Integrated Approaches in Digital / Interactive Landscape Planning

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Abstract

A future challenge of comprehensive environmental planning is to integrate digital information technology into environmental planning processes by matching the present technological capabilities to the specific requirements and tasks of the different planning phases. Web 2.0 technologies hold the potential for supporting landscape planning tasks such as scoping, landscape analysis, assessment, planning concept, assigning objectives and measures, implementation concept, implementation support, continuing update and monitoring. Application fields of crowd sourcing, social media / networks and scenario techniques / Geodesign are discussed and recommendations are made for deciding which E-tools best fulfil the interactive functions requested in the planning process.

1   Introduction

In the light of growing conflicts around controversial urban planning projects (e.g., 'Stuttgart 21', RUCHT 2012; 'Gezi Park Istanbul', BEZMEZ 2013) and increased land-use competition in some rural areas, the challenge remains to identify requirements for participation in planning and to determine how they can be achieved. Planning that involves participation falls into two categories: project-related planning and conceptual planning. First, planning that prepares projects, e.g., for urban or infrastructure development, seeks to gain acceptance for planned changes. Second, conceptual planning sets a framework (development options and limits) for future development, e.g., precautionary environmental planning which includes landscape planning. For both types of planning, participation is hampered by people's lack of self-motivation to become involved in an early state of planning. Many people engage in participation only if and when they feel personally affected. The challenge for participation in planning is to inform, activate and motivate citizens to engage in issues of the planning process before specific measures or projects reach formal levels of decision making. When citizens are confronted with final planning proposals through official public announcements in the local newspapers or other media without being involved, their motivation often turns negative. If citizens are affected directly by planning without participation in the decisions, they generally oppose or even launch self-protection or defensive initiatives to illustrate their objections to the planned

changes (HÄUßERMANN 2009). These NIMBY- or LULU-phenomena (acronyms of 'Not in my backyard' and 'Locally unwanted land use') hinder a constructive planning process once they have been provoked (SCHIVELY 2007). Often planners are surprised by citizens' protests and their arguments because they have had no information about how citizens value their environment. Information and communication came too late in these cases and opportunities for a constructive, well-informed discourse were forfeited. Furthermore, citizens are left in passive role and the resources they offer (ideas, engagement etc.) remained untapped (FÜRST & SCHOLLES 2008).

A major challenge for precautionary landscape planning is to activate citizen to participate even when there is no concrete project that threatens their quality of life. Until now the information generated and presented in landscape planning has primarily targeted experts in administrations and NGOs. Despite the attempts to help the public to understand planning proposals with landscape simulations and other features to support lay people in the planning process (as in the research project `Interactive Landscape Plan Königslutter am Elm´, HAAREN et al. 2005; HAAREN & WARREN-KRETZSCHMAR 2006), the fact remains that landscape planning has focused on general services and values for human well-being and not on the individual interests of people. Landscape planning must begin to include and explain the ecosystem services and benefits that individuals derive from the landscape. In this way, it can foster people's awareness of what the landscape holds for them personally instead of focusing on impacts of an individual project. In addition, this could lead to involving citizens in proactive environmental planning and to initiating social discourse about the benefits and values of the landscape on the local scale. Furthermore, such a focus in landscape planning would prepare citizens for a qualified and well-informed participation in planning development projects.

If citizens can contribute to decisions about the objectives of future landscape and urban development, then they are more likely to willingly accompany the planning process and to support the objectives and their implementation in practice. In fact, if citizens can have a say in the solution of an environmental problem, they are even more likely to change their own behaviour (CORBETT 2006). Finally, conflicts may be managed more effectively if they are addressed within generally accepted procedures instead of a confrontational public debate.

These considerations are reflected in the concept of open government (BEUS 2010; KUBICEK 2010; BRÜGGEMEIER et al. 2006; LUCKE & REINERMANN 2000) and its principles of transparency and citizen involvement, in which individual concerns and interests can be expressed in participatory discourse. This requires open and transparent communication, which is the strength of new media approaches.

Information technology increasingly offers opportunities to involve citizens in data collection and to integrate their knowledge in valuation of the landscape, as well as to develop ideas and visions (DAWES 2008; KUBICEK 2010; ROGGENDORF & HERRMANN 2008). Apps for mobile devices provide new opportunities to access and involve public users. Attempts have been made to activate citizens' interest in landscape planning and environmental protection by using different methods of landscape visualization (WARREN-KRETZSCHMAR 2011). Today landscape planning uses GIS based data management and web-based interactive communication with public and private parties. For example, two- and three-dimensional interactive visualization generated from geodata are made accessible on the internet

by implementing map server solutions or with virtual reality 3D-tools (e.g., http://overmorgeninbeeld.nl/nl/geslaagde-premiere-in-duitsland). Furthermore, web-based commentary functions provide feedback during the planning process (e.g., landscape programme of Bremen). Participation tools allow georeferenced comments that are summarizing in tabular form and provide for automated response from the responsible authority (e.g., regional plan for the Region of Brunswick, SCHULZE-WOLF & MENZEL 2007). However, emerging IT solutions hold much more potential and many opportunities to explore and systematically integrate peoples' individual interests into the landscape planning process.

Especially the role of new forms of communication and interaction with the public, e.g., crowd sourcing, social media / Web 2.0 in planning requires more investigation. Not only do the new technologies need to be tested, but also opportunities for interactive and collaborative planning within the institutional framework of the planning process (administrative and legal requirements) need to be identified. Some of the challenges of integrating new interactive approaches include information overload, rising costs caused by additional administrative expense and increased need for data maintenance and storage (this includes standardizing meta data, e.g., INSPIRE). Furthermore, these opportunities should satisfy the demands of the public and stakeholders who wish to participate in the process (i.e., to get informed early in the process, opportunities to contribute their knowledge, opinion and to collaborate). The challenge is to bridge the gap between the formal, procedural and technical requirements of planning with the dynamics of interactive web-based participation functions and the quickly changing digital world / the www as well as the expectations of web-users.

The objectives of this paper are: (i) to develop a structure of information and participation functions that either are required during the different phases of the landscape planning process or offer the opportunity to engage individual citizen's interest in the environment; and (ii) to identify which communication functions can be supported by various E-tools (electronic interactive planning tools, IT solutions and software for internet or mobile devices). Emphasis is laid on new approaches such as crowd sourcing, social media / networks as well as scenario and Geodesign techniques.

Methodologically, the study is based on an analysis of the current literature about interactive landscape planning. More specifically, the literature analysis focused on the requirements and contents of landscape planning in Europe and in particular in Germany as well as the present technical opportunities of the new media. Furthermore, the study examined the interactive tools that were tested in the Interactive Landscape Plan Königslutter (HAAREN & WARREN-KRETZSCHMAR 2006) as to how up-to-date they have remained. To assess this, planners were surveyed and questioned in focus groups about their experience with interactive planning tools, and the use of new media in currently available web-based landscape plans was reviewed.

In a first step, we introduce landscape planning as a comprehensive and interactive planning process, describe the planning process, identify its information and participation functionalities, and extrapolate requirements for web-based interaction / collaborative planning. In a further step we present examples of E-tools and their application in the phases of landscape planning. Third, deficits and opportunities of interactive web-based landscape (and environmental) planning are discussed and recommendations are made.

2   Requirements and Options for Open Government in the Field of Landscape Planning

Public involvement

Decisions in environmental planning must be supported by public participation and the environmental information must be accessible (UN/ECE Aarhus convention). This right to environmental information is implemented in European (Directive 2003/35/EC, Directive 2003/4/EC) and German national law (Umweltinformations-, Öffentlichkeitsbeteiligungs-gesetz), and it is established in administrative procedures. Legal minimum standards regulate the participation of various authorities and the public and they lay down (formal) participation procedures (FÜRST & SCHOLLES 2008; for environmental planning in a broad perspective: grounded in e.g., Water Framework Directive, Directive on Strategic Environmental Assessment, Environmental Impact Assessment Directive, German Federal Building Code). However, in Germany public participation in landscape planning is not mandatory. Nevertheless, participation is usually standard in the planning process, although often restricted to a few meetings covered by the fee agreement between planner and local or regionnal authorities.

Participative planning addresses a range of non-government related persons or organisations – e.g., stakeholders, key persons / actors, affected persons or interested citizens, environmental groups, citizens' initiatives, bodies with a statutory consultative role (HAAREN & GALLER 2012). Their roles vary greatly in the planning process because they have different institutional and organizational backgrounds as well as different understandings of environmental information and different accesses to a technical infrastructure. Thus, they may require different opportunities to participate.
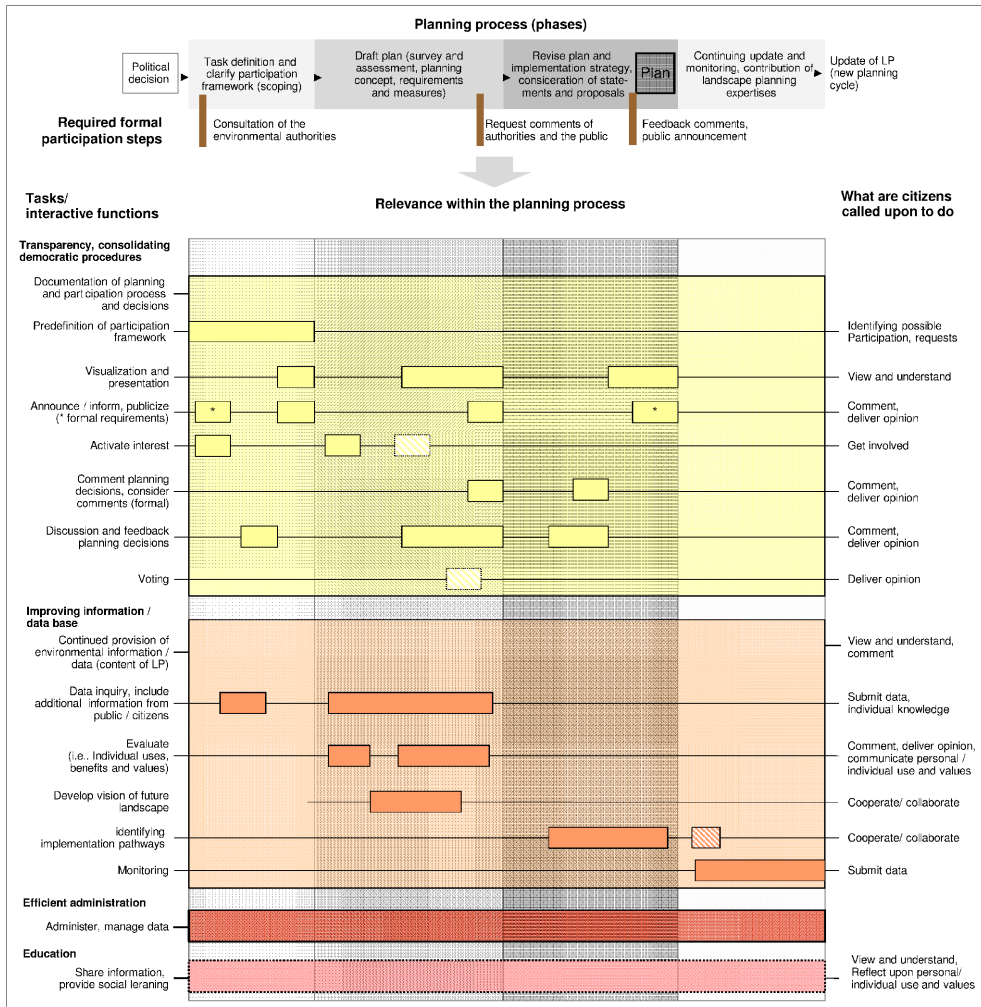
Additionally, landscape planning requires coordination within the government and collaboration of experts located in different administrative units and authorities. This is due to the fact that environmental planning decisions incorporate scientific knowledge, accepted methodologies and comprehensive information from a wide variety of sources (HAAREN 2004; JESSEL & TOBIAS 2002). Furthermore, landscape planning is a cross-sectoral planning that makes recommendations about sustainable development not only for the nature conservation authorities but also for other sector-administrations (HAAREN & GALLER 2012).

In light of these legal and operational requirements of landscape planning, successful online communication and collaboration must not only activate citizens but also adhere to these requirements. Such a system must: (i) Incorporate and integrate established administrative procedures. (ii) Tailor information and access to the needs of specific groups. (iii) Make background environmental information available.

Interactive functions within the planning process

Although landscape planning is an iterative process, it has distinct phases. In each planning phase specific interactive functions should be included (see figure 1). They support different landscape planning tasks that follow general objectives, in particular transparency, consolidating democratic procedures, improving environmental information base and education.

- **Scoping:** Following the example of environmental impact assessment, the planning process starts with a scoping (see figure 1) to define the planning issues, identify recent problems and determine the assessment framework. Public agencies, environmental associations and citizens are requested to contribute information and ideas for the landscape plan. In this way, planners and responsible authorities can ensure that the plan will focus on current and pressing issues. Furthermore, the scoping helps to provide a framework for the participation within the planning process (who, when, how, influences in decision-making / possible codecisions). This initial step should be implemented in planning practice to clearly frame the options / opportunities and the ways public will be involved in the planning and decision-making process (STATE MINISTRY BADEN-WÜRTTEMBERG 2013). E-tools with interactive functions such as a web discussion platform can complement face-to-face discussions, for example, in town hall meetings. They should be integrated in this initial phase of the process to activate citizens and NGOs to contribute their views and local knowledge in the planning.

- **Landscape analysis, assessment:** Landscape planning is based on digital environmental information about the status quo, historical status and forecasts of the prospective state of the environment. Various public (and private) authorities maintain these data (GALLER & GNEST, 2011). Database portals (e.g., the German Environmental Portal U, www.portalu.de/kartendienste) interface these data about the landscape partly. Furthermore, non-governmental organizations or citizens can provide additional data (e.g., additional species assessments, ARDINI). The relevant information must be consolidated and processed for case-related analyses. Furthermore, the landscape planning process requires that the content of the landscape planning process, as well as the landscape plan, be documented and made accessible to the public. These requirements are achieved preferably with a web-based information system that offers interactive functions for information exchange and integration of user-based values about the landscape (georeferenced preferences / feedback).

- **Development / planning concept, assigning objectives and measures:** To a limited degree landscape planning allows for alternatives in the specification of nature conservation objectives and their resulting spatial and thematic prioritization. Citizens and local actors can and should be involved in decisions about alternative objectives and measures. For this, feedback functions as well as interactive scenario development and visioning provide important tools for collaborative planning.

- **Implementation concept and implementation support:** Politicians, together with actors and the public, should draw up a political agreement on priorities in terms of objectives and timing of environmental measures (that are recommended in the expertise of the landscape plan). This is the basis for an implementation strategy. In this planning phase interactive functions need to be included that allow involvement and feedback of relevant parties.

- **Continuing update and monitoring:** Increasingly, environmental monitoring plays an important role in ensuring the targeted outcomes of the landscape plan. Crowd-sourcing functions offer inexpensive opportunity to survey and monitor the landscape and its development.

Planning process (phases)

Political decision → Task definition and clarify participation framework (scoping) → Draft plan (survey and assessment, planning concept, requirements and measures) → Revise plan and implementation strategy, consiceration of statements and proposals → Plan → Continuing update and monitoring, contribution of landscape planning expertises → Update of LP (new planning cycle)

Required formal participation steps

Consultation of the environmental authorities | Request comments of authorities and the public | Feedback comments, public announcement

Relevance within the planning process

Tasks / interactive functions — **What are citizens called upon to do**

Transparency, consolidating democratic procedures

Documentation of planning and participation process and decisions

Predefinition of participation framework — Identifying possible Participation, requests

Visualization and presentation — View and understand

Announce / inform, publicize (* formal requirements) — Comment, deliver opinion

Activate interest — Get involved

Comment planning decisions, consider comments (formal) — Comment, deliver opinion

Discussion and feedback planning decisions — Comment, deliver opinion

Voting — Deliver opinion

Improving information / data base

Continued provision of environmental information / data (content of LP) — View and understand, comment

Data inquiry, include additional information from public / citizens — Submit data, individual knowledge

Evaluate (i.e., Individual uses, benefits and values) — Comment, deliver opinion, communicate personal / individual use and values

Develop vision of future landscape — Cooperate / collaborate

identifying implementation pathways — Cooperate / collaborate

Monitoring — Submit data

Efficient administration

Administer, manage data

Education

Share information, provide social learning — View and understand, Reflect upon personal / individual use and values

Fig. 1: The landscape planning process is closely linked to interactive functions that respond to the requirements of the addressees.

Participating parties have different requirements on interactive functions. For example, public agencies must respond to planning proposals with a formally documented comment, e.g., written comments, while citizens may respond more informally. In order to decide which E-tools best fulfil the interactive functions the following criteria should be considered: (i) phase of the planning, (ii) addressees / respective target group / actors involved, (iii) institutional background / procedural requirements (formal or informal participation), (iv) pursued outcome for addressees, (v) pursued feedback, respectively input for the planning process.

An array of E-tools and applications that offer the interactive functions are available to support landscape planning tasks (table 1). Many are already employed in landscape planning

while new applications, especially new approaches based on Web 2.0 technology, remain untested.

Table 1: E-tools that support the tasks and functions in the landscape planning (grouped along overall objectives); for references of good practice examples see footnotes at the end.

Task of landscape planning	Web 1.0 (Websites + Email)	webGIS	Scenario Planning Software	Crowd Sourcing Apps	Augmented Reality	Visualization	Virtual Globes	Discussion groups	Social Networks	Votings, Polls	E-file (www)	Good practice
Transparency												
Predefinition of participation framework								X	X	X		
Scope of the assessment framework	X			X				X				
Continuing supply of environmental information/ data (content of LP)		X		X			X				X	Portal U - Environmental Portal Germany[1]; Environmental register Münster[2]
Documentation of planning and participation process and decisions	X					X					X	Environmental information system Bremen[3]
Announce/ inform, publicise	X	X					X	X	X			Mapserver FNP Bremen[4]; Citymap Dresden[5]; Interactive maps Hamburg[6]
Consolidating democratic procedures												
Activate interest	X			X	X	X	X	X	X	X	X	Participatory budget Weimar on Facebook[7]; Conversion of form. US-space in Heidelberg (YouTube)[8]
Feedback/ comment, discussion about planning decisions (formal and informal)	X	X	X	X				X	X	X		National park Rheinland-Pfalz[9]; BOB-SH[10]
Develop vision of future landscape			X		X	X					X	Future vision Region Hannover[11]; Wasatch Choice for 2040[12]
Improving information/ data base												
Include additional information from public/ citizens	X	X		X		X	X	X	X		X	Fix my Street[13]; Ardini[14]; OpenElm[15]; Noise action plans[16]; Cultural landscapes-Wiki KLEKS[17]
Monitoring		X		X							X	
Evaluate (i.a. individual uses, benefits and values)	X	X		X		X	X	X	X	X		GeoVisualizer (Tracking of roots and emotions (stress))[18]; Experience natural heritage (Coesfeld, Ger.)[19]
Education												
Share information, provide social learning	X	X	X		X	X	X	X	X			Climate city Bremerhaven[20]; Experience natural heritage (Coesfeld, Ger.)[19]; Eye on Earth (Information portal of the European Environmental Agency)[21]
Efficient administration												
Administer, manage data											X	
Respond										X	X	Regional plan for the Brunswick Region[22]

3 Potentials of New Approaches Based on Web 2.0 Technology within the Landscape Planning Process

Crowd sourcing

Increasingly, administrations and NGOs are interested in using crowd sourcing to incorporate citizens' knowledge and preferences in planning. The EU directive of environmental noise (2002/49/EG) demands cities and city regions to map traffic and industrial noise. Crowd sourcing has been used successfully in action plans to reduce noise in cities. For example, the city of Dortmund has used crowd sourcing to examine how citizens perceive noise in their city. Participants were asked to locate areas with disturbing noise or pleasant silence on a map in the internet and to describe the situation. The administration was able to connect and compare this data with the official noise mapping data, and the results were used to develop and prioritize measures to reduce the noise.

Today, apps for crowd sourcing not only support information exchange in landscape planning (see table 1), they allow for the input of data into an information base from mobile end-user devises (tablets, smartphones) in real time. In landscape planning, citizens and stakeholders have helped to update and expand the environmental information base using the bird mapping app 'ARDINI' or the tree mapping app 'OPENELMPROJECT'. These projects represent good practice for coordinating the local knowledge of volunteers / NGOs with the methodological, technical and administrative requirements for official data management. Furthermore, these applications can collect spatial information about the citizens' needs and perceptions, such as noise and olfactory perception or aesthetical experiences in the landscape. However, the collected data must be compatible with administrative data management systems and the correctness as well as the uncertainties of the data must be well documented.

Social media and social networks

Social media and social networks offer different levels of participatory involvement to support the objectives and tasks in planning (cp. for the following passages KRÄTZIG & WARREN-KRETZSCHMAR 2014). Social media offers five potential levels of participation in environmental planning (The administrative objectives are in brackets): "listen" (Know what is said online about environmental issues), "promote" (Raise awareness of environmental planning programs, opportunities, planning activities), "participate" (Join a conversation with citizens about environmental measures), "share content" (Share information or results of environmental measures) and "build community" (Build relationships online, nurture community, engage people, encourage them to take action). Social media and social networks, such as Facebook, offer the possibility to access and incorporate citizens' opinions and suggestions through examining comments and group discussions. Further, they allow administrators to inform a large number of citizens about environmental issues with relative little effort. Administrators could use, e.g., Facebook groups to improve transparency about existing ecosystem services and to publicize information about new planning measures as well as the monitoring. Finally, social media offers the opportunity to engage citizens in group discussion, possibly activating their interest in the planning process and building a community of involved citizens.

In a social network a citizen receives information as it happens by networking with people who are involved in similar or related issues, instead of explicitly searching for information from a specific person or institutional source. Observations of Facebook showed that users often receive answer to questions or obtain additional information much faster than waiting for answers from official institutional sources. In addition, these statements from non-governmental sources often contain more details or local knowledge, special tips or alternative interpretations of particular issues. This immediate and dynamic exchange of information can also be spread very quickly when it goes 'viral' (KANTER & FINE 2010). In contrast to formal participation procedures with strict requirements, Facebook or other social networks offer the opportunity to engage citizens in a loose and informal way without formal regulations.

However, social media has limitations for use in the present planning practice. Its use is difficult to direct and may not always follow the intended participatory objective. For example, participants on Facebook may not enter into a group discussion, or they may use the platform to express their opinion without reading the comments of other participants (KRÄTZIG & WARREN-KRETZSCHMAR 2014). Communication on commercial social networks may not support the mandatory participatory objective of planning, and it illustrates the benefits of self-managed discussion platforms. The question remains whether social media and networks could be a permissible and representative form of communication for formal and informal participation processes. For formal participation, they must fulfil requirements such as time-limits for participation, social equity and usability as well as binding character and reliability, privacy and the right of use (MARTINI & FRITZSCHE 2013). Presently, further development of social media or proprietary software is needed in order to reach a permissible and representative (formal or informal) form of communication.

Geodesign / Scenario techniques

In most participatory processes in landscape planning citizens are asked to respond to a set of proposals rather than to develop their own ideas or vision about the landscape. Many environmental issues are non-negotiable and are regulated by law. However, citizens should have a say about other issues, such as the future direction of the development of their landscape or priorities in the implementation of planning measures. Geodesign can help the public become involved in the decision process in meaningful ways (ABUKHATER & WALKER 2010). Geodesign not only uses spatial data to inform and support decision making, it also offers analytical functions that become an important communication tool for describing changes in the landscape, either face-to-face or over the internet. Such capabilities make Geodesign an important tool for planning and design decisions in landscape planning (WARREN-KRETZSCHMAR et al. 2012). Furthermore, opportunities to export GIS analyses to Google Earth can make spatial information relevant to the planning decisions more accessible and perhaps even more understandable to a dispersed audience. In this way citizens can make more competent decisions about alternatives in the planning and design process. Cloud technologies now enable Geodesign capabilities to move from the desktop to online applications (see Esri ArcGIS online http://www.esri.com/software/arcgis/arcgisonline) that integrate geoanalysis with a repository of maps as well as apps that can be used to collect data in the field. The technology is developing rapidly, but landscape planners must acquire the knowledge and experience to embrace it.

In addition to geodesign, scenario planning allows citizens to be part of the discussion about landscape development and it gives decision-makers, stakeholders and the public the ability to consider a range of possible landscape planning futures. Scenario software generally includes sketch planning tools that enable scenarios to be drawn and quantified. Such tools help to develop a consensus about future development with participants in the scoping of a project as well as in the development of a "*Leitbild*" or vision for a community. Visioning is practiced in group sessions with stakeholders and citizens (e.g., in the region of Hanover[1]) and attempts to develop a consensus about the future, often using software tools. Envision Tomorrow Plus (ET+) is an open-access scenario planning tool kit that allows users to develop scenarios and compare their outcomes in real time (www.arch.utah. edu/cgi-bin/worldpress-etplus/). ET+ enables group discussion and development of scenarios while showing consequences of planning to citizens (visual, ecological, economic and social consequences). ET+ is an Excel- and ArcGIS-based modelling and evaluation tool that analyses growth that can be used online to development scenarios at different scales (examples include EnvisionWatsch2040 and Envision Central Texas). Also the proprietary software CommunityViz® (PlaceWays LLP http://placeways.com) allows users to develop and evaluate land use scenarios that can help build a fundamental consensus about the desired direction of a community with its citizens. It supports scenario planning, sketch planning, 3-D visualization, suitability analysis, impact assessment, growth modelling. The use of such software gives planning decisions a stronger democratic legitimization, and it help planners address problems in a proactive manner (e.g., avoiding urban sprawl http://placeways.com/gisapps/customsoftware_pdf/NHCOS.pdf) or develop values-driven community plans (e.g., in Victor, Idaho http://placeways.com/communityviz/gallery/ casestudies/pdf/Victor.pdf). However, perhaps the most important benefits of scenario planning are to educate the public about planning issues as well as the social learning that occurs during the process.

4   Coloured, Faster, Better? Discussion of Options and Recommendations for Interactive Landscape Planning

The `Interactive Landscape Plan Königslutter am Elm´, which was developed ten years ago, used web-based information technology that relied on mapserver technology and allowed (georeferenced) feedback functions (HAAREN et al. 2005). The project also capitalized on the potential of the internet to disseminate information. Today the internet is a primary source of environmental and planning information, and it has become an accepted method for publishing information and announcements to the public. However, E-tools have not been broadly applied and the innovations of Web 2.0 have not found their way into planning. Applications within the wider context of environmental planning – such as in urban land use planning (e.g., land development plan of Bremen) or noise action plans (e.g., for the city of Dortmund) – exemplify how today's IT/web-solutions could contribute to landscape planning practice. However, the diversity of E-tools illustrates the need for standardization in order to promote their use. Tools offered by service providers and federal or national initiatives help to standardize participation systems (e.g., `BOB-SH´, www.bob-sh.de) which makes a uniform processing of formal participation in urban land-use planning possible. Such applications could be expanded to environmental and landscape planning.

The German case illustrates a long standing landscape planning concept, which on the one hand contains a wealth of data and information, though dominated by governmental and public welfare perspectives, and on the other hand is neglecting individual perspectives of citizens and shows structural deficits in participation. This makes it possible to contrast the information potential and its actual as well as potential activation succeeding in engaging citizens. Our analysis of the opportunities to include citizens and authorities in the landscape planning process and the potential to use new media has identified phases as well as ways in which new media may support open government in the planning process. Web 2.0 and the use of social media and networks now offer planning new forms of two-way communication with citizens that go beyond simply providing information on the internet. In addition, these tools show great potential to help individual citizens voice their preferences in the planning process. This in turn, can support the citizen's active identification with the surrounding landscape and their involvement in the planning decisions, making the decisions more transparent and understandable.

Some of the questions identified during the Interactive Landscape Plan in Königslutter remain today. Many of these questions also apply to Web 2.0. For example, who is actively using social networks, and is social media a permissible and representative form of communication for formal and informal participation processes? Do social networks need to be developed specifically for the planning discussion? An analysis of social networks reveals that they can be used in different ways and many types of networks exist. Our investigation of the use of Facebook clearly shows that more empirical research is needed about the potential of different social networks to support the planning process in the future. Just as emails are now a legally accepted method of response to planning proposals, perhaps social networks will one day be an accepted channel for informal participation in the planning process.

In addition to the development of social media and networks, the development of different end user technology, such as smart phones and tablets, provides the opportunity not only to access information but also to provide information through crowd sourcing applications. They offer a new and exciting opportunity for planners to update and expand information with the help of citizens and stakeholders. Planners must formulate their information needs, so that applications can be developed specifically for planning purposes (e.g., Esri development of a Landscape Planner App).

The visualization used in the Interactive Landscape Plan Königslutter was shown to support discussion with citizens in face-to-face situations. Since then the technology has become more powerful and more intuitive. Augmented reality could offer participants the possibility to see simulations of change in the landscape where it is happening (LANGE 2011). Geodesign provides powerful tools to evaluate the impacts of decisions and software such as CommunityViz or Envision Tomorrow Plus enables citizens to be part of the process of developing scenarios for the future development of their community and landscape, however, such software is not regularly employed in the planning process.

The technological development pushes the question of how much citizen involvement is wanted or needed. In landscape planning processes possible additional benefits of web-based participation and collaboration (such as educating the public and promoting or intensifying their identification with their environment) must be traded off against the added expense of involving citizens in the planning decision process. Furthermore, the

question arises just how transparent should open government become; is anonymity justifiable in the participatory process?

Finally, environmental planning often leads to legally binding results and must follow a regulated procedure. As such it carries the responsibility to uphold the democratic process and must be legally defensible. The move towards open government holds many challenges, not just technological, but also the fulfilment of legal regulations. The potential of new technologies to promote transparent and accessible government through open government is clearly apparent; however a cautious examination of the legal ramifications of using the technology is justified.

Acknowledgement

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