The governance of integrated regional development and the role of geographical information systems: Managing complex information relations between two different worlds

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1. Introduction

Urban and rural development can be seen as a governance challenge. The main challenge is to produce a common policy practice in which relevant actors (stakeholders) are able to create a shared understanding about the necessity of integrated development of a region as well as the content of the desired outcomes of this development. In the case of integrated regional development the exchange of geo-graphical and other information and knowledge between the actors involved is an important challenge in this process of co-production. Is it possible to create a common information domain, which is accessible for each of the actors involved and which can be seen as a shared information and knowledge reservoir. The creation of such a common information domain goes beyond the information domains of the actors which are involved in the planning process.

In the Netherlands several initiatives has been developed which try to create such a common, standardized nation wide geographical information domain (NGII), in terms of a nation wide geo graphical information infrastructure in which several projects can be discerned, like the digital exchange of urban an rural plans (DURP). The importance of such an infrastructure is that is that a common language is being provided in which basic and standardized definitions of geographical objects enhance the transparency and efficiency of urban and rural planning processes. Up till now the world of geographical information and geo-graphical information systems (GIS) could be seen as an archipelago of different approaches, definitions and systems, which frustrated the exchange and sharing of information and knowledge. One the one hand the creation of a standardized and open geo-graphical infrastructure could facilitate the regional development process, because the incentive for dysfunctional information politicking, in relation to the protection of specific interests and frames of reference has disappeared to some extent. One the other hand there is possible tension between the need for tailor-made, regional focused planning solutions and the standardized nature of these nation wide infrastructures. What does the emergence of a standardized nation wide geographical information infrastructure as well as the supply of information which will be generated by this infrastructure, imply for the process of co-production in local and regional (and thus contingent) planning practices and the information and knowledge needs which are expressed in the local practices by relevant stakeholders? What does this imply for the management of information relations in these local planning and regional development practices? Moreover, it is important to notice that the development and use of GIS and the practice of integrated regional planning are separate worlds, each with their own 'rules', rationalities and way

of communication, which up till now have difficulty in meeting each other. Based on two case studies we will try to answer the question, if these two worlds will meet each other and under which specific conditions.

2. Integrated urban and rural planning

If one looks at the Dutch theory and practice of urban and rural planning, one can observe a shift from a rather restrictive planning practice, based on command and control, towards a planning practice in which stakeholders through communication, negotiation and exchange develop a common planning practice. This can also be understood in terms of a shift from 'top down' towards a more 'bottom-up' approach of urban and region development.

Traditionally, in the Netherlands, urban and rural planning is being defined as a rather classical, top down planning process in which each of the formally involved and responsible layers of government develops a plan within the framework of conditions which have been laid down in a prior and superordinated planning document. On a central level, it is the Ministry of Housing, Urban Planning and Environmental Affairs, which defines the assumptions and headlines regarding the ways in which the available space in the Netherlands should be used, what kinds of spatial, traffic, economic, leisure and other function should be realized, and under which conditions . This is done in a central planning document (the so-called *Planologische Kernbeslissing*). Based on this document the provinces develop a regional planning document (the so-called S*treekplan*), while the municipalities develop their own plan, based on the conditions which are set in the regional planning document (the so-called *Bestemmingsplan*). The local urban and rural planning document plays an important role in the allowance of local building permits. This planning practice can be defined as hierarchical way of imposing a cascade of restrictions, in which each restriction is based on and derived from other restrictions, which in the end leads to the acceptance of the building or development plan.

At the same time there is a growing tension between the vertical, restrictive, quite static and rather one-dimensional (functional) planning approach of the way land should be used and the dynamic, multi-dimensional needs of citizens, companies, local and regional public authorities and real estate developers. Moreover, a growing cleavage has emerged between the contents of the urban and regional plans and the factual urban developments (Dammers et. al, 2004, Van Rooij e.a. 2004; WRR 1998).

This has led to another approach of urban and rural planning, which tries to anticipate on the multi-dimensional and dynamic nature of urban and rural development, which is primarily defined as a 'governance' challenge. The main test is to produce a common policy practice in which relevant actors (stakeholders) are able to create a shared understanding about the necessity of integrated regional development as well as the content of the development. These actors do not only represent different interests and frame of references, but they also operate within several (public, private or semi-public) domains and functional and territorial layers of government. In this, more developmental planning approach, it is important that stakeholders actually and substantially participate in the development and implementation of plans and the arrangements for co-operation are being established. Looking at the practice of this approach five characteristics can be distinguished:

- the need for a rather robust planning concept, which sets a horizon for the desired development of an area, but at the same time is flexible enough to react and anticipate on all kinds of economic, social, demographic developments and its spatial effects;
- many developments take place and the level of a region, which is a scale that can be located between the level of the municipalities and the level of the provinces. That's why a regional focus should prevail in rural planning, which actually takes into account the specific regional conditions and developments. Up till now the regional level as an independent planning level has not been recognized in the formal practice of Dutch rural planning;
- it has an open character, which implies that a lot of discretion has been given to the participating actors to give them actually influence in the way a region should be developed;
- This open character also implies room for innovation through competing design perspectives, which can be seen as the expression of the multiple meanings that different actors with different interests and frames of reference attach to way land can be the used;
- a strong focus on implementation, because implementation conditions (in terms of investments, allocation of costs and benefits in relation to the provision of a business case) play an important role in the definition of successful regional projects.

An important issue in regional development is the sharing of information and knowledge between the stakeholders which are involved in these open planning processes and in the negotiation, communication and co-operation processes which take place between them.

3. The creation of common information domain

One of resources that actors can strategically deploy in order to protect or to advocate specific interests in complex negotiation and communication process which are focused on the organization of collective action, is the control of the access to and the distribution of information and knowledge, the (definition of the) use of ICT in order to gather, distribute, share and process information and knowledge, and the definition and control of the information relations between them. (Pfeffer & Salancik, 1978).

In the case of integrated regional development the exchange of geo-graphical and other information and knowledge between the actors involved is an important bottleneck in the process of co-production. A major challenge in integrated regional development is the creation of a common information domain, that is accessible for each of the actors involved. It can be seen as a shared information and knowledge reservoir. In the Netherlands several initiatives has been developed which try to create a common, standardized nation wide information domain, in terms of a nation wide geo graphical information infrastructure (National Geographical Information-infrastructure, which called NGII) in which several projects can be discerned, like the digital exchange of urban an rural plans (DURP).

The importance of such an infrastructure is that is that a common language is being provided in which basic and standardized definitions of geographical objects enhance the transparency and efficiency of urban and rural planning process. This facilitates the exchange and disclosure of geo-graphical information between relevant parties. Moreover, such a standardization process – which increasingly takes place at the European level - can also stimulate further innovation in geo-services and products, because suppliers and users of these services and products share the same 'playing rules'. Up till now the world of geo-graphical information and GIS could be seen as an archipelago of different approaches, definitions and systems, which frustrated the exchange and sharing of information and knowledge.

From an information of computer science perspective an information infrastructure can be described as a set rather generic and permanent provisions which facilitate the collection, retrieval, transport, processing and distribution of information in order to support specific functions and processes, like the development and implementation of an regional plan. These provisions often refer to a) technical provisions, like hard and software, b) data- and knowledge sets c) exchange procedures, norms, standards and other playing rules, and d) the organization of the maintenance of the information and information systems(Bemelmans, 1994; Matthijsse, 2003). From a more public management perspective an information infrastructure can be

described as a set of agreements that enables the sharing and exchange of information and knowledge. These agreements can have political-administrative (referring to the distribution of tasks, responsibilities and competences), legal (e.g. the legal status of information and privacy), economic (distribution costs and benefits), technological (all kinds of technological provisions) nature which all are necessary to share and exchange information.

Moreover, the development of an information infrastructure can be described as the development of a common information domain, in which an information infrastructure fulfills several functions:

- it integrates process and functions through the established of a common organization of the information which is needed for all the parties involved;
- it standardizes the content and the exchange of information through the development of (automated) formalized rules;
- it prescripts how existing and new information should be gathered, exchanged and processed;
- it governs the development of a common rules and the shared organization of information;
- it facilitates communication, because it provides a common 'language' or 'grammar' which enables the definition and interpretation of information.

If one looks at these functions, one can understand the political nature of the way in which information and of information and communication technology is being deployed. Two arguments underline this observation.

The first one is based on the fact that information and ICT are important resources which define the domain of an organization. An information domain is a unique sphere of influence, ownership and control over information – its specification, format, exploitation and interpretation (Bellamy & Taylor, 1998). An information domain can be said to exist where significant control over access has been established, so that information is withheld or surrendered on terms, or in a form, negotiated by dominant actors. Thus, the existence of an information domain is signalled by a) a break in flows of information, b) compartmentalisation of information resources, c) idiosyncrasy of information specifications and d) the hegemony of specific discourses that shape information and influence in its creation and interpretation (Bellamy, 1998).

The introduction of a nation wide geographical information infrastructure implies that established information domains are being challenged. The boundaries between them begin to

blur, or even new domains emerge, which can lead to a complex mixture of conflict and cooperation (Kumar & Van Dissel, 1996; Bekkers, 1998; Homburg, 1998). According to the resource dependency-theory, the strategic behaviour of organizations, in terms of conflict, competition, exchange, negotiation and co-operation, can be understood in terms of, how these stakeholders perceive the nature and degree of the uncertainties and dependencies which resolve from a more intensive and coordinated exchange of information between them (Pfeffer & Salancik, 1978). They are willing to set up information systems that cross organizational boundaries, if they are able to minimise their dependency on other organizations or are to maximise the dependence of other organizations on them (Beynon-Davies, 1994; Bekkers, 1998). This will lead to shifts in power, even may even result in organizations losing their reasons to exist (Kumar & van Dissel, 1996; Dawes, 1996; Bellamy, 1998) Therefore, the development of an information infrastructure in terms of integration and standardization should be understood in terms of 'information politicking' (Knights & Murray, 1992; Davenport, Eccles & Prusak, 1992).

The second argument is that the standardization of information processing procedures and content of information can destroy local and functional variety. Computerization presupposes standardization and formalization of the content of data format and data processing and exchange procedures (Frissen, 1989). Moreover, the efficiency advantages which standardization can provide also presupposes uniformity. This does not only lead to shifts in power, but it can also challenge culturally or professionally accepted procedures that may not be given up easily (Kumar & van Dissel, 1996). From an institutional point of view established 'rules' are being challenged and replaced by other ones, which are 'not invented here' (Kling, 1987). By rules March & Olsen (1989) mean the routines, procedures, conventions, roles, strategies, organizational forms and technologies around which political activity is constructed. They also view the beliefs, the myths, paradigms, codes, cultures and knowledge that surround, support, elaborate or contradict these roles and routines, as expression of the rules (March & Olsen, 1989). These 'rules' function as a shared frame of reference within an organization or within a policy sector which reduces ambiguity (Weick, 1969), but at the same time the introduction of new rules imply that other meanings and other practices will be introduced that can be understood as a possible threat for the established practices and meanings. Not only integrated regional planning is such new practice, but also the use of GIS.

4. Coproducing the Blue City and the exchange of geographical information

In this section we will describe how the world of developmental regional planning (the world of policy-makers), in which concerted and tailor-made solutions are being explored through communication, negotiation and exchange, tries to meet the world in which information analysts and computer scientist tries to produce standardized computer-based geographical information. The meeting place is the development of a specific region in the Groningen, one of the provinces in the north of the Netherlands. First, we will describe the main characteristics of the Blue City project. Second, we will describe how the main actors who were involved in this project, assessed the role and meaning of geographical information, produced by GIS.

4.1 The Blue City project

In the north of Groningen lies the territory of the so-called Blue City which is about 40.000 ha. In this territory a lake should be excavated of 8 km², around which new nature reserves, recreation areas and housing locations should be realized. The building of the houses should generate the money for the development of the lake and the nature reserves. The economic and social problems of the region, with fallow agricultural areas, high unemployment, a low average income, the migration of younger people to the city, a strong growing number of eldery people, decline of shops and other private and public facilities, like public traffic provisions, were an important reason to revitalize the region, based on an integrated approach of the regional problems. The idea was that a large lake, surrounded by nature and housing areas, could attract new people and business. Since 1992 several sketches, based on analysis of the situation, have been made in which the contours of the idea has been worked out in all kinds of imaginative sketches, which were integrated. On the basis of these sketches global ideas were work out in competitive, more detailed plans – based on different perspectives and views on the desired development of the region and specific areas in this region. They were subjected to an open debate with relevant stakeholders that also lead to a number of adjustments. Later on these plan, which could count on consensus, were integrated in the regional plan of the province of Groningen and in all kinds of local urban and rural plan of the municipalities which were involved in the Blue City project. The legal planning process was seen as a way to codify the emerged consensus.

4.2 Assessing the role of geographical information technology

If we look at the role of geographical information and GIS in this project some interesting observations can be made.

Geographical information in combination with other policy information (like economic prognoses and residence information) has plaid an important role in the early development of the plan. In the beginning of the project there was a rather broad and generic need for information about the kind of economic activities which have been taken place, economic prognoses, specific characteristics of parcels, resident and income distribution information, soil and water information and altitudes. This was needed to get a better insight in the specific conditions of the region.

Later on, during the more detailed design and the planning of facilities, geo-information has plaid a limited role. Primarily it was used to test and to legitimise afterwards the design decisions which were made and the (wanted and unwanted) effects which emerge from these decisions. Geographical information has primarily not been used as input for the design process. A too detailed image of the region, based on geographical information, was perceived by town and country planners as a possible threat to their creativity, because it would impose all kinds of limitations. Due to this attitude, town and country planners did sometimes present sketches which were not always realistic. In one case an architect was not aware of the presence of a number of legal-ecological limitations which protected the specific characteristics of an area in which he located a new housing complex.

During this development process parties did not consciously consider what kind of information they need to have. There was no deliberate information search process. There was an emergent and incremental information search strategy, based on 'trial and error' which followed the interactions which took place during the development of the plan. One problem was that it was not always clear where to find specific information, what the quality of the information was (e.g. a lot of data was out-dated and incomplete), and if the information was accessible it was not always clear how it could be exchanged with other organizations. So the lacking quality of the (organization of the) information which was needed for the integral development of the plan, has contributed to a rather time-consuming process of the gathering and processing of information.

However, there is one example in which geographical information has plaid an important role as an intended input resource for the design process. One part of the region is protected by

the so-called Ecological Structure Plan. Town and country planners, civil engineers, representatives and experts of the Regional Water Board, the province of Groningen and the municipalities in this area as well the National Forest Agency had to develop a plan for this area which could respect the ecological importance of the area as well as to combine it with other relevant economic and social activities and interest. In advance a common information set was provided to all parties involved (like information about altitudes, about the composition of the soil and water management information). This contributed to the quality and the speed of the design process, because it contributed to realistic design alternatives. The emerging debate was more focussed on the assessment of effects of possible design alternatives, which improved the quality of the feedback in the design process and the supplementary dialogue between relevant stakeholders.

Another important observation has been that, once there was consensus about a design and it should be further operationalized in order to meet a number of administrative and legal requirements and obligations, the need for more detailed information grew exponentially. The information which was provided by the databases that have been used for the drafting of the broad sketches for the development of region, could not be used. In many cases additional research took place, focussing on presenting a rather integrated and detailed picture of a specific parcel within an area. This was also necessary in order to meet a legal obligation (the so-called MER-obligation). In advance an integrated assessment of possible desired and undesired effects of measures to be taken should be made. For instance, in order to assess the hydrological effects of specific interventions in the landscape, it was necessary to have very detailed soil profiles, so one could assess what kind of water management measures should be taken to handle these unwanted effects. It took a lot of time to gather the needed information.

4.3. Conclusion

The main conclusion is that the development of an integrated regional plan is not based on the adding of relevant information and information sources. During the drafting of the plan complex communication and negotiation processes take place in which geographical information and GIS have not been systematically used as inputs for the design process. In many cases, this information has been considered argumentations to legitimise ex post the decisions that have already been made. However, in those case in which it is seriously being regarded as an important input source, at the beginning of the design process, it has contributed to a better and faster

design process because it facilitated a collective learning and co-operation process. Moreover, we observe that designers, like town and country planners and civil engineers, perceive detailed information about the region as a threat for their own creativity. On the other hand this has led to situations in which they have worked with wrong design assumptions, so that they have to return to the drawing table. However, if geographical information is being used as input for the design process, it is important that the quality of the information is high, that the information can be trusted and can be made accessible, and that it is possible to 'zoom in' in order to provide more detailed information.

5. DURP: The digital exchange of urban plan

In the previous section we looked at how parties that are involved in the co-production of regional development plan assess the importance of geographical information and GIS. Demand and supply of information has been primarily viewed from the position of the user. In this section we use another perspective. We start from a supply side perspective by looking at the DURP-project: a project that is aiming a digital exchange of the town plan, and that has an important legal status in the relationships between municipalities, provinces and central government. How does such a rather 'technology pushed' project contribute to the meeting of the two worlds we have described in the previous section?

5.1 The DURP-project

The aim of DURP is that public and private organizations are able to make a better use of geographical information through the digitisation of the urban planning document and the electronic exchange of these plans between them. This digital exchangeable urban plan consists of, a) a digital map which contains formalized objects to which specific attributes can be given, b) the map is based on the existing national system of co-ordinates c) the legal rules and regulations, which are applicable and possible explanations should also be presented in a digital form, d) the exchange of the plans is based on existing norms and codes which are based on a nation wide infrastructure for the exchange of geographical information, in which internationally exchange standards become more and more important and e) it should also be possible to couple

administrative information to the object which are represented by the map. Organizations are not forced to make use of the DURP system. DURP has been implemented on a voluntary basis.

5.2 Assessing the role of geo-graphical information systems

How do parties assess the contribution of these digital exchangeable plans to the practice of urban planning? Some observations can be put forward, based on a number of in depth interviews, which has been carried out.

Up till now DURP can be defined as a rather technological project in which the emphasis has been laid on the formulation of a technological and information requirements and agreements. An advantage is that it has not been perceived a possible threat to the existing interests and frames of references of stakeholders in planning processes. DURP has been primarily considered as a tool which is only of use to the work floor of the planning department of municipality or province; a tool which is seen as primarily automating existing exchange procedures. It has not been perceived as a tool that is also important in relation to strategic urban and rural planning and policymaking. Hence, the political-administrative embedded ness of the project is not been strong. A major challenge for the survival of DURP is that is should be able to connect itself to relevant policy themes at a local and regional level (like external safety, integrated regional development, water management) and show what the added value of DURP is. This implies that in the further development of DURP it is necessary to anticipate on the policy needs of policy makers and planning professionals. Up till now DURP has been too much an ICT-project, while the real users have been, to some extent, neglected in the project.

At the same time we observe that DURP is more than the automation of exchange procedures. Nation wide exchange of geographical information also presupposes that there is a common language that enables people to attach a common meaning to a map and destinations i.e. objects that are being made visible by the map. If this not the case, if objects are multi-interpretable, a map cannot be read. Understanding the meaning of an object implies e.g. uniformity of the colours which have been given to these destinations on the map, the name-giving of the destination and the planning code which relate to the object and the way objects should be graphically being presented. Professionals, like architects, town and country planners are afraid of this process of standardization which takes place, because they see it as a threat to their own discretion and professional creativity. Especially the way in which colours can be given to specific objects has been perceived as a sensitive issue. Potentially, each architectural firm can choose its own colours to give a specific meaning to an object, but also municipalities have this

freedom. So within one region, municipalities, designers and planners use different colours to attach specific meanings to a specific object, while each the description of an object also can differ. Integrated regional development implies also integration of colours and the name giving of object.

Although this process of standardization has been perceived as a threat to the discretion of the professionals involved, which could negatively influence their creativity, it could have an important added value for the process of integrated regional development. Up till now the emphasis in DURP has been put on the standardization of the exchange of the plan between a vertical chain of layers of government. If we look at the emerging practice of developmental planning the emphasis should shift from an orientation on exchanging plans towards the creation of a basic common language which is understandable and compatible for each of the organizations involved, thereby recognizing the network and open character of developmental regional planning in which there is an ongoing process of inclusion and exclusion of actors, interests and views. This process of in- and exclusion within a policy network of integrated regional planning can be facilitated if all the parties involved shared a minimum of standardized definitions of what a destination or object is.

DURP is a program in which agreements are formulated on a central level between the associations of the municipalities, provinces, water boards, the involved ministries and the professional associations of architects and town and country planners. At the same time the decisions that have been made at this central level, need to be translated to the local and regional level, because the actual exchange of digital plans takes place on this level. At the same time we observe that this translation not always work well. Regional planning practice require tailor-made translation of the agreements which have been made at the central level. In Gelderland, the province has worked an agreement with the twelve municipalities and town and country planning firms to develop plans which are DURP- proof in order to gather information and knowledge about the way in which the central DURP-arrangements can be translated in a tailor-made way which recognizes the local and regional circumstances. This enables municipalities and country planners, which have been involved in integrated regional development, to develop a 'local language' within the framework of the general language of DURP.

Another factor that can frustrate the penetration of DURP in integrated regional planning is the perceived unequal distribution of costs and benefits among the participating organizations. Especially municipalities have the idea that they have to invest in the digital exchange of urban and rural plans, and thus have to make costs in terms in investing in new technologies, the redesign of all kinds of procedures and routines, while provinces have most of the benefits.

Moreover, for them it is rather easy to distribute digitally mastered plans. This can prohibit the optimal use of DURP in regional planning.

5.3. Conclusion

The DURP project has been defined as an important trigger to stimulate geo-graphical information systems in urban and rural planning. A common grammar has been presented which could facilitate the communication and negotiation processes in integrated regional planning. At the same time this grammar presupposes uniformity that can be perceived as a threat for the discretion of the professionals involved while at the same time, it can facilitate a smoother process of in- and exclusion of parties in the policy network of integrated regional development. Moreover, it is important to show that DURP has real added value for the specific needs of policy makers and planner and that is not a 'technology driven' project.

6. Conclusions and recommendations

Geographical information and GIS can play an important role in integrated regional planning, but at the same time both case studies show that the GIS-world and the urban and rural planning world are rather separated worlds. GIS can provide a 'common grammar' to all kinds of stakeholders which are involved in the creation of shared frame of reference about regional integrated developments, while at the same time, this common grammar presupposes a process of standardization which challenges the discretion and professional autonomy of the actors involved, but at the same time could improve the quality the data which could be used and the accessibility of geographical information. Moreover GIS can contribute to the transparency of a region by the possibility to couple different kinds of geographical information sources and other, more administrative information. Planners can get a better insight in the characteristics and dynamics of region.

Based on our research we will formulate a number of recommendations which can bridge the distance between the world of the GIS-system developers and the world of regional planning. First, it is important in the development of GIS to make a more clear distinction between the provisions at the central and regional level. At the central level, rather 'lean and mean' provisions

should be focussed on the disclosure of rather robust geographical data sets, how they can be exchanged and how they can be coupled, according to national and international standards. The emphasis lies on information management. Working with these rather robust data sets will create the possibility that local variety and local knowledge will not be destroyed. There will be still some discretion left to the professional planners that are perceived as a necessary condition to be creative.

The development of GIS-application on the regional level should primarily focus on knowledge management, which tries to facilitate common learning process between the actors involved and tries to mobilize local intelligence. GIS-services should be focussed on the provision of rather advanced information processing and analysing applications that can also help to visualize views and the effects of specific design decisions. Up till the emphasis has been to much on GIS as an information input source in order to assess the status of an area, and not on GIS as tools which facilitate the communication and the exchange of thoughts and views between the parties involved, and thus the process of co-operation between them Such a shift in orientation will also contribute to a better connection to the local and regional political and policy agenda.

In order to strengthen the regional level, one could set up regional knowledge centres for GIS-services, especially in relation to integrated regional planning projects. In these centres experts from the private and public sector work together in order to assess which information and knowledge needs should be satisfied in order to facilitate a better insight in the characteristics and dynamics of a region, the communication process between relevant actors in order to develop different views on the desired development of the region as well as what kind of GIS-services should be used.

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