactly the way cityscape is formed and differentiated lobs of the human brain emerges. The Internet system thus starts to learn, connect places (sites) and defines the relationhip between them. The only thing that is required is a lot of agents (users) and software that is looking for patterns. This intelligence is the aggregated wisdom of billions of users.

## Feedback

General interconnectednessof the system: the better the more chance oat a feedback loop. Internet & media are densely interconnected systems. And these systems shifted towards a distributed network away from traditional top-down ones. This changed all with CNN entered the picture (impulse?): local news became national stories and the strategy of wooing local stations was introduced: this made it possible to pick up and choose from almost everything the stations capture. Furthermore, the staton began to mimic the local stations: the system starts to call for shots instead of reporters reporting happenings. The feedback drives the systemnegative feedback makes it possible to transform a fluid changeable complex system into an adaptive one. Positive feedback lets the mergence of the same behaviour increase more and more: stories generate more stories, which generate stories about the coverage of the stories, which generate coverage about the netacoverage and so on. This leads to an ongoing cycle of 'hypiness'. The combination of positive and negative feedback loops form the system, pushing the suystem forward/upward. The medium stays the same, the message stays the same only the rools of the system change: adjust the feedback loops and a new type of community appears.

In order to reach a resilient regional community we ought to modify the system by changing the feedback loops. The message is the aim of a resilient, adaptive region, the medium might be the Inter-

net, the only thing that need to be changed are the rules in order to create those feedback loops.

## Indirect control

The system or a region better not be controlled aal the way. In order to create an adaptive system, which is more resilient in times of changes the elements in the systems obey certain rules we define in advance, but those rules only govern micromotives (of individual elements). The macrobehaviour is not directly controlled. We are to set up the conditions that might make this behaviour possible. After setting the rules the only thing to be done is: press play and see what happens. The elements within the system will evolve according to Darwinistic rules: Survival of the fittest. This system we create should function like an environment, not like an organism. An environment' which creates space where intelligent elements could grow and adapt. Emergent systems are rule-governed systems. Their capacity for learning and growth and experimentation derives from their adherance to low-level rules. This is the swarm logic. Without low-level rules there would be a swarm without logic. Too much control can be disastrous. A mix of the familiar and the strange is required to create an emergent system. People, who have a feeling for too much and too little order, are able to create an emergent system. They have a feeling for the edges.

Marriage of bottom-up growth and top-down management: let the neighbourhoods come from below, but build incentives in the system to encourage their growth. The brain is able to detect shared patterns in disparate fields: a chain of decentralised intelligence appears: brain, organisms, networks, virtual cities, cities, all following the same rules. Emergence: giving up control, let the system govern itself as much as possible letting it learn from the footprints.

## 6.3.2 Conclusion

A couple of intermediate conclusions can be drawn :
If a new view on the world, shared by thousands of individuals and aiming to make regions more climate-proof pushing the complex adaptive system in a certain direction, should be enhanced, the following parameters need to be defined:
1.      The agents/cells. Put more cells (streets, people, buildings) in the system and give them a

longer trail: more impact;

2.     The trails. Follow which trails make agents more sophisticated. The trail needs to be enlarged and interconnected to create a higher level order;

3.     A huge pool of individuals and some simple rules.

4.     Create the unaverage. Social unaverage elements are important as the announcers what is happening in the system. The law of the few declare those unaverage exceptions with extraordinary creativity, which may flourish between a bunch of average. These exceptions play a crucial role in bringing the system to a higher level of complexity. If they are able to give a push or an impulse the system starts to evolve.

5.     Unexpected solutions cause the adaptation of the system, which makes it more resilient and better prepared to adapt to climate change.

6.     The regional city landscape is the complex adaptive system. Find the kind and number of nodes (shopping mall areas), transportsystem (freeway/intenet instead of sidewalks), interactions and information flows of our time. What are the new neighbours, sidewalks, communities, strangers and cities?

7.     Formulate the positive and negative feed back loops in order to reach a resilient regional community.

If we would like to test these principles, which should result in a climate-proof region, in real world they should be sustained in a village, which starts following the signs, not consciously, but steered by internet. The use of advertisement and the creation of cool marks may be useful to be successful.

### 6.3.3 Pacemakers introduction

If the system is not randombly self-organising itself evolving to a higher level of complexity might require some kind of incentive. Pacemakers may be introduced to do so. These new crucial interventions need to be able to change the entire regional spatial system and make it more reselient. A new design paradigm, which focuses on these interventions, is therefore required. This new design paradigm can be called swarm planning, referring to a swarm of birds. A swarm is transforming constantly, influenced by external impulses and directed by only a few -very simple- rules. The swarm is chang-

ing its pattern suddenly by apparent impulse: it changes its form and direction. The question is which interventions are crucial to bring the swarm to a higher lever of complexity, which can be characterised by 'away-from-the-average' and 'multilayered thinking'. In order to consider this, it is helpful to look at complex systems, especially those that are "close to chaos".

## Typology of complex systems

Which kind of systems are the 'playground' on the edge between chaos and effective interventions? Systems in general can be subdivided in 4 categories [Wolfram, 2002]: I) closed system, II) linear feed back systems, III) systems randomly open to assimilation and IV) non-linear adaptive systems. De Roo [Roo, 2006] describes the characteristics of class IV systems. These systems are able to behave such as to maximise benefits of stability while retaining a capacity to change [Mitchell Waldrop, 1994].

The question is how to interpret design projects in terms of complex systems. The following aspects of design projects are relevant:
- They contain a large number of interactions,
- Simple rules underpin complexity,
- Adaptation, self-organisation and co-evolution are apparent,
- The design transforms and retains the project and
- Design principles are characterized by robustness, emergence and fitness for purpose.

The same characteristics de Roo [Roo, 2006] describes for class IV systems. In addition, experience shows that the subject of design is often sensitive to impulses and tipping points.

The question at this stage is which planning approaches would be most effective if the future consists of Class IV system behaviour, manifest in a large number of interactions. The insights of organisation dynamics can be useful here. The conditions to improve the overall fitness of an organisation are [Homan, 2005]:
- Large groups of individual elements lead to emergence of collective patterns under certain conditions (amount of connections, quality of relations and network matter)
- Enough diversity but not too much to start autocatalytic processes

- Idea-interaction (Homan calls it idea-sex) between different elements may lead to creative jumps where new structures and information is created
- Co-evolution of local systems leads to emergence of collective patterns, enhancing the overall fitness of the system
- Complex systems manifest several co-existing patterns (patches), rather than either one overall pattern or a large variety of local systems
- Local ideas function as nuclei, eventually influencing and patronising large parts of a complex system

The common characteristic in the conditions described, are large numbers and many interactions. There needs to be a large pool of elements. Then, the chance that things interact is larger and new processes emerge increasing the overall fitness of the system.

What is missing so far is a trigger setting these processes in motion, such as a focal point that enforces the pool of elements to interact and starting the process of changing the system. These points, where 'dovecotes flutter', ultimately make things happen. Every element in the system oriëntates itself to these points, and by doing so the system as a whole changes. The result is an innovation coming out of a bunch of ideas. An impulse needs to be added in order to reach a tipping point.

## Tipping points

The tipping point is that magic moment when an idea, trend or social behaviour crosses a threshold, tips, and spreads like wildfire. The possibility of sudden change is at the centre of the idea of the tipping point. Big changes occur as a result of small events. The situation is similar to the phenomenon of an epidemic.

Epidemics follow three rules [Gladwell, 2000]:

1. The law of the few, a small part of the whole is doing all the work (80/20)
2. The stickiness factor: the message makes an impact. It is impossible to forget.
3. The power of context: sensitivity to the environment, influence of the surrounding.

By applying these rules to planning and design, the question when a design becomes a success, reïnforcing the required changes, can be understood. First of all the law of the few tells us that a success-

ful design will originate from a small group of individuals. The design is not what the common people expect. To change things the design will be away-from-the average [Ridderstråle and Nordström, 2004, Roggema, 2005].

Secondly, the stickiness factor suggests that a successful design sticks in ones heads. Once having seen the image of the design it is not forgotten. Roberts calls it a visible love mark [Roberts, 2005]. A good example of this is the design for Almere Poort, the Wall (figure 7) [MVRDV et al, 2001].

Finally, the power of context in relation to design processes tells us that a design with huge impact provides the solution to a commonly felt problem. If a fundamental change is required, such as climate change is asking for, a widely shared context of deep trouble improves the chances of change. A sense of real urgency is required for fundamental change. A crisis will provide the energy to jump to the new situation [Timmermans, 2004]. If the existing system dissatisfies, a crisis is required to jump to the next level of complexity required to upgrade the system (figure 8) [Geldof, 2002]. These crises
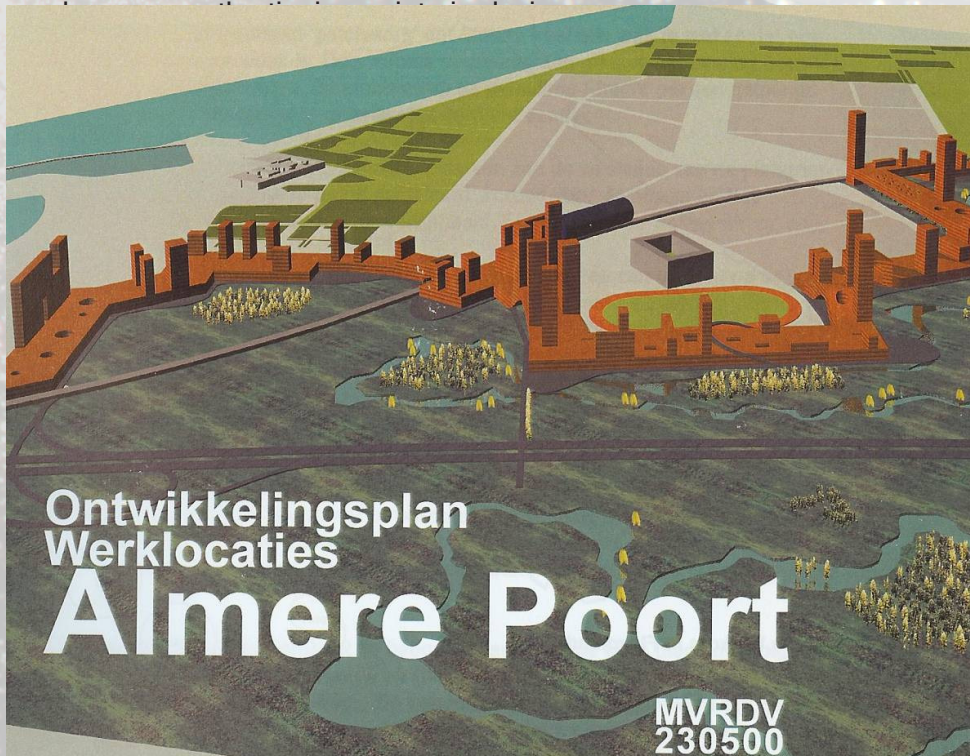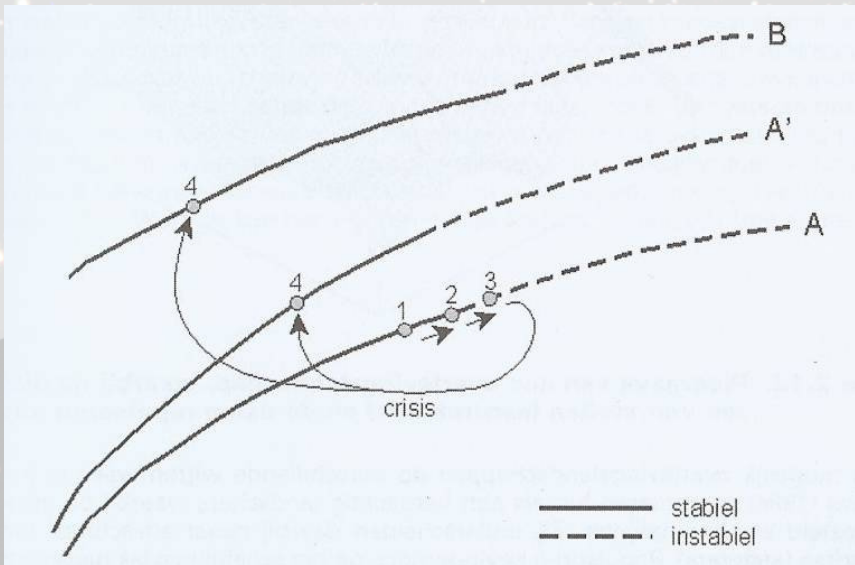


Figure 7. The Wall in Almere Poort, MVRDV, 1999

Figure 8. Crisis enforces the jump to a higher level, Geldof, 2002

## 6.4    A new design paradigm

Translated in planning design terms, the effective spatial intervention creates a tipping point, directing all spatial, societal, political elements in such a way that the entire region changes. Contemporary planning approaches do not provide this and, in the light of the problems posed by climate change a new way of design is required. As we suggested earlier this new spatial design paradigm is called swarm planning [Roggema, 2005]. In this paradigm the role of spatial design is seen as introducing essential impulses to influence the whole system, like a swarm of birds is reshaping itself constantly under external influences. Spatial design will no longer be concerned with the whole picture, but will focus on those essential design interventions that enforce the region to reshape it self. The metaphor is not any longer the blueprint, but acupuncture.

Thus, for a swarm planning approach [Roggema et al, 2006] to be successful, two aspects are essential: the (spatial) characteristics of the region and the availability of extraordinary ideas. Complex systems theory suggests that the swarm paradigm will work where the following conditions are met:

- A large group of individual elements (people, buildings)
- Many connections (virtual, roads, rail, water)
- High quality of relations (fast, intense)

- High quality network (flexibility, intensity)
- Enough, but not too much, diversity (neighbourhoods, groups)
- Several co-existing patterns (patches)

If these circumstances pertain idea-mergers between different elements will lead to creative jumps, and new structures and information is created. A small group of extravagant idea creating people will enforce this and transform it into a sticky idea, which influences and shapes large parts of the region. If the sense of urgency is there -climate change for instance- a suitable trigger brings the idea to a tipping point and collective patterns emerge out of co-evolution of local systems, leading to an increased overall fitness of the system, which is able to adapt more easily to the new world of climate change.

This paradigm is not yet common, but the first examples in spatial design are there. The way interventions are planned in the "Blauwe Stad" in the remote parts of Groningen province [Karelse van der Meer, 2003], the projection of new islands in front of the Northern coast of the Netherlands, the impact the Öresund-bridge has on the accessibility, economic welfare and image of Malmö and Copenhagen or the way Mendini [Mendini, 1994] changed the entire inner city in Groningen through the Groninger Museum project are early examples of swarm planning.

"Blauwe Stad"

The eastern part of the Province of Groningen has traditionally been the poorest region in the Netherlands with pervasive high unemployment, low levels of education and poverty. People, who could, left the area. In this case the swarm consists of the people living in the area. They were dissatisfied with their situation – or in other words: with the shape of their swarm. The common felt sense was that some things needed to be changes. This situation has fundamentally changed with the impulse –given by one deputy of the regional government - of an implant of a whole new village -Blauwe Stad- around a new lake, which has shown to attract well-educated and wealthy people from outside the area. The reason is that the new village makes itself felt across the entire area, with new amenities, restructured villages and new transportation developing around the Blauwe Stad.

Figure 9. Blauwe Stad implemented in the landscape of eastern Groningen

## The Groninger Museum

The "Verbindingskanaal" is a waterway at the edge of the city-centre of Groningen, located between the central station and the inner city. The fastest way to reach the inner city was traditionally to go around the canal. As a consequence the area at the city side of the Verbindingskanaal became neglected, attracting hooligans and criminals. In this case, the swarm consists of the buildings, functions and routes in this part of the inner city. Most of the elements in the area were neglected, malfunctioning and of low quality. The shape of the swarm dissatisfied large groups of people, users, policy makers and politicians. One deputy of the Municipality gave an important impulse. He enforced the building of the Museum right in the middle of the Verbindingskanaal. A new and much shorter connection was introduced between the station and the inner city. Many people started to use this connection and in few years time the neglected area transformed into a very popular neighbourhood, where lots of high quality shops emerged. This way the Museum transformed the entire inner city.
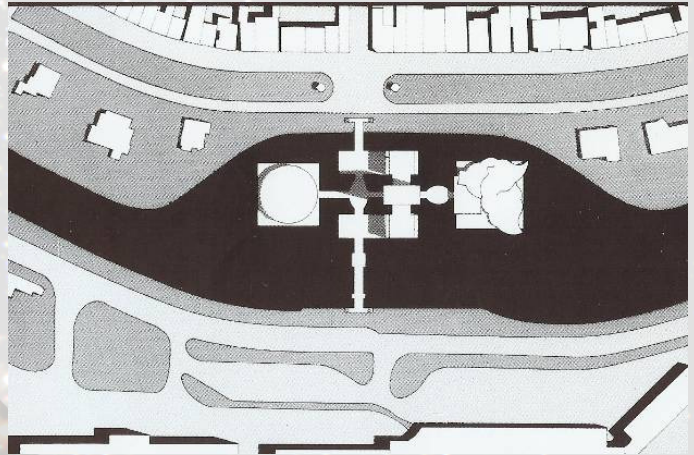
Figure 10. The Groninger Museum positioned in the Verbindingskanaalzone, before (left) and after (right)



Figure 11. The Groninger Museum

## 6.5    Steer the Swarm

Because of the inability of traditional spatial planning to create and reinforce effective interventions, capable of changing the regional system, a new steering principle needs to be developed. In the environmental spatial plan of the Province of Groningen [Roggema et al, 2007a] this issue is explored in some depth, leading to the decision to develop a range of approaches to influence the spatial system (figure 12). In doing so it is hoped that the best regime to realise a satisfactory outcome will emerge. The aim is to end up with a regime that is able to change the direction of the 'swarm' towards a high standard of spatial quality. The most appropriate approaches may differ from area to area, depending on their identity, and the availability of a number of approaches to choose from in combination with the unique characteristics of the area will make it possible to retain the flexibility to make the area adaptive to uncertain future developments, like climate change.
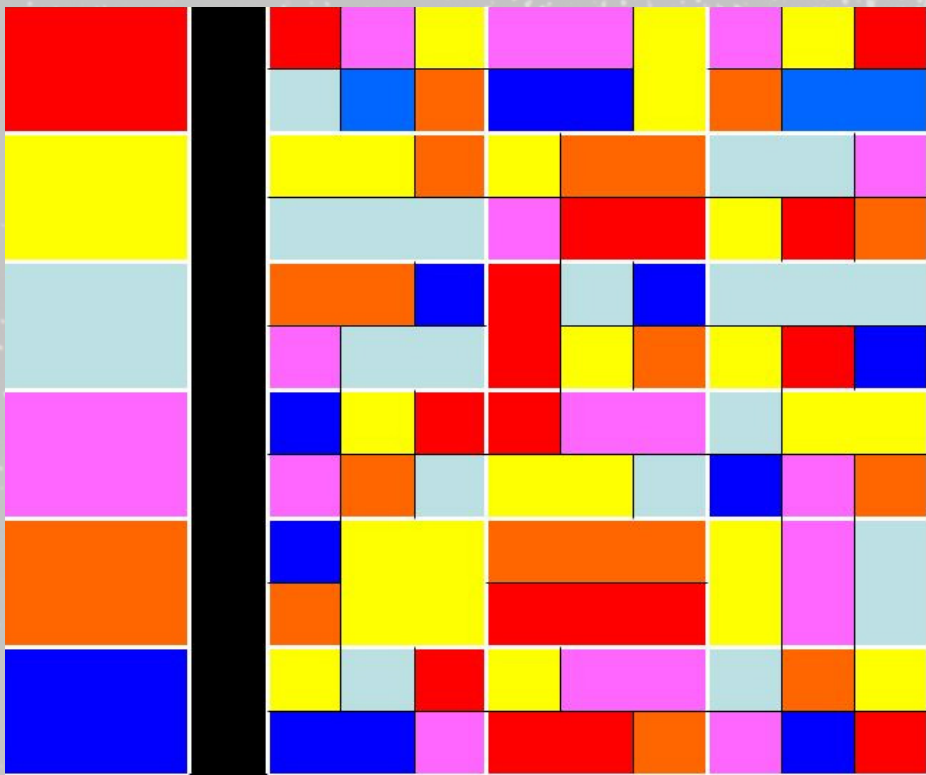


Figure 12. Mondrian combination of regimes and identities [Roggema et al, 2007a]

# 7.    Tame & Wicked: steps towards a new planning paradigm

Design decisions on a regional level are nowadays mostly based on historic knowledge, a programmatic, quantitative analysis or political short-term references. These characteristics are associated with tame problems. Tame problems are characterised as [Conklin, 2001]:

- Relatively well-defined and stable problem statement;
- Definite stopping point, i.e. we know when the solution is reached;
- Solution can be objectively evaluated as being right or wrong;
- A problem belongs to a class of problems which can be solved in a similar way;
- Solutions, which can be tried and abandoned.

Long-term changes, such as the depletion of energy resources or changes in climate, play a minimal role in design processes. This is due to the fact that these long-term changes are uncertain and complex. In fact they are wicked problems: these problems are not 'solvable', but can only be changed by influencing them. Wicked problems can be characterised by [Rittel and Webber, 1973]:

1.    There is no definite formulation of a wicked problem;
2.    Wicked problems have no stopping rules;
3.    Solutions to wicked problems are not true or false, but better or worse;
4.    There is no immediate and ultimate test of a solution to a wicked problem;
5.    Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial-and-error, every attempt counts significantly;
6.    Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated in the plan;
7.    Every wicked problem is essentially unique;
8.    Every wicked problem can be considered to be a symptom of another {wicked} problem;
9.    The causes of a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution;
10.    [With wicked problems,] the planner has no right to be wrong.

The necessity of adaptation urges to think about the question how climate change and energy potentials can be included in spatial design processes. An adjusted planning paradigm will emerge if the regular (tame) planning approach is improved and a wicked parallel process is introduced. On the other hand, if the planning process is not adjusted it will be hard to incorporate climate change and energy supply in the existing planning practice and to realise a sustainable energy system and climate-proof regions.

## Paradigm shift

The existing design practice behaves along the laws of the existing paradigm that everything is a tame problem and can be solved in a tame way. Therefore, the attempt is to make climate change measurable: for instance, we calculate the rise of sea level and solve this problem by heightening the dikes. The regional spatial system is not really adapted to long-term or disruptive changes. However, our society will undergo a fundamental change - due to the changes in climate [Gore, 2006; Stern, 2006] and the scarcity and the price of fossil energy [Power Concern, 2007], which makes it urgent to include long-term developments and challenges.

A paradigm shift in planning process may be the result if climate-proof regions are designed. This paradigm shift, in which the changes in climate and energy supply are seen as uncertain, long-term problems — wicked problems — seems to be inevitable.

The central question is if a new design paradigm emerges if the adaptation to climate change and the adjustment to a sustainable energy system are included. Up to now a few studies are conducted on climate- and energy-inclusive design [Roggema et al., 2006; Dobbelsteen et al., 2007; Roggema, 2007], but long-term, uncertain (wicked) side processes are scarce [for example: Hotspot Groningen, 2008, work in progress]. Climate change is both a tame and wicked problem. This causes an even stronger difficulty, because planning practitioners assume that if tame adjustments are made in the planning process, the complex problems are tackled as well. However, it is essential to approach Climate Change and Energy Supply as wicked problems also. The aim is to come up wit those solutions that are able to change the problem and as a result of that starting processes towards increased climate-proof regions. In the research this aspect need to be looked at very carefully and 'proven' with support of several empirical cases.

## Current planning processes

If we take a look at the recent planning process to realise a regional plan for Groningen pro-vince, we see a stiff linear process, which starts with an analysis, followed by an interactive phase and resulting in a reflective phase in which the final plan is put together [figure 13]. There is hardly room to create bypasses or loops.
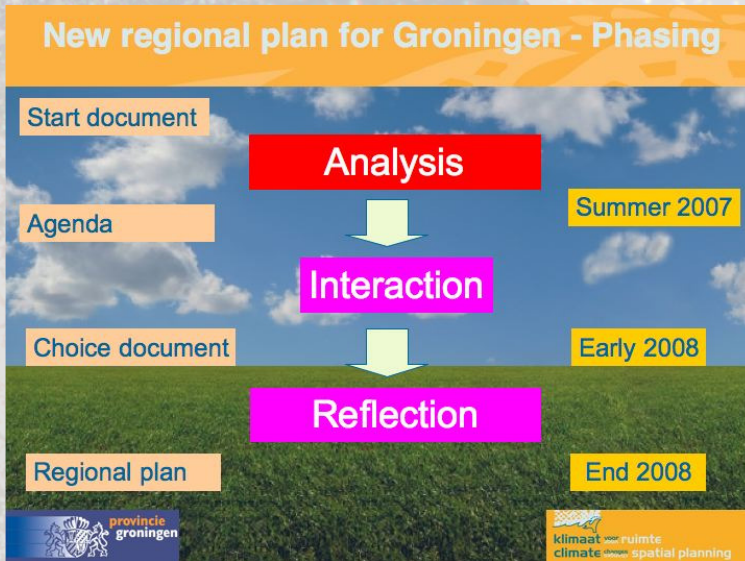


Figure 13. Planning process for the regional plan Groningen

The analysis is focussing on a rather short term of 10-20 years and is dominated by program-matic aspects (housing program, economic programme, demographic developments, ecological main structure, water management, energy-networks and –aims and so on). The amount of required space for different functions is the main ingredient for the planning process [figure 14]. The final plan can be characterised as the policy-like abstract translation of these programs for the next ten years. Long-term developments, as well as narrative micro input [Geldof, 2008] is left out.
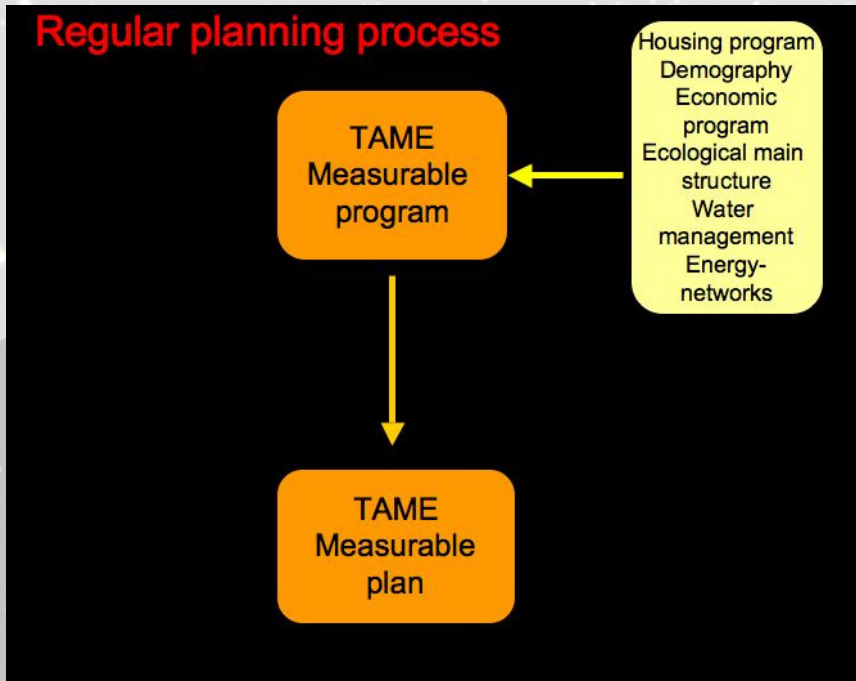
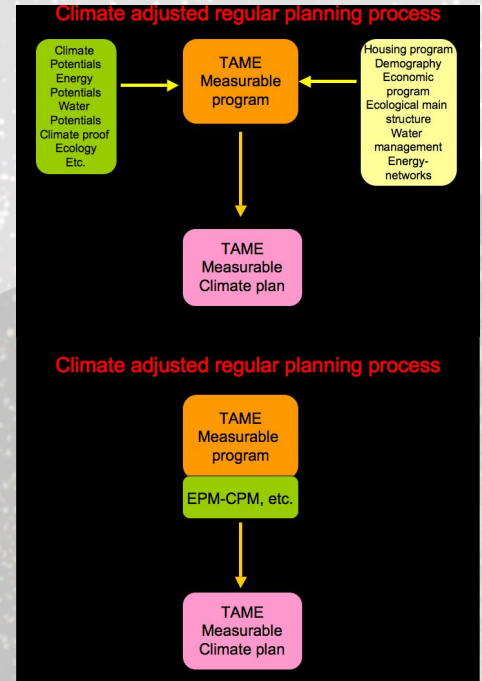Figure 14. Regular planning process: programmatic induced analysis leads to a measurable plan

Figure 15. Climate and energy potentials added in tame planning processes

Within regular processes environmental issues are included in the processes, but in a short-term orien-ted way. The quality of the soil, the accepted level of noise and the amount of dust in the atmosphere are put in boundaries. Energy policy is also normative: the ambitions and goals are put in percentages reduction and saving, the energy use of houses is put in a directive (EPC) and even the latest agree-ment on energy goals [Energieakkoord Noord Nederland, 2007] is defined as volumes, which must be realised. The complexity-side of sustainable energy and adaptation to climate change is not (yet) a part of these planning processes, probably because the deliverables are not exactly required quantities, but potential quantities. Insights in Energy and Climate Potentials [Dobbelsteen et al, 2007; Roggema, 2007b; Dobbelsteen et al, 2008] show that the potentials can be translated in numeric figures and can be presented on maps. The Energy & Climate Potential Mapping (EPM & CPM) for Groningen and Almere indicate the possibilities.

Here the first part of the paradigm shift is required: use of available knowledge and implementation in regular (tame) planning processes [figure 15].

Beside this Climate Change and Energy Supply are not recognised as a wicked problem. And if climate change and energy supply are part of the planning process, these wicked issues are solved in a tame manner. This is not successful.

The second part of a paradigm shift emerges here: a wicked bypass needs to be created in the planning process [figure 16]. In this wicked environment, which is operational during the tame planning process, wicked problems are 'processed' and transformed in a way that the problem is changed or that the output are adaptable solutions, which may be implemented in the tame environment.

If climate change and energy supply are, indeed, (partly) wicked problems, solving them in a tame environment (i.e. current planning system), is impossible. Trying to fit long-term problems in a short-term practice is impossible because the sense of the problem doesn't fit in the current planning system. And if it is not possible to enclose these aspects in spatial planning no climate proof spatial project will be realised and because of that climate proof regions will not emerge. Instead of a neces-sary acceleration, required to reach a future climate proof 'dream' [figure 17], the spatial system falls back in routine and is not able to enforce the required system jump [Geldof, 2008]. The system is 'locked in', or, even worse, finds itself in a backlash status [Geldof, 2008].
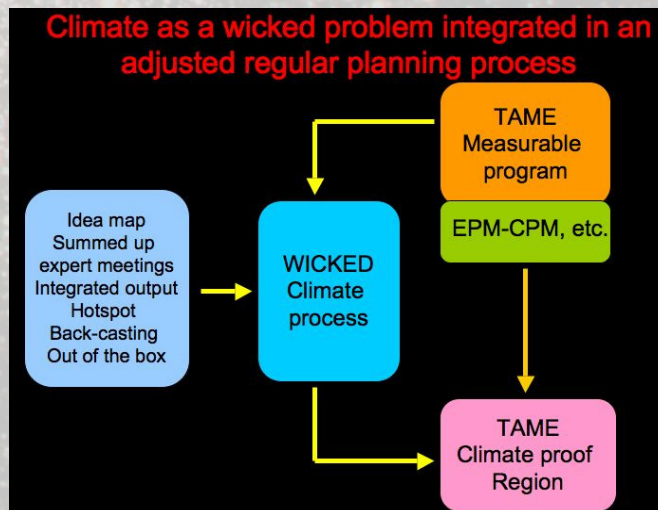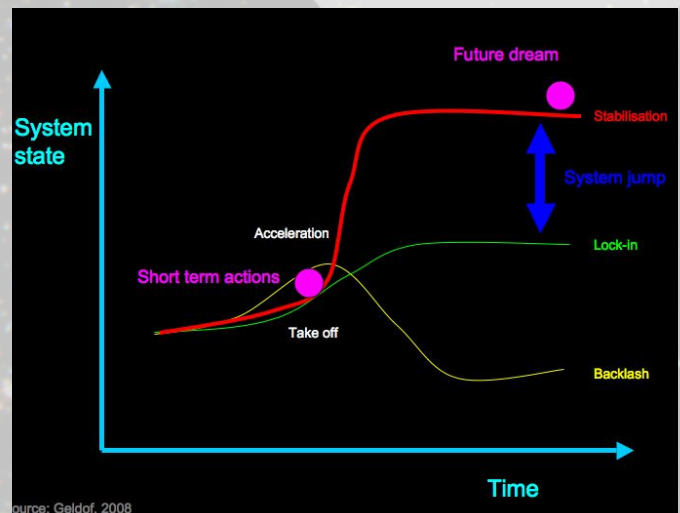


Figure 16. Introduction of wicked bypass in the planning processes



Figure 17. Possible developments of spatial systems [Geldof, 2008]

In order to realise climate proof regions, two elements should be enforced in the field of spatial planning:

1.    Incorporation of the measurable aspects of Climate Change and Energy Potentials in regular, tame, planning processes. This is a matter of priorities and the attention of decision-makers to include them in existing planning procedures. To make it easy to incorporate these issues, they should be made quantitative: hectares, spatial claims and measurable areas. Methods like Energy Potential Mapping (EPM) [Dobbelsteen et. Al., 2007] and Climate Potential Mapping [Roggema, 2007b], or the results from the Lands-project [Koomen et al, 2007] and Ruimtes canner [Schotten et al, 1997] are excellent to deliver the required input. This way of thinking is rational and analytical: the ß-side of thinking.

2.    Introduction of a wicked bypass parallel in the planning process. By creating wicked circumstances, wicked problems may be treated. These wicked circumstances may consist of intuitive design and a high level of complexity. Impulses need to be incorporated in these processes, like an idea map [Roggema, 2007], expert judgement meetings [Hotspot-results, 2008] or the output from student designs [WUR, 2008]. During the processes creative jumps are looked for. These jumps require a high level of complexity, which may be supported by a narrative approach [Geldof, 2008]. This seeking process towards implicit, intuitive and experience based thoughts, which may contribute to and initiate developments, is more important than finding solutions for a problem. Design theory and the choices for design principles [Koh, 2005] from a look-up table may be useful to stimulate such a process. The results may be translated in tame, measurable contributions to a regular planning process or just enforcing changes by modifying the problem. This approach may be seen as the x-side of thinking.

| Wicked | Tame |
|---|---|
| Misfits (D. Jacobs, 2008) | Fits |
| Smugglers (W. Huyink, 2007) | Border-security |
| Impulses/Swarm | Blueprint |
| Idea map | Existing planning |
| Backcasting | Forecasting |
| Black box | Transparency |
| Intuitive | Rational |
| Look-up table | EPM/CPM, Lands |
| Cherry picking | Measures |
| Expert judgements | Research |
| Exception | Rule |
| Loner | The mass |
| Stone in the pond | Undisturbed waters |
| Tipping points | Undisrupted development |
| Design | Planning |
| Visionair | Consolidator |

Table 1. Characteristics of wicked and tame

## 8.  Summarising thoughts

In order to summarise this paper several concluding thoughts may be presented here:

1. The new spatial law does not prevent long term planning, but is very suitable and encourages long term planning;

2. Development-planning is not the best solution to make regions climate proof;

3. Society is changing into a complex interactive exchange of values. This offers chances to initiate measures, which effect long-term developments, starting right now;

4. A large pool of genes, some simple rules and enlargement of trails is the start of changes on the long-term;

5. The genes of regions, the trails and the simple rules, which may be successful inturning a region into a climate-proof one are yet to be found;

6. The transportsystem, the sidewalk, the stranger and the city of our time is yet to be discovered;

7. Swarm planning (large pool), with a well-defined (simple) impulse (able to enlarges the trail) may be able to steer a region into the desired direction;

8. In order to incorporate long term planning in regular planning processes a wicked bypass is required, in which alternative planning methods are used.

# References

Adviescommissie Gebiesdontwikkeling (2005); Ontwikkel kracht!, Lysias Consulting Group B.V. Amersfoort

Bakas, A. (2005); Megatrends Nederland; Scriptum, Schiedam

Bakas, A. (2006); Megatrends Europe; Marshall Cavendish Business, Singapore

Bloemberg, J. (2005); De lange lijnen van de ruimtelijke ordening; presentatie provincie Groningen

Castells, M. (1995); The rise of the network society, 3 volumes; Oxford; Blackwell

Conklin, Jeff; "Dialog Mapping: An Approach for Wicked Problems," CogNexus Institute, 2003.

Conklin, Jeff; Wicked Problems & Social Complexity, Chapter 1 of Dialogue Mapping: Building Shared Understanding of Wicked Problems, Wiley, October 2006

Conklin, Jeff, Min Basadur, and GK Van Patter; Rethinking Wicked Problems: Unpacking Paradigms, Bridging Universes, Next Design Leadership Institute Journal, 2007

Dammers, E. (2000); Leren van de toekomst; Delft; Eburon

Dijk, A. van (2006); Ontwikkelen op niveau; Provincie Zuid-Holland, Den Haag

Dobbelsteen A. van den, Jansen S. & Timmeren A. van (2007); Naar een energiegestuurde Omgevingsplan Groningen (Towards an energy-steered regional design Groningen); TU Delft, Climate Design & Sustainability; Delft

Dobbelsteen, A. van den, Grinten B. van der & Timmeren A. van (2008); Energiepotentiestudie Almere Oost; TU Delft, Climate Design & Sustainability

Esselbrugge, M. (2003); openheid en geslotenheid: een kwestie van combineren; Delft; Eburon

Eye magazine (2007); 'De nieuwe economie draait om liefde'; interview met Martijn Aslander; Eye Magazine 11-2007

Florida, Richard (2005); The flight of the creative class, Harper Business

Geldof, G. (2002); Coping with complexity in integrated water-management, Universiteit Twente, Tauw

Geldof, G. (2008); Water scarcity and drought, presentation, No Regret-conference, 28 may 2008, Zeegse

Gladwell, M. (2000); The tipping point, Back bay books

Gore, A. (2006); 'An inconvenient truth'; Rodale

Greenfield, S. (2003); Yomorrow's people: how 21st century technology is changing the way we think

and feel; Penguin books Ltd.; London

Hajer, M. & Sijmons, D. (red.) (2006); Een plan dat werkt – ontwerp en politiek in de regionale plan-vorming; Rotterdam

Homan, T. (2005); Organisatiedynamica; Sdu uitgevers

Innovatienetwerk Groene Ruimte en Agrocluster, International Centre for Integral Studies & Ministerie van LNV (2002); Samenleving in transitie, een vernieuwend gezichtspunt; Den Haag; Innovatienetwerk Groene Ruimte en Agrocluster

IPO (2001); Van ordenen naar ontwikkelen; Den Haag, Interprovinciaal overleg

Jacobs, Dany and Rob Roggema (2005); term invented during searching conversation

Jacobs, Jane (1961); The death and life of great American cities; Random House, New York

Janssen-Jansen, L. (2004); Regio's uitgedaagd, 'growth management' ter inspiratie voor nieuwe paden van proactieve ruimtelijke planning, Koninklijke van Gorcum, Assen

Johnson, S. (2001); Emergence; Scribner; New York

Jonge J.M. de (2001); Meesters van de paradox; Blauwe Kamer, nr. 5 pp.23-33

Karelse van der Meer (2003); Urban design Blauwe Stad, Province of Groningen

Klaassen, A.W. (2000); Ruimtelijk beleid in theorie en praktijk; Den Haag; Elsevier/Samson

Koh, J. (2005); Ecological reasoning and Architectural Imagination, Uitgeverij Blauwdruk, Wageningen

Koomen, E.; Stillwell, J.; Bakema, A. and Scholten, HJ. (eds.) (2007) Modelling Land-use Change:

Power Concern (2007); Groningen Thinktank on energy issues, brainstorm, april 2007

Progress and Applications (GeoJournal Volume 90); Springer, Dordrecht

Mendini, Atelier Mendini (1994); Groninger Museum, Fabbri editori

Ministeries van EZ en VROM, Provincies Groningen, Friesland, Drenthe en Noord Holland, Samen-werkingsverband Noord Nederland (2007); Energieakkoord Noord Nederland

Mitchell Waldrop, M. (1994); The edge of chaos, About complex systems, Uitgeverij Contact

MVRDV, KCAP and Roggema R. (2001); Working City, Development Plan Working Locations, Almere Poort, Department of Urban development, Municipality of Almere

NRC Next (2007); 'Werken zonder uurtje-factuurtje'; In: NRC Next, 7 november 2007

Ridderstråle, J. and Nordström, K (2004); Karaoke capitalism, Pearson education limited

Rifkin, J. (2004); 'De waterstofeconomie'; Lemniscaat

Rittel, Horst, and Melvin Webber; "Dilemmas in a General Theory of Planning," pp. 155-169, Policy Sciences, Vol. 4, Elsevier Scientific Publishing Company, Inc., Amsterdam, 1973. [Reprinted in N. Cross (ed.), Developments in Design Methodology, J. Wiley & Sons, Chichester, 1984, pp. 135-144.]

Rittel, Horst; "Second Generation Design Methods," Interview in Design Methods Group, 5th Anniversary Report, DMG Occasional Paper 1, 1972, pp. 5-10. Reprinted in N. Cross (ed.), Developments in Design Methodology, J. Wiley & Sons, Chichester, 1984, pp. 317-327.

Roberts, Kevin (2005); Volkskrant

Roggema, R.E. (2005); 'Hansje Brinker, take your finger away'; Oxford Futures Forum

Roggema R., Dobbelsteen A. van den & Stegenga K. (eds.); Pallet of Possibilities – Spatial team, Grounds for Change, Bridging to the Future; Province of Groningen, 2006

Roggema R. & Dobbelsteen A. van den; Swarm planning - About how was becomes, paper Ravage of the Planet, WIT-Press, 2006

Roggema, R.E. and Dobbelsteen, A. van den, (2006); How was becomes, in: The management of natural resources, sustainable development and ecological hazards, The ravage of the planet; C. A. Brebbia et al. (edts); WIT Press

Roggema, R.E. and Huyink, W. (2007a) Atlas Groningen, Analytical document Environmental-Spatial plan - concept, Province of Groningen

Roggema R. (2007a); Terms of Reference and Project proposal Hotspot BSIK-Climate changes Spatial Planning, Climate proof regional design Groningen, Province of Groningen; Groningen

Roggema R. (2007b); Spatial impact of adaptation to climate chance in Groningen; Province of Groningen; Groningen

Roggema, R.E. (2007b); 'Climate proof regional design in the province of Groningen'; Presentatie congres Climate Changes Spatial Planning; Den Haag

Roggema, R.E. (2008a); Landschap 2.0; in: Roggema, R.E. (red.) Tegenhouden of meebewegen, adaptatie aan klimaatverandering en de ruimte; WEKA uitgeverij B.V.; Amsterdam

Roggema, R.E. (2008b); 'Swarm planning: a new design paradigm dealing with long term problems, like climate change'; in: 'Why Scenarios Fly, & how causal textures theory clarifies how they help address turbulent environments'; Earthscan (expected)

Roggema, R. (2008a); The benefits of swarm planning to cope with long-term developments,

Roggema, R. (2008b); Swarm planning: how complex systems approach improves the resiliency of regions to adapt to climate change, UKSS-international conference, 'Building resilience: Responses to a turbulent world, Oxford University

Roggema, R.E. (2008c); Swarm planning: a new design paradigm dealing with long term problems, like climate change; in: 'Business Planning in Turbulent Times; Rafael Ramirez, John W. Selsky and Kees van der heijden (eds.)'; Earthscan (expected)

Roggema, R. & Dobbelsteen A. van den (2008); Swarm planning: Development of a new panning paradigm, which improves the capacity of regional spatial systems to adapt to climate change; Sustainable Building Conference; Melbourne; Australia

Roo, G. de (2006); Understanding planning and complexity - a systems approach; AESOP-working group complexity and planning

Rooy, P. van, A. van Luin, E. Dil (2006); Nederland boven water, praktijkboek gebiedsontwikkeling, Habiforum

Ruimtelijk Planbureau (2004); Ontwikkelingsplanologie, lessen uit en voor de praktijk; NAi Uitgevers, Rotterdam

Schön, D.A. & Rein, M. (1994); Frame reflection; New York; Basic Books

Schoot, Mr. T.H.H.A. van der (2007a); Geconsolideerde wettekst Wro; Berghauser Pont Publishing

Schoot, Mr. T.H.H.A. van der (2007b); Nieuwe wetgeving ruimtelijke ordening, in theorie en praktijk; Berghauser Pont Publishing

Schotten CGJ, Velde RJ van de, Scholten HJ, Boersma WT, Hilferink M, Ransijn M, Zut R (1997); De Ruimtescanner, geïntegreerd ruimtelijk informatiesysteem voor de simulatie van toekomstig ruimtegebruik; RIVM rapport 711901002

Selfridge, O.G. (1959); Pandemonium: a paradigm for learning; in: Mechanisation of thought process. Proceedings of a symposium held at the National Physical Office in November 1958; Her Majesty's Stationary Office; London

Sijmons, D.F. (2002); De voldongen fictie; Archis, nr. 4. pp.71-77

Staatsblad van het Koninkrijk der Nederlanden (2006); Wet van 20 oktober 2006, houdende nieuwe regels omtrent de ruimtelijke ordening (Wet ruimtelijke ordening); jaargang 2006-566; kamerstuk 28916; Sdu Uitgevers; 's-Gravenhage, 2006

Stern Sir N. (2006); The economics of climate change

Taylor, John (1999); The race for conciousness; MIT Press; Cambridge, Mass. and London

Teisman, G.R. (1997); Sturen via creatieve concurrentie, Inaugurele rede Katholieke Universiteit Nijmegen; Nijmegen

Timmermans, W. (2004); Crises and innovation in sustainable city planning

Toffler, Alvin en Heidi (2006); 'Revolutionaire rijkdom, Hoe de nieuwe welvaart onze levens gaat veranderen'; Uitgeverij Contact

Vermunt, B. Aerts, N. en Woerkom, C. van (2003); Gebieden der wijzen, deel 2; Wageningen; Wageningen Universiteit

VROM, Ministerie van (2003); Van hindermacht naar ontwikkelkracht?; Den Haag; Ministerie van VROM

VROM, Ministerie van (2004); Nota Ruimte, Ruimte voor Ontwikkeling; den Haag, Ministerie van VROM

VROM-raad (2001); Kwaliteit in ontwikkeling; VROM-raad; Den Haag

VROM-raad (2004); Gereedschap voor ruimtelijke ontwikkelingspolitiek; VROM-raad; Den Haag

VROM-raad (2006); Slimmer investeren: advies over het besluitvormingsproces bij strategische rijksinvesteringen; Advies 057; VROM-raad; Den Haag

Witsen, P.P. (2006); Het rijk moet zich waarmaken in de regio; S7RO, 05 pp. 15-23

Wolfram S. (2002); A new kind of science; Wolfram Media

Wouden, R. van der, Luijten, A. (2006); De toekomst van de Nederlandse ruimtelijke ordening; S&RO, 05 pp.10-13

WRR (1998); Ruimtelijke ontwikkelingspolitiek; Rapporten aan de regering nr. 53; Den Haag; Sdu Uitgevers

WUR (2008); Climate adaptation in Groningen province; Master atelier Landscape Architecture; Wageningen

Zonneveld, W. (1991); Conceptvorming in de ruimtelijke planning; Amsterdam; Universiteit van Amsterdam