GeoDesign – Approximations of a Catchphrase

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Abstract
The paper discusses methodologically the term ‘Geodesign’. The history of the term is illustrated by three approaches which can be considered as complementarily covering the broad meaning of the term. A classification scheme for the description of geodesign outcomes leads to the description of product-lines according to the purpose and function of Geodesign. The authors suggest to consider ‘Geodesign’ a collaboration and convergence program between geo-science and the design of spatial visions.

1 Introduction

„‘We’ve been doing GeoDesign for years’ was a statement commonly overheard at the first Geodesign Summit held in January 2010” (Artz 2010). Our contribution tries to balance what is new and what is old and what is worth to follow up as a perspective concerning the catch-term „GeoDesign”. We try to come to a conclusion about what fits and what does not fit under a broad definition of the term. But this contribution also simply bundles up some own examples in order to define main „product-lines” ‘GeoDesign’ could have. Finally an outlook will be given into the potential future of ‘GeoDesign’ as a bridge between landscape planning and landscape design.

2 Approaches

The nineties. Not later than 1993 KUNZMANN (1993) uses the term ‘Geodesign’ to discuss opportunities and threats related to illustrative sketches communicating ideas of spatial structures like the “European Banana”. His fear is that simple iconic map like representations of ideas on spatial development replace the time consuming activity of reading texts as well as reanalysing numbers and reinterpreting complex maps which underlay the text. In the meantime for example DÜHR (2007) has clarified that the Banana was an extreme simplification on the way to balance out the degree of generalisation and to maintain the idea of a territory-specific concept. What remains is that we have to accept that maps are „socially produced and discursively embedded within broader contexts of social action” and that conceptualisation and developing graphical images help – and often must help – to communicate spatial relations in a consumable language. This affords that the graphical and the linguistic structure of a cartographic representation collaboratively addresses its intentional meaning. All in all ‘Geodesign’ coming from the nineties was strongly related to non-binding planning cartography which was working on spatial scenarios and visions. Dühr (2007, 58) summarizes different types and functions of ‘geodesigned futures’ which are conceptualized in Fig. 1 – a very helpful scheme to classify
‘Geodesign’ case studies in general. BBSR (2011) shows and Pütz et al. (2009) discusses the actual state of the Art of the “German branch” of ‘Geodesign’.

**Ecological Design.** Looking back to the roots of ecological design, Ian McHarg (1969) in his book “Design with Nature” put forward a system of analyzing the layers of a site such as the history, hydrology, topography, vegetation, etc. with the aim of compiling a complete understanding of the qualitative attributes of a place as a set framework for planning. His system is considered to be the foundation of today’s Geographic Information Systems (GIS) and therefore also for GeoDesign. McHarg’s approach has been further developed into an institutionalized system of ecological planning (not design) which is basically an analytical process. Landscape objectives are drawn from both scientifically based landscape analysis and from normative democratically legitimized goals (as stipulated in laws).

However from the point of view of ecological design in the 21st century, the approach of “nature showing the way” is criticized by Nina-Marie Lister (2007) as a too deterministic model of nature: good design does not mean that the correct reading of the landscape would necessarily prescribe appropriate design. Whereas in landscape planning science is perceived as a deterministic imperative for design, the landscape designers call for a more open, process-oriented and flexible design process. That also means that the designers themselves have a more active role as “creative agents” who consider their interpretations of ecological realities not as solutions but as choices and trade-offs within an evolving, open landscape system.

![Diagram of Geodesign Scenarios](image.png)

**Fig. 1:** Types and functions of ‘geodesigned futures from Dühr (2007, 58)

**The Geodesign Summits.** Since the First Geodesign Summit 2010 the term ‘Geodesign’ gets popular in the GIS community. The term now concerns the gap between GIS and
visual communication on spatial ideas. From this starting point ESRI publishes ArcSketch™ but the discussion goes more in depth, it

- Enlarges the role of GIS as a backbone of data driven spatial reasoning
- Includes the role of participative and collaborative planning approaches
- Considers spatial visualisation as a key in such approaches
- Includes modelling as a tool to generate visualisations of spatial structures and
- Tries to re-establish a rational view on spatial planning.

The summits in 2010 (http://www.geodesignsummit.com/pdf/agenda.pdf) and 2011 (http://www.geodesignsummit.com) tried to gather the ‘who is who’ contributing to the topic in the United States and completed the list by some flagships from e.g. Canada and Europe. The intention of the summits is to combine the presentation of existing and innovative technologies, experiences and results with creative and innovative reasoning in ‘idea labs’. As a focal methodological approach the use of geo-information directly or processed by spatial analysis and statistics, simulations, geo-processing models and Multi Criteria Analysis is used to develop ‘plans’ which are optimized by adaptive loops through impact analysis and participatory communications.

3 Terms, and Towards a Unifying Definition

Despite having highly ranked promoters, the term is not yet clearly defined. ‘Geodesign’ must be specified somewhere between mapping, modelling, sketching, visioning, planning, generating, constructing and engineering. But the term must also be specified according to the common understanding of ‘geo’ and ‘design’.

**Geo**. All approaches agree the convention of ‘geo’ coming from geospatial information, which can be descriptive, analytical or – as a modelling result – conjectural, which covers bio-, geo- and landscape-ecological as well as social, socioeconomic, economic and socio-cultural aspects, which includes their physical spatial manifestations of physical human land-use structures and infrastructure facility patterns, and which provides insights in spatial coincidence, patterns and processes. When using geo-information technologies like GIS, spatial modelling and 3D-visualisation (including the use of ingenious VR-devices) or when bethinking expert knowledge, in both cases doing Geo-design means to be “real world related” (FISHER 2010) or “evidence based” (TANZER 2010) or “consequence anticipation guided” (GOODCHILD 2010). It intents to include natural, semi-natural and man-made environments and mechanisms (system process), geo-pasts and geo-futures into what we consider as a design process.

**Design.** The task of design is the purposeful manipulation of an object or arrangement (e.g. physical space and its organization) in terms of information, function and systems with regard to functional performance, aesthetic qualities and social affects. Designers use the creative design process as a fundamental tool for synthesizing complex factors into cohesive designs. Landscape designers consider landscape “less [as] a quantifiable object than an idea, a cultural way of seeing, and as such it remains open to interpretation, design

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1 In general we know three meanings of ‘geo’: ‘abiotic’, ‘earth’ or ‘spatial’.
and transformation” (CORNER 1999). Von SEGGERN et al. (2008) describe spatial design in the context of designing urban landscapes as “searching for interpretations, for development possibilities and a spatial Gestalt which is able to unite multiple requirements – from function, to process, aesthetics, construction, material, symbolism and ageing – in a convincing whole” (von SEGGERN et al. 2008). To express findings and ideas about the landscape, the visual representation tools of landscape design are of particular importance as they do not only represent an abstract system of colour-codes but mainly operate as a mechanism for the new interpretation of landscape. It is only through representation and picturing that landscapes become culturally visible and meaningful – “the world is visually prefabricated through its potential for being seen” (WALDHEIM 1999). Using a variety of tools from pencil to computer, designs can be represented and communicated in the form of drawings, photo-montages, plans, diagrams, models, films and texts.

**Geodesign.** Our suggestion now is not to define sharp conditions for a belonging to the subject, but we suggest three dimensions which could help to classify and to discern an approach being ‘Geodesign’.

1. The first classification aspect can be labelled **technology**. Besides the fundamental separation of doing Geodesign analogously or digitally the used technology refers to the dimensionality of space considered. Depending on the technology involved we can do Geodesign in 2, 3 or 4 dimensions and have to accept the limitations coming from the capability, usability and suitability – as the case may be – of relevant software products\(^2\), devices\(^3\) and, related to both, limitations with regard to grain and/or scale.

2. As a second dimension for characterizing Geodesign product-lines we have to look for the role of geo-information in the design process. E.g. Multicriteria Evaluation results can be transferred directly into decisions, but they also can be considered as an input from a ‘side event’ into a planning process, which allows a certain or efforts a huge degree of freedom and which leads to a result that is not consequently following the rational suggestions of geo-information processing. And the workflow can (and in the ambitioned thinking of the recent promoters of Geodesign should) go beyond a one-way workflow. Given a high degree of interactivity between man/group and machine ideally an iterative loop can be established by a multiple walk through the rational planning concept “evaluation of conditions and options \(\rightarrow\) decision/design \(\rightarrow\) impact evaluation”.

3. The third criterion considers the function of ‘Geodesign’ products according to its binding character between vision and prescription (refer to Fig. 1). Depending on the function of the result we have to use less or more precise Geo-data and have to be less or more accurate in modelling, accepting evaluation procedures or representation detail. And we have also – besides an appropriate lay out of the visual representation – to select an appropriate lay out of the collaboration between the actors themselves and between the actors an the GeoIT-facilities.

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\(^2\) ArcSketch is a very ingenious take off, but it has to be improved; the discussion about geodesign will enforce efforts the integration of CAD and GIS.

\(^3\) We just like to paraphrase the limitations of devices by the similarities of the words ‘cave’ and ‘cage’.
4 Product-lines and Examples

As we can see there is a wide range of combinations of inputs and outputs, methods and techniques, targets and target groups which are touched by the brand ‘Geodesign’. Now we go more in depth concerning the functions of ‘Geodesign’ referring to the concept of Moll (1992), who first separates external from internal purposes when using maps in the planning process, and who then separates basic analytical maps from cartographic representations for participatory purposes and from representations of binding objectives laid down in a unifying or prescriptive form. Some own examples can be assigned to each of this ‘Geodesign’ product-lines and use cases.

Representations for analytical purposes. Here ‘Geodesign’ products are addressing decision-makers – if used internally – or they try to give evidence or justification if used externally. A lot of examples exist where the label ‘Geodesign’ is used for applying Multi Criteria Evaluation (MCE) methods to propose patterns for landscape or urban development. MCE-methods or other analytical applications of geo-processing models per se do just weakly meet the term Design. The results can closely be used as an input of a design process, but usually an additional creative revision will be necessary. Supplementing this kind of geo-information processing based ‘Geodesign’ SCHWARZ-V.RAUMER & SADEK (2008) suggest to use spatial disaggregation/allocation procedures to create hypothetical land use patterns according to assumptions on strategically preferred spatial structures in urban planning. The scenarios can be used to find strategies for minimizing forest cover decline and related loss of retention capacity. This design approach goes beyond drawing a geo-data based sketch of new development areas as an input for impact analysis (DANGERMOND & ESRI 2010, FLAXMAN 2010). Here geo-processing model parameters are used to implement strategies into a complex land-use change model which then creates referential spatial structures (Fig. 2).

Fig. 2: Forest decline (= black raster cells) according to two future urbanisation scenario patterns, designed using a geo-processing model: a) unbiased urban development and b) development preferably in high density urban areas (urban areas 0 grey raster cells) (SCHWARZ-V.RAUMER AND SADEK 2008)
Representations for participation purposes. Here we must separate ‘Geodesign’ done by from that done for an addressed target group. Examples for the ‘done by’ group are reported by von Haaren (2010) and Carlos (2010) who interactively work with planning actors and clients to adaptively develop plans and thus inherently improve their acceptance. To discuss the ‘done for’ group we refer to Aggens (1983, cit. in Oppermann 2001), who separates in an “Orbit-model” different groups participating in the planning process according to the degree of being involved by the scale ‘unsurprised apathetics – observers – reviewers – advisors – creators – decision-makers’. He compares the degree of being involved with an energetic level. Graphic representations of plans here play not only the role of being a medium for communication. Maps, CAD-drawings and other ‘Geodesign’ products sent by a visual channel are able to ‘energize’ a person’s involvement und to push his/her role more close to the kernel of the planning process. For that purpose again GIS can be helpful, particularly when geo-processing models build up spatial future visions. And the activating effect of such visualisations can be amplified when spatial scenario representations are used to demonstrate the consequences of per se non-spatial alterations. For example Schwarz-v.Raumer et al. (2007) (also refer to Kaule & Schwarz-v.Raumer (2008)) did that when visualising the difference of future land-use patterns in the northern Benin according to a different birth rate (Fig. 3). The visualisations have been successfully used in a stakeholder discussion about the necessity of the implementation of watershed management structures.

Representations for normative purposes. The target of spatial representations for normative purposes is to lay down and to socially unify interpretations of the present or of ideas, plans and visions concerning the future. Depending on the degree of being binding they are to be considered as a suggestion, an intention or a prescription. The European banana for example tries to unify the perception of the European spatio-economic structure and so to facilitate the internal and external communication about future strategies. The professional work of landscape architects on the other hand offer concepts for to get accepted as a binding design of geographical space. If – in the sense of the Ecological Design approach – the concept strongly incorporates landscape and geo-ecological conditions and processes, landscape architects do a normative ‘Geodesign’ job. The essence of these ideas is reduced in complexity by making use of the human capability to reduce complex information into coherent designs at the interface of analytical and creative knowledge. The complexity of the design needs to be condensed into a strong design idea that is easy to communicate and appeals to the client and public. Comprehensive information that might have been accumulated within the iterative process of analysis and design recedes into the background and is aggregated into a comprehensive and convincing idea that signifies the future and gains support. This idea is communicated through a spatial concept that is expressed in drawings and texts that communicate its essence and form a clear basis for more specific design decisions. Carefully selected, meaningful metaphors and titles are used to explain spatial concepts, like the vision of the ”Tidal City Hamburg” (Stokman 2010) developed by the office osp urbanelandschaften presented in Fig. 4. The spatial vision for giving more space to the flood is expressed by the two landscape types of tidal lakes and tidal islands within the low-lying marshlands of the Elbe river in Hamburg.
a) birth rate = 3.2

b) birth rate = 3.5

**Fig. 3a/b:** Two sketches visualising different future land-use patterns and processes in the north of Benin and overlaying the result of a 30-year land-use change simulation in the background. According to SCHWARZ-V.RAUMER et al. (2007).
Collaboration Is the Key

We suggest to not only focus on ‘Geodesign’ being something which is related to GIS-application and geodata-processing. We consider ‘Geodesign’ as a convergence program for bridging the gap between geo-science based spatial analysis and inventing, sketching, communicating and shaping the future of spatial environments. This includes a circular relation between the perception of given geospatial structures and conditions, the creation of ideas, and the control of their implications. It is possible that this workflow can be established individually, but in general we would prefer to combine the skills and knowledge of landscape designer and architects, GIS/GI-technology experts as well as landscape researchers, ecologists and engineers.

STOKMAN et al. (2010) analyse the different approaches of landscape planning and landscape design and suggest to link adaptive landscape management and experimental landscape design by new ways of interaction and towards a process-driven plan development and project implementation. Here ‘Geodesign’ can play the role of a key link, but there still remains the task to find appropriate new ways of collaboration which optimally include GI-technologies into adapted terms of interaction specified for the group of actors involved. Here it is worth to learn from science-policy facilitation. For example the “Joint Fact Finding (JFF) process” suggested by KARL et al. (2007) can be adapted. However there also exists a wide range of experimental fields to develop collaborative work modes and to replace an „Inform and Ignore“-practice. Work modes which can be tested in and should lead to improvements of teaching and learning in landscape planning, architecture and design.
6 Conclusions

The first conclusion we draw from the above considerations is a suggestion for a future research agenda (and perhaps for the next Geodesign Summit): it should not focus on technical or methodological aspects, but should emphasize the importance (1) of visual communication theory and visual language development\(^4\), and (2) of the development of collaborative design settings which goes beyond simple workflow descriptions (DANGERMOND 2010) and yinyang ideas (GOODCHILD 2010). This would help to prevent a fall back to the idea of Wegener’s planning machines (cit. in SCHWARZ-V.RAUMER 1999).

Secondly: the long lasting discussions about the rational planning approach\(^5\) and about applying quantitative methods (MCE, Modelling) in planning should not be overheard due to the positivistic proclamations of the good deeds the new ‘Geodesign’ concept promises. Using an advanced technology and being stuck in the old usage of methods does not increase evidence of MCE and modelling analysis – and evidence is a fundamentally necessary prerequisite when using science in policy making and in planning.

Thirdly: ‘Geodesign’ could serve as an important contribution to bring back the designers type of intuition, creativity and emotion into the process of data analysis and representation, while at the same time it contributes to a new designer’s perspective which is driven by a better understanding of man-environment interactions and which is a result of the take over of new collaborative design settings.

References


\(^4\) Here ArcSketch must be improved and should be oriented to a unified symbolic language like the chorèmes suggested by Brunet (cit. in DÜHR 2007).

\(^5\) “The rational model has come under fire […] no one follows the pure rational model […]. Instead, it is claimed that decisions are made by “muddling through” […].” (CHAPIN & KAISER 1979).