Partnerskap

SLU

# RAPPORT

## Movium Partnerskap

Neil Sang

# DELUGE

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Rapportfakta
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Thanks are also due to the staff of Lomma municipality who participated in the workshops, and Professor Carl Steinitz (Harvard University / University College London) and Professor Brian Orland (University of Georgia) who coordinated the International Geodesign Collaboration of which this project was a part.

**Delta-Environment Landscape planning; an Urban Geodesign Example (DELUGE)**

Sweden's planning system is facing an increasingly complex set of decisions in order to plan for climate change, environmental pollution, population growth, urbanization and similar issues. Computer models and Geographical Information Systems (GIS) can help predict future scenarios and estimate the likely impact of different strategies. However with many possible options, some of which may be controversial, there is also a need to develop approaches that ensure stakeholders are included in the decision making process.

Geodesign is a method for building consensus solutions which are based on scientific evidence of likely future scenarios. It combines GIS, computer models and scientific knowledge with a process for managing discussion between different stakeholders. The project used the software geodesignhub.com, which allows suggestions for different design elements, such as a new park here or more housing there, to be given online. An overall design can then be agreed by selecting from and negotiating around these suggestions in a workshop.

This project worked with Lomma Municipality to consider how the town can accommodate more people while protecting agricultural land and reducing flood risk. It was part of the International Geodesign Collaboration, allowing comparison of approaches with over 90 other projects world wide.

**What is Geodesign?**

Geodesign is, in principle, a very simple concept: When designing interventions or changes to a landscape, particularly at larger scales, this should be based on scientific evidence as to what will work. However, because landscapes are complex living systems, understanding this evidence requires the support of geodata and computer models, particularly GIS. And because that living system includes people, what will work is partly dependent on what the people will be willing to support. So any geodesign process must include a method to achieve consensus as to the best course of action (within the limits of the evidence) and this needs the evidence to be presented in the most intuitive way possible without over simplification. Geodesign needs a different kind of technological support than that used in scientific modelling, one which is intuitive to use and allows just enough flexibility to foster a fact based discussion.

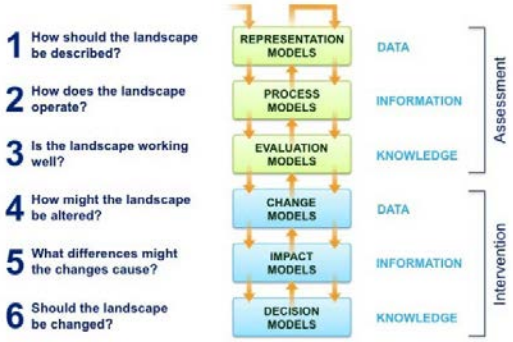



*Figure 1 A workflow for geodesign (Steinitz 2012)*

Given the ambition of geodesign to find consensus on complex issues, a solution is unlikely to be achieved at the first attempt. Geodesign is an iterative process which works through several steps, starting with agreeing on what the various pieces of the problem are and how to represent these, then moving on to agree what the mechanisms are that direct the interaction between these parts (process models) and so which might be used to change the system toward a desired goal, and then agreeing what the goal(s) may be and how to judge when this is achieved (evaluation model). Collectively these three stages are principally about agreeing in advance what the problem to be addressed is and ensuring that all participants are working toward the same end. Given a complex system with multiple processes and multiple interest groups, this unlikely to be a linear process but one where prior steps are returned to as people develop a common understanding of the problem to be tackled.

The second phase is that of deciding what interventions are needed. Change models are simply suggestions of what might be done, while impact models consider the likely effect. This is a reasonably standard approach for evidence based planning, with the difference being that impacts are also measured with respect to the previously agreed criterion of the evaluation model. In this way the process of agreeing priorities is separated from that of assessing against them which avoids the problem of some interested parties "moving the goal posts" if they do not like the evidence. Of course, consensus cannot be achieved with the argument that a solution meets the evaluation criterion if some parties still do not accept it. So the final step is an agreed process for making a decision about when a solution has been reached. Geodesign does not specify a decision process (e.g. to accept the majority vote or to require unanimity) it simply emphasises that to benefit from reduced conflict on implementation decisions must be taken in a manner which is agreed to be legitimate.

**The International Geodesign Collaboration**

Geodesign might seem straightforward, but its implementation requires a considerable degree of judgement and experience as to what is likely to work. Assessing whether it is a better method than alternative approaches is difficult for a single case since the alternative cannot be run as a control trial. The International Geodesign Collaboration (IGC) was set up in order to learn by comparison from many projects worldwide. Over 90 universities have so far participated and projects were run according to guidelines which would ensure a minimum degree of comparability.

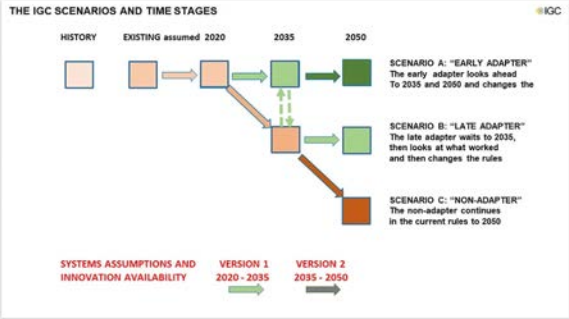



*Figure 2 The IGC Scenarios*

Projects which participated in the IGC agreed to :

- A common set of future dates for which designs would be made and assessed.
- A common set of global trends, of which each project would consider at least one.
- A common set of 9 general land use systems, plus one to provide local flexibility, making 10 systems in total.
- A common legend so designs could be easily compared.
- Select a square study area from a fixed set of scales.

In terms of supporting software most projects used geodesignhub.com and or ESRI geoplanner, plus GIS. Some used other modelling software such as Rhino or ESRI City Engine in addition depending on their objective. The common aim of all projects was to predict what the major implications would be to their case study area by 2020, 2035 and 2050 for three scenarios:

- No change (no change in planning approach)
- Early adoption (a new direction 2020)
- Late Adoption (a new direction from 2035)

This formed the basic framework for the DELUGE project: Given expected pressures of population growth and the anticipated changes in sea level, plus rising need for food security and urban green space what are the implications for the municipality of Lomma in 2020, 2035 and 2050 and what alternatives can be designed?

**DELUGE**

*Lomma Municipality*

Situated on the South-West coast of Skane, Lomma is a wealthy town of c15,000 people. It has a generally high quality of life due to its beaches, riverside recreation, yachting harbour and commuting proximity to both Lund and Malmo. Formerly a small industrial town, recent decades have seen it expand and gentrify dramatically. It is now one of the wealthiest and fastest growing municipalities in Sweden. That rapid growth presents a quandary for planners since space to expand is limited by the sea to one side and high quality agricultural soil inland.

**Workshop 1 : Representation, Process and Evaluation**

An opening workshop was held with staff at the Lomma municipality planning offices including planners and specialists in environmental science and GIS (here after the Lomma Working Group (LWG)). After explaining the geodesign process and the IGC project, the priorities for planning to 2050 were discussed. Expansion of housing and the risk of flooding were clearly the two most pressing issues.

Some initial evaluation models were also presented, setting out how existing land uses were to be represented in the 10 classes and discussing adjustments and additional rules to take into account planning practices.

Also part of the evaluation model, was the setting of a target for the expected growth which would need to be accommodated.

*Follow Up on WS1*

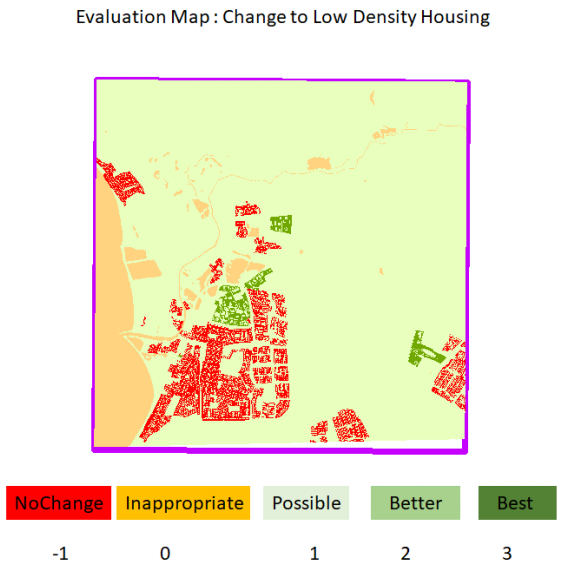



*Figure 3 Evaluation map showing where would or would not be a good place for new Low Density Housing*

The evaluation maps were adjusted according to the wishes of the LWG. An evaluation map does not show what is there today, it shows where would or would not be a good place for a change to one other land use system. Figure 3 shows an example of one of these maps in respect of possible new Low Density Housing (LDH), dark green shows that the LWG were of the view that it would be better to convert industrial area rather than expand on to the light green (agriculture) but there are also some areas where it would not be appropriate (mostly water). Red shows that most current housing was already of LDH type.

In total 9 such evaluation maps were created taking into account current land use and appropriate distance to existing residential areas for different kinds of development.

The target population growth by 2050 was statistically back cast to 2035 and 2020 then converted to the additional amount of each system that would be needed in order for every resident to continue to have access to the same amount as at present e.g. the same amount of Urban Green Space (UGS) per person.

This was visualised as a "sketch" showing how much of each extra land use system would be needed in the "no change" scenario. The image excludes agriculture since, with a population doubling, this would require double the total amount of land which of course then exceeds the land available. The figure emphasises how much agricultural land would be lost if planning practices do not change.

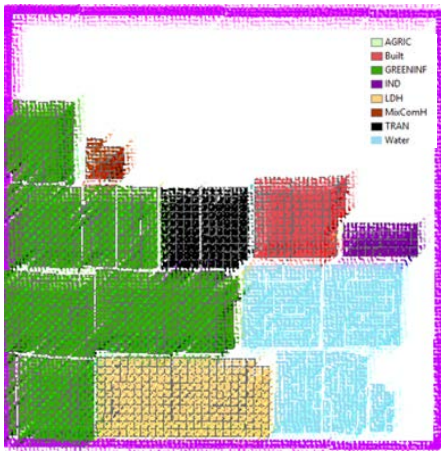
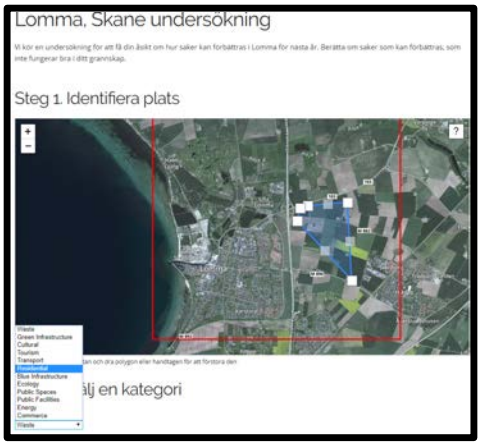



*Figure 4 Sketch visualisation of the amount of additional land needed to maintain current per capita resources (in a the 10x10 km study area)*




*Figur 1 Public Participatory Geodesign : Entering design suggestions via www.geogorage.io*

In order to save time in the second workshop it was decided to collect some suggested changes in advance via a Participatory GIS tool www.geoforage.io .

This allowed respondents to draw polygons over the areas where they proposed a change and then tag this from the list of possible new land use systems which the IGC had agreed.

The tool could in principle be used to collect suggestions from a wide range of stakeholders .

**Workshop 2 : Change, Impact and Decision Making**

Workshop 2 was chaired by Dr. Hrishikesh Ballal, owner and developer of www.geodesignhub.com. Participants were divided into two teams and each presented with the same challenging population scenario which they were asked to accommodate by entering diagrams for low or high density housing (suggested areas) into the geodesignhub project (where they could also bring up other map information such as flood risk).

Discussion ranged on topics such as how tall a mixed use commercial/residential building could be and still retain support from local people, consequent pressure on green infrastructure, transition issues with respect to former industrial areas, flooding from sea level rise and the large river catchment, opportunities for services and employment and more.

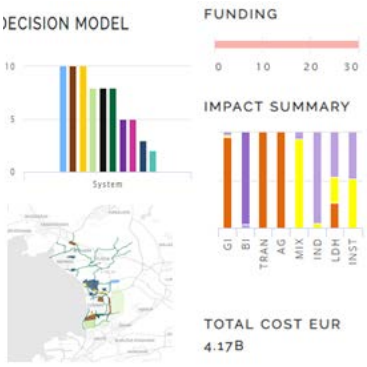


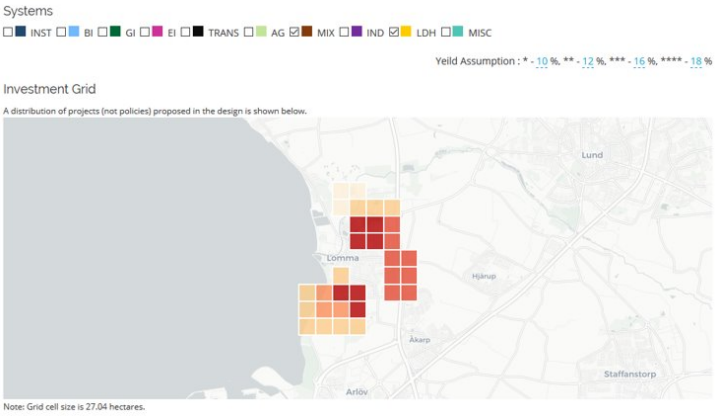

*Figure 6 A design with statistical output from geodesignhub.com*

Each team created their own design covering not only where housing should be but also other systems such as Urban Green Space and Transport.

The geodesignhub.com software provided immediate feedback as to the cost of the proposals over time and how it impacted on the evaluation maps.

The teams then negotiated a common design from the best pieces of their respective suggestions.

With the design negotiated and statistics considered, the workshop then considered the whole process with respect to whether they felt it could be deployed in practice. Dr. Ballal also presented some recent innovations in the geodesignhub.com software aimed to help project manage implementation of a design. For example figure 7 shows the degree of investment required over the area.




*Figur 2 Using geodesignhub.com to map the planned investment*

**Learning Lessons**

*Experience of the process*

In general there was support for the approach and participants felt that it could improve communication during the design phase, but there was also the suggestion that the 10 systems needed to be more precise (i.e. able to vary the residential density rather than having a fixed value for each) and questions as to how to widen participation without opening up avenues for unconstructive criticism. There was agreement that it had good potential for involvement of the political level in the municipality but unfortunately this had not been possible since the project took place during an election year.

One aspect for future research is identifying a suitably intuitive and fast approach to flood modelling. Several options were investigated during the preparation for WS2 but none were suitable for the task.

*Comparative studies within the IGC*

The IGC context provided an excellent framework for this project, allowing the problems to be focused around key trends deemed of critical importance by global experts. Some of the scenarios being based on global trends e.g. IPCC 2013, were actually considered a little conservative by the planning professionals who set themselves tougher targets. Presenting the work to the International Geodesign Summit at the ESRI Head Quarters, Redlands California, allowed it to be compared with others worldwide. One thing this highlighted was the importance of working with practitioners as in this project compared with studies from student projects where solutions were often more ambitious but (perhaps) less feasible. The professionals were very conscious of the political, social and financial practicalities throughout the process. However the project did also push these professionals to find solutions to very stringent objectives. The geodesignhub.com analytics also made it quite clear that this process would use up available brownfield space by 2050 and thus directed attention to how to accommodate growth their after or whether these designs would need to be more radical today in order to save space for even longer term planning. DELUGE has provided evidence that planners were able to work with a geodesign process in the geodesignhub.com software and that doing so could help promote evidence based planning.

Partnerskap

Movium Partnerskap Project no. 2018 194

Detta projekt är genomfört inom ramen för Movium Partnerskap
Movium partnerskap erbjuder möjligheter för samarbete och erfarenhetsutbyte. Med Movium Partnerskap ökar organisationen personalens kompetens, medverkar till branschens utveckling, får kontaktytor med SLU, Movium och branschen och har möjlighet att delta i forskningsprojekt och gemensamma aktiviteter.

Kontaktpersonen och anslutna användare får alla Moviums prenumerationstjänster, rabatt på Moviums kurser, seminarier och konferenser. De erbjuds också tillfällen för erfarenhetsutbyte och breddar sitt kontaktnät genom att delta vid nätverksträffar.

Nätverket Movium Partnerskap bidrar till en process där bransch och forskare vid SLU delar omvärldsbevakning och inspirerar varandra i kreativa samtal om aktuella frågor ca sex gånger per år.

Partnerskapets forskningsprojekt har som mål att utveckla kunskap som är relevant för både universitet och bransch. Movium Partnerskap bekostar maximalt 50 procent av beviljade forskningsprojekt, resterande står en eller era partners för. Ansökan sker via Moviums hemsida två gånger per år och görs av en forskare knuten till LTV-fakulteten vid SLU och minst en partner. Exempel på aktiviteter är kunskapssammanställningar, seminarier, workshops och konferenser.

**Anders Rasmusson**
Movium Partnerskap