Geodesign Summit Europe

September 11-12, 2014
Delft University of Technology, Netherlands

Hosted By:
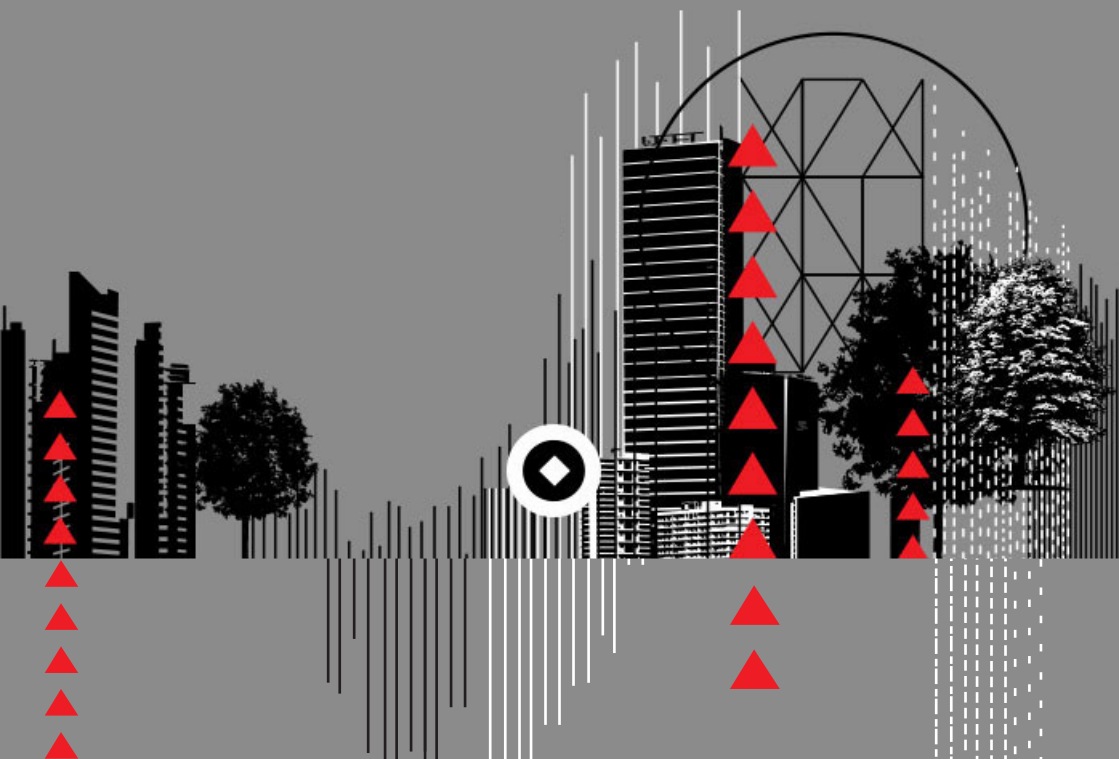
Geodan   VU — VRIJE UNIVERSITEIT AMSTERDAM   TUDelft   esri

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Wednesday, 10 September
0830–0930, Berlagezaal, Faculty of Architecture

Thursday, 11 September
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0830–1200, Aula Foyer

Welcome

We welcome you to the second edition of the Geodesign Summit Europe at a leading Dutch breeding ground for geodesign, Delft University of Technology. It's here that geospatial sciences, architecture, and urbanism covalently bond, and form impactful research.

Last year we were able to introduce the idea of adopting geodesign thinking by a cross-pollination of disciplines concerned with making our world safer, sustainable, cultural, historical, and more livable. We also succeeded in publishing our first book *Geodesign by Integrating Design and Geospatial Sciences*, showcasing the broad array of fascinating work from around the world but especially Europe.

We want the Summit this year to be as challenging, eye-opening, and enjoyable as the last one, while illustrating how far the discipline has advanced. To do so, we've selected a collection of projects to portray how innovative geospatial technology has and will change the way we solve complex problems in areas like urban redevelopment, heritage conservation, and disaster management. This year we stress especially the way geodesign will be of prime importance to create a safer urban environment. We hope it leaves you infused with promise for adopting geodesign into your own good work.

On behalf of Delft University of Technology, Esri, VU University Amsterdam and Geodan,

Sisi Zlatanova, Frank Holsmuller, Eduardo Dias and Henk Scholten

Pre-Conference Workshops

Wednesday, 10 September

0830–0930	**Registration and Refreshments** Berlagezaal 1&2, Faculty of Architecture	
0930–1700	**Geodesign Framework** *with Carl Steinitz* Berlagezaal 1&2, Faculty of Architecture	
0930–1700	**CityEngine** *with Esri* Geolab, Faculty of Architecture	
0930–1700	**Geodesign for Cultural Heritage** *with Niels van Manen* Room P, Faculty of Architecture	
1300–1600	**Network Centric Working Vs. Hierarchical Working** *with VU University Amsterdam SPINlab* Room Q, Faculty of Architecture	
1730–1930	**Ice Breaker** Berlagezaal 1&2, Faculty of Architecture	

Summit at a Glance

Thursday, 11 September

0830–1000	**Registration and Refreshments** Aula Foyer
1000–1015	**Welcome Message** *Machiel van Dorst and Hosts* Aula Auditorium
1015–1100	**Keynote Speaker** *Peter Head* Aula Auditorium
1100–1120	**Featured Speaker** *Max Craglia* Aula Auditorium
1120–1200	**Discussion with Peter Head and Max Craglia** Aula Auditorium
1200–1330	**Hosted Lunch** Aula Foyer
1330–1400	**Esri Enabling Technologies** Aula Auditorium
1400–1420	**Featured Speaker** *Kelleann Foster* Aula Auditorium
1420–1440	**Featured Speaker** *Abdullah Alkadi* Aula Auditorium
1440–1500	**Discussion with Kelleann Foster and Abdullah Alkadi** Aula Auditorium
1500–1530	**Networking Break** Aula Foyer
1530–1700	**A. Visualizing Change** Berlagezaal 1, Faculty of Architecture
1530–1700	**B. From Design to Decision** Room P, Faculty of Architecture
1530–1700	**C. Towards Safe and Suitable** Room R, Faculty of Architecture
1530–1700	**D. Adopting Geodesign Thinking** Room U, Faculty of Architecture
1800–2200	**Evening Social** The Prinsenhof Museum

Friday, 12 September

0830–0900	**Registration and Refreshments** Aula Foyer
0900–0920	**Featured Speaker** *Patricia Sendin* Aula Auditorium
0920–0940	**Featured Speaker** *Raymond Feron* Aula Auditorium
0940–1000	**Featured Speaker** *Abbas Rajabifard* Aula Auditorium
1000–1030	**Discussion with Patricia Sendin, Raymond Feron and Abbas Rajabifard** Aula Auditorium
1030–1100	**Networking Break** Aula Foyer
1100–1200	**Lightning Talks - Quantifying Heritage Landscapes** Aula Auditorium
1200–1330	**Hosted Lunch + Poster Exhibition** Aula Foyer
1330–1500	**A. Changing Environmental Systems** Room P, Faculty of Architecture
1330–1500	**B. Smarter Development** Room R, Faculty of Architecture
1330–1500	**C. Crisis Management** Berlagezaal 1, Faculty of Architecture
1500–1530	**Networking Break** Aula Foyer
1530–1615	**Closing Keynote** *Carl Steinitz* Aula Auditorium
1615–1645	**Discussion with Carl Steinitz** Aula Auditorium
1645–1700	**Closing Remarks** *Henk Scholten and Josef Strobl* Aula Auditorium

Thursday, 11 September

General Session | Aula Auditorium

Welcome Message

Machiel van Dorst, Delft University of Technology
Henk Scholten, Geodan and VU University Amsterdam

Keynote Speaker

People, Planet, Profit -a revolution in integrating local and global for a resilient future

Peter Head, The Ecological Sequestration Trust

Peter will describe his groundbreaking work in integrating global and local economic, human and ecological information in a model available to all to inform and test local decisions for the sustainable development of a city or a whole region. The systems model platform will bring together remote ground and satellite sensors, formal data and crowd sourced data. His easy-to-use model integrating many sources of relevant information creates what he calls "collaborative intelligence" to enable planners and policy makers to decide what projects to build, in what order and with what combination of public and private capital – better decisions sooner for people, planet and profit, for communities, the environment and for business in the short and long term. Not only does it have huge application for the developing world but also for western businesses wanting to create Apps to enable access to their services with the platform. Peter believes this can help us to create "collaborative consciousness" to achieve the change that will improve our resilience to the uncertainties of the future, notably climate change and increasing food and water demand for the growing population which will become increasingly urban and middle class.

Featured Speaker

Geodesign in a changing landscape

Max Craglia, European Commission - Joint Research Centre

The presentation will reflect on the new data sources and new social actors taking prominent stage in the landscape of geo-referenced content production and consumption. The vertical integration form the bottom up of 3D data from Building Information Models all the way to neighbourhoods and entire cities, and from the top down of high resolution imagery down to sub-meter resolution provide a seamless virtual environment rich in information at all scales. Add citizen-generated content and sensor networks and you end up with an urban Big Data landscape of enormous potential for quasi-real time, interactive, urban management. It all sounds very promising, but the policy and social spheres move at a much slower pace then technology or data, causing tensions, contradictions, and uncertainty. Against the background of these considerations, the talk will stimulate discussion on ways to narrow these gaps, and develop more participative policy-making.

Discussion with Peter Head and Max Craglia

Moderated by Henk Scholten, Geodan and VU University Amsterdam

Thursday, 11 September

General Session | Aula Auditorium

Hosted Lunch

Aula Foyer

Esri Enabling Technologies

New Tools Enable the Expansion of Geodesign

This presentation will showcase some of Esri's latest emerging technology that supports the expansion of geodesign from the desktop to the web, and from 2D to 3D. A new application specifically designed to be used in the geodesign process for land-based planning, GeoPlanner for ArcGIS provides tools to integrate online design workflows and organisational data. CityEngine rules and the 3DCIM (City Information Model) can be used to enhance and enliven an organisations' 2D data and analysis, opening a world of new and interesting opportunities for geodesign and a more engaged community. These processes and workflows integrate seamlessly into new templates in ArcGIS Pro with the output presented in streaming 3D webscenes for online analysis, presentation, and consumption. Together, these tools represent an important step in the evolution of GIS with the potential to transform planning and design.

Featured Speaker

Bringing Geodesign to the World in a Massive, Open, Online Format

Kelleann Foster, Pennsylvania State University

"Geodesign: Change your world" is a unique approach to scaling up awareness about geodesign to a global audience. Massive Open Online Courses (MOOCs) have been gaining visibility as a wide-reaching educational trend for providing exposure to topics, theories and techniques on literally any subject. Penn State launched the first MOOC on the subject of geodesign in mid-August 2014. The geodesign MOOC grew out of our strong desire to help shape the dialogue and better define this emerging form of practice and due to our school's expertise in both online learning and MOOC offerings. This presentation will share the process of crafting a successful MOOC, including a detailed two-stage internal university review, input from our geodesign programs' advisory board, review of and guidance from recent MOOCs at our university, and the course author's personal participation in and critique of other MOOCs.

One of this course's new innovations in MOOC instruction is the inclusion of illustrative case studies. Sensitive to the fact that a MOOCs audience is worldwide, the course author curated geodesign case study examples from an international perspective. More than half of the 15 case studies showcased are outside of the United States. Several case studies related to the conference theme of "disaster management" will be highlighted. Along with the development of the MOOC, this presentation will also provide an overview of the rational for the course design and delivery mechanisms, and the process for student engagement – which produces a distinct challenge with over 6500 students enrolled.

Thursday, 11 September

General Session | Aula Auditorium

Featured Speaker

Navigate Hajj: An Interactive Digital Spatial Guide to Mecca and Madinah

Abdullah Alkadi, University of Dammam

Since ancient times, the Muslims from all over the world come to Mecca to perform Hajj and Umrah. The Government of Saudi Arabia keeps adding new expansions to accommodate the continuous increase of pilgrims year after year. In 2011, the number of pilgrims reached more than three millions, and the number of Umrah visitors reached five millions. With the ever-growing numbers of pilgrims, many problems occur causing the scrambling, trampling and panicking producing many missing, injuring and mortality incidences. These incidents occur as a result of the presence of large numbers of people gathering in one place and time to perform the rituals. For visitors speaking different languages, unfamiliar with how to perform the steps of Hajj, lacking any knowledge of the sites and directions, and facing the difficulty of movement from one place to another, the situation becomes very difficult for them to communicate and to perform the rituals effectively and efficiently.

As a result, the idea of digital spatial interactive guide of Makkah and Madinah and the Holy places (Navigate Hajj) emerged as the first interactive spatial application for Hajj and Umrah on mobile devices. This paper explains the capabilities and functions of Navigate Hajj as the first interactive spatial application for Hajj and Umrah that can be obtained for free from the Apple Store for use by iPhone & iPad in Arabic, English and French languages. The Application can alert the user when he/she passes near the location

of MIQAT (a point aligned to an assigned place), and shows the conditions of such location. The application provides the possibility to arrange the steps of Hajj dynamically depending on the type of pilgrimage (individual, joint, or enjoyment). It also alerts the user about the distance, orientation and time of that must be considered to reach specific spatial locations. The App includes many other useful functions for Hajj and Umrah visitors.

1440–1500   ## Discussion with Kelleann Foster and Abdullah Alkadi

Moderated by Henk Scholten, Geodan and VU University Amsterdam

1500–1530   ## Networking Break

Aula Foyer

Thursday, 11 September

Parallel Sessions | Faculty of Architecture

1530–1700   ## Visualizing Change

Berlagezaal 1, Faculty of Architecture

A picture tells a thousand words. The way we communicate ideas about change and system interaction is pivotal to the success of any planning and design process. From 2D maps to 4D virtual reality, our physical, economic, and cultural futures can be imagined and explored in more collaborative and transparent ways than ever before.

1530–1545   **Combining Virtual Reality and a 4D GIS**

Juergen Rossmann, Institute for Man-Machine Interaction; Arno Buecken and Marc Priggemeyer, RWTH Aachen

During the last years GIS moved ahead from 2D to 3D and some approaches also consider time as a 4th dimension. Visualization of the included data moved ahead from simple maps towards 3D landscapes and cities. But in most cases it is still limited to a single display on a single computer. In this paper we will present an approach of a fully integrated 4D geo-information and virtual reality system, where visualization and simulation are merged.

Besides the virtual reality style visualization, it is possible to use the stored geo-information as a model in a simulation and even to feel the data with a motion-feedback system. We will explain how to connect a steward-goch platform or a robot-based motion simulator including a hemispheric high-resolution 3D display system and interaction components to the geo-information system and give examples of geo-information based simulations. The advantage to this approach is that it becomes possible to change object data in the GIS, even to generate live-maps from the object data and

immediately explore the results in virtual reality. On the other hand the geo-referenced simulation results can be evaluated with all tools that are available in the GIS, which is one of the ideas of a virtual testbed.

Immersed in a virtual world: Visualization laboratory supporting design

Dafna Fisher-Gewirtzman, Israel Institute of Technology

The research at the visualization laboratory at the Faculty of Architecture aims to develop effective tools, protocols, and principles in support of design processes. The laboratory can host up to twenty people simultaneously for a 3D experience in which one participant, followed with tracking cameras, can "move" through the image or manipulate a 3D object on the screen. It enables virtual tours of buildings and neighborhoods and 3D study and design of objects in various scales; testing movement patterns in urban environments at different points in time; quick observations on built alternatives and their influence on human perception of space during navigation and way-finding in urban environments and large internal spaces.

Real-time interactive, walk-through and immersion in the virtual scenes brings about an understanding of the virtual environment, that can't be achieved in commonly used tools. Virtual scenes may empower community stakeholders through the use of 3D visualization of urban development and architectural scenarios, thereby eliminating the gap between professional jargon and popular perceptions of development. The potential of such working environment is explored through Interior design and architecture design studios where new interventions in existing fabric and built form are proposed and explored. Implementing a regular use of the visualization lab during the design process along two semesters is described. Observations regarding the students' design process and their design decisions while immersed in the virtual environment designed by them in the visualization lab are presented.

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1600–1615

Geodesign for revitalization projects: Gap between theory and practice

Tessa Eikelboom and Ron Janssen, VU University Amsterdam

Spatial planning is about combining multiple objectives in plans that meet the needs of stakeholders. Multiple stakeholders imply different priorities and consequently the need for a set of alternatives. Optimization models can support spatial planning by generating plans that fulfill a preset of requirements. This paper describes the implementation of an optimization algorithm in an existing geodesign tool that provides dynamic feedback on stakeholder objectives in response to the application of spatial planning measures. The optimization model is a genetic algorithm that can be used to generate land use plans that maximize both additive and spatial objectives in a vector based GIS environment. The optimizer was designed to be flexible in handling different problem settings. Interactive optimization is of particular interest for the identification of options as it can provide fast solutions based on a set of constraints that can easily be updated. We intend the tool to be used to generate a set of alternatives to start a decision process. This can be single objective alternatives, compromise alternatives, alternatives within set constraints, or stakeholder defined decision variables.

The tool can also be used interactively by combining tool output with stakeholder feedback to generate an alternative in a number of iterations. This study identifies opportunities and limitations of optimization with stakeholder input for interactive collaborative spatial planning.

GISualisation: A tool for visually supporting planning processes

Elena Masala and Stefano Pensa, Polytechnic University of Turin

The evaluation of quality of life in cities can be supported by the analysis of data coming from different sources and describing different aspects such as economic, social, environmental, energy, housing or mobility issues. The analysis of such big amounts of data is difficult and only expert technicians can access their inner contents, the outcomes of which are often presented in static forms reproduce the reasoning of technicians who have not expertise in urban studies. Thus, planners and decision-makers have to base their own choices on given outcomes without opportunities for personally investigating the data themselves.

To facilitate data exploration and readability by non-technicians, a web-based user-friendly GIS-based visualization tool, "GISualisation", has been realized to give to actors involved in planning processes a decision support system to visualize the inter-relations between data which describe cities. It works on geo-referenced dynamic maps, currently created with free Web GIS applications. GISualisation displays data on a map and offers the possibility to select and filter data by single attributes, allowing users to interact readily with large databases and customize the visualization of information on the basis of users' requests, enabling analysis from a planning and design perspective. It can be used in collaborative and participatory session to improve information sharing among participants. GISualisation has already been applied in investigating inefficiencies in a public transport system in studying pedestrian paths in an urban area, in analyzing urban population health and in the evaluation of social housing projects.

1630–1700 **Panel Discussion**

Moderated by Eduardo Dias, Geodan and VU University Amsterdam

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Parallel Sessions | Faculty of Architecture

1530–1700

From Design to Decision

Room P, Faculty of Architecture

Complex planning and design decisions involve multiple stakeholders with different needs. By leveraging geospatial technology to provide real-time impact analysis, negotiating and balancing design decisions in more holistic ways become possible. It keeps the task focussed and the decisions accountable for all involved.

1530–1550

RDSS; A design support system for Rotterdam

Bardia Mashhoodi and Egbert Stolk, Delft University of Technology

The design support system for city of Rotterdam (RDSS) has been developed over the last two-years in collaboration with a panel of experts in the municipality. The objective of the project is to assess development plans for the south part of the Rotterdam.

The first two components of RDSS refer to the identification of design objectives and defining the utility of different locations of the city (which is a normative statement in its nature). The former is approached by five rounds of delphi method with experts and the later is approached by more than 500 questionnaires, filled by 12 municipality experts, resulting in overall utility scores and the identification of 23 urban area typologies. The objective of RDSS is to find a geographic explanation for the subjective utility score of areas. To do so, 49 geographic indicators are acquired. In addition, to reflect the stigmatization of southern areas, a dummy variable is introduced. We conducted factor analysis, to decrease the dimension of geographic data, and linear regression, to relate the geographic properties to subjective utility of the areas.

Four different plans/scenario have been tested in Rotterdam south: accessibility-based plans, housing-based plans, a social scenario and a reputation scenario. The result shows the probable consequences of the plans/scenarios, and in particular, that the improvement of reputation of south can be as effective as social/physical interventions. Therefore, we recommend the planners of the city to invest on soft solutions, improvement of the image of the areas, as much as hard solutions, actual social/physical interventions.

1550–1610   **Real-time sustainability evaluation for industrial land redevelopment**

Tong Wang, Eindhoven University of Technology; Jan Kazak, Wrocław University of Environmental and Life Sciences; Qi Han and Bauke de Vries, Eindhoven University of Technology

Current stagnating industrial land redevelopment process in the Netherlands requires pro-active and cautious planning to mitigate pressures on the environment and prevent the same problem in the future, thus asking for sustainable industrial land redevelopment. With the great help of decision support systems, we are able to practice real-time sustainability evaluation for industrial land redevelopment process, as tested in the case of North Brabant (a Dutch region). The current industrial buildings in the region are displayed in a GIS environment and several predetermined sustainability indicators are evaluated based on the status of these buildings with the support of CommunityViz. These indicators are selected from over thirty different frameworks with a focus on industrial land evaluation and are weighted by various stakeholders. They are categorized into site level and regional level with social, environmental, economic and physical disciplines. Additionally, the current status of the industrial site itself or the region itself is considered, which provides a more comprehensive understanding of this location and the corresponding properties.

This kind of holistic assessment for industrial land redevelopment provides an integral overview of the sustainability status for current industrial land. Several possible designs for future industrial site redevelopment are also performed in the system to see the real-time results of these indicators. These designs are referenced from several successful redevelopment cases like Strijp-S which tries to connect the historical assets to the modern world.

1610–1630   **Geodesign for negotiating spatial development rights in a transport corridor**

Gustavo Arciniegas, Mapsup; Sander Lenferink, Ady Samsura and Linda Carton, Radboud University Nijmegen

In the transport corridor between the Dutch cities of Arnhem and Doetinchem, there is an oversupply of planned locations for future area development, under the 'active land policy'. However, present economic conditions and the expected demographic decline forces the municipalities to readjust their plans through a compensation mechanism referred to as 'transferable development rights', and could help municipalities overcome mutual competition. In order to address oversupply and test the applicability of transferable development rights, two geodesign workshops were organized by the Radboud University Nijmegen, in which negotiations between six municipalities were facilitated using financial and geographical data on residential and industrial developments.

The MapTable PSS, featuring an interactive GIS, a touch table and a negotiation tool, supported the spatially-explicit negotiated allocation of municipal development rights on a digital map of the corridor area. This serious-gaming tool calculates in real-time the financial impacts as a function of the intended spatial develop-

ments as well as the maximum regional supply, individual municipal supplies, and the regional demand for future spatial plans. Through negotiation of residential and industrial areas, the goal of the game is for all players reach a distribution of spatial plans that generates profits as close as possible to their theoretical maximums. Although both workshops yielded mixed results as to reaching agreements, the PSS was pivotal in focusing the negotiations, in which financial and spatial negotiations were combined, and a first step towards attaining a better regional adjustment of supply and demand.

1630–1700   **Panel Discussion**

Moderated by Shannon McElvaney, Esri Redlands

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1530–1700

Towards Safe and Suitable

Room R, Faculty of Architecture

Debates on what makes a place great, safe, and enjoyable boil down to views on community, cultural behaviour, and lifestyle. Spatial models and simulations help to objectively explore this debate, but several uncertainties inherently remain on the subject of 'livable places' to which geodesigners must respond.

1530–1550

Spatial tools for diagnosing and regenerating urban areas in the Netherlands

Akkelies van Nes, Delft University of Technology; Manuel Lopez, RCM-Advies; Dirk Verhagen and Laura de Bonth, Urban Synergy

This paper describes the tool Social Safe Urban Design (In Dutch: 'Sociaal Veilige Stedenbouw') seen together with socio-spatial and linguistic challenges when applying space syntax in regenerating urban areas. The space syntax jargon is technical and needs to be translated into a language understandable and acceptable to stake-holders who are responsible for implementation. Simultaneously, there is also a challenge to generate local and global functioning spatial solutions for reducing opportunities for crime and anti-social behaviour for the neighbourhoods. Proposed solutions for three neighbourhoods are presented in this paper.

At present, some of the municipalities have taken our proposal into their long-term strategic plans. On a micro scale level, proposals are made for removing blind walls and to make segregated dead-end streets with only parking garages accessible only for the owners of these garages. On a macro scale level, proposals are formulated which aim to create a central main route through the neighbour-hoods by using existing streets and to make the missing linkages for improving the spatial integration for the neighbourhoods.

Modeling the Suitability of Places for Actions

David Jonietz and Sabine Timpf, University of Augsburg

The concept of 'place' has sparked major research activities in various disciplines, including Geography, Spatial Cognition and, more recently, GIScience. Although it represents a vital characteristic of human conceptualizations of space, the full range of place-related aspects has not yet been explored properly, which is why computational models of place are still at an early stage. Instead GIS are generally based on an abstract, mathematical spatial model, with various problems arising such as the inability to cope with queries about, references to or descriptions of places.

By this time, GIScientists have identified the need to overcome the fundamental discrepancy between the notion of space underlying GIS and human conceptualizations of space, for example using activity-related approaches. We argue for the inclusion of spatial suitability as an extension to activity-based approaches. In our opinion, the formation and identity of a place is not merely determined by its affordances in the sense of action potentials, or the question "what can be done" there but also by the suitability it provides with regards to these actions, since the higher its suitability, the higher the probability that it will be preferred to other alternatives and something will actually be done there. Like other place-related attributes, suitability is not an objective property inherent in the environment, but rather highly subjective quality and created in the mind of the individual observing agent. We build on a cognitive model of spatial suitability developed earlier, and which is based on the psychological concepts of affordances and activity theory. The focus will be on walkability, since meeting the specific needs that pedestrians pose to their environment has been demonstrated to be critical for place identity as well as a precondition for a variety of other activities conducted at places.

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1610–1630   **Two challenges for geodesign: Dealing with uncertainty and creativity**

Giovanni Rabino, Polytechnic University of Milan

Looking on the history of spatial planning, the geodesign movement seems to re-propose an approach to the geo-governance very similar to the so-called rational-comprehensive planning of the 60s. Obviously, there are many differences (in urban problems, in societies, in culture and science, in technology) but the philosophy underneath the approach remains the same. In order to avoid to repeating the same mistakes of the rational-comprehensive planning (the failure wasn't a "technical" failure alone), geodesign must face two problems, till now largely forgotten. First is that we live in a uncertain (and risky) world, often very uncertain, and (geo)design has to be resilient to unforeseen events. Secondly, the future is open and there's room for innovation (not just room for "technically" optimal or satisfying plans); (geo)design has to deal with individual and social creativity.

Both problems have epistemological, methodological and operational aspects. This paper sets the philosophical and methodological questions, in the frame of the emerging "complex thinking" and related "science of complexity". It also presents some recent achievements in operationally treating uncertainty and creativity in planning and design, in order to add them to the tool-box of geodesign.

1630–1700   **Panel Discussion**

Moderated by Sisi Zlatanova, Delft University of Technology

1530–1700 # Adopting Geodesign Thinking

Room U, Faculty of Architecture

Adopting geodesign thinking can start anywhere, for everyone. Geodesign embraces learning by doing, which makes a captivating backdrop for training on how to think spatially, holistically, and collaboratively next to concrete technical skills in geospatial sciences.

1530–1550 ### Geodesign Education: Reflections on a Collaborative Geodesign Summer Course

Darren Ruddel, University of Southern California; Niels van Manen, Danbi Lee and Eduardo Dias, VU University Amsterdam

As interest and demand for sustainable development gains traction at national, international, municipal, and household scales, the use of geodesign principles will be increasingly valuable to address global challenges that foster human and environmental well-being. While the practice of geodesign is centuries old, as witnessed in European approaches to land management, transportation systems, residential and commercial development, and alternative energy systems, the existence of geodesign as a curricular pathway is just developing. For instance, the very first Bachelor's degree in Geodesign was launched in 2013 at the University of Southern California, and efforts are currently underway by various universities to introduce graduate and/or undergraduate degrees in geodesign.

The purpose of this presentation is to reflect on an intensive collaboration between the University of Southern California and VU University Amsterdam to develop and deliver a Geodesign study-

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abroad course in summer 2014. The motivation to develop this course was to provide a living-learning experience that introduced students to the critical and spatial thinking skills of geodesign while engaged in both classroom and field settings. The five-week intensive course included guest lectures, field excursions, hands-on activities, in addition to an applied case study. This year, the case study was focussed on the Amstelland region in Amsterdam, a leisure landscape for residents, a tourism destination for visitors, and an ecological biodiversity zone. The course activities addressed skills in multi-disciplinary decision-making, complex spatial analysis, and geospatial technology.

1550–1610 **Less space more Geodesign: A case study in the Rotterdam Port Region**

Peter de Graaf, Geodan

Over the years the Rotterdam Port Region has expanded extensively. When space became scarce, growth was achieved by expansion in the sea. Space was simply created. However, this movement is not sustainable. Pressure on the environment got to its limits and quality of life did not meet national and European norms anymore. At the same time the port of Rotterdam is an economic driver of national importance and growth remains necessary to keep up with international concurrence. This case study investigates how the introduction of Geodesign facilitates growth without concessions to environmental parameters. Results of the study reveal that the potential of the Geodesign concept is a powerful tool towards sustainable development in the Rotterdam Port Region while even pressure on the environment decreases and quality of life increases.

The case study was executed in cooperation with the Rotterdam Port Authority and DCMR (Regional Environmental Agency).

| 1610–1630 | **HISLO: Where every historical location comes to life** |
| | *Mohammed Alkadi and Noorah Alkadi, University of Dammam* |

Worldwide, there is a shortage of local research attempting to test the application of Augmented Reality (AR) in heritage tourism, especially in countries like Saudi Arabia. Physical tours to historical locations are the only way to enjoy these valuable assets. Heritage and tourism development is negatively affected with the absence of AR and similar applications. Therefore, the aim of the research is to explore and design an AR Application that could be used to improve the outcomes of heritage tourism in Saudi Arabia in general and in historical locations in the City of Medina in specific.

As a result, an augmented reality mobile application was created (HISLO). HISLO is a mobile application that gives the users a feeling of time travel. This creates an entirely new dimension to the person's experience of the world. It enables historical locations to come back to life, as if they were never affected over time. HISLO does not only focus on the location, but on the path itself as well. This app takes the users on a journey, and provides them with the whereabouts of the location. In addition, social media has been added to the mobile app, so that users can communicate easily, and they can stay up-to-date with their friends. Plus, with the integration of social networking aspects, the value and awareness of historical sites will increase. HISLO is unique in functionality and design compared to other apps of the same caliber. It is meant to be a practical contribution in its field as it is using augmented reality methods that enriches and deepens the experience of the users, showing the full structure of the landmark in augmented 3D. Finally, by using HISLO, the app will not only enhance the experience for the users, but also open new frontiers to preserve the landmarks.

| 1630–1700 | **Panel Discussion** |
| | *Moderated by Kelleann Foster, Pennsylvania State University* |

Friday, 12 September

General Session | Aula Auditorium

Featured Speaker

Space planning, systems thinking and wealth creation in rural environments in the developing countries

Patricia Sendin, Send a City

Cities are the engine of economic growth and the best stage for social development. They are our most up-to-date way to organise communities. However, not every new community does benefit from a city-like organisation, this becoming an impediment to their economic and social development.

The demand for new urban environments is staggering. According to the World Bank and the UN an additional billion people will be seeking to live in cities by 2015 and 80% of them, or what is to say 800 million people, will be in the developing world. This equals to a city of 5 million people emerging in the developing world every month for the next years.

The current way of urbanising (high cost, long times, specialized teams) has shown that it cannot satisfy the fast growing demand for cities, making it essential to find an alternative model. How could this model be? Which twist can we add to urbanisation to make it accessible to all? And once this is achieved, is urbanisation all it takes to create prosperity and well-being?

Thriving communities show that there are many "layers" to prosperity and that it is the balanced inclusion of all of them that makes a city a successful one.

Featured Speaker

Digital delta and Geo-design, connecting water with other domains through spatial perspectives.

Raymond Feron, Rijkswaterstaat

Digital Delta investigates how to integrate and analyze water data from a wide range of existing data sources. With 55 percent of the Dutch population located in areas prone to large-scale flooding, the Netherlands has immense experience in preventing floods and managing water. Every water-related event is critical and can impact businesses, agriculture and citizens' daily lives. The ongoing cost of managing water, including anticipating flooding, droughts and low water levels, adds up to €7 billion each year. Costs are expected to increase €1- 2 billion by 2020, unless urgent action is taken.

The Netherlands has one of the best-monitored water systems in the world. While large amounts of data are collected, relevant data can be difficult to find, data quality can be uncertain and with data in many different formats, this creates costly integration issues for water managing authorities. Solving these Big Data challenges is an important step towards a Smarter Water management approach.

Together, Rijkswaterstaat, local Water Authority Delfland, Deltares Science Institute, the University of Delft and IBM have combined data and technology from several new and existing water manage-ment projects.

As society is developing rapidly towards more locally governed ini-tiatives, the individual behavior of people is glued together by social networks en peer to peer communication. For the water sector the digital delta acts as a bridge to interconnect the data services (public as well as private) with easy to use IT services (apps). This will enable smarter solutions and contribute to flexible, local and customized communication with citizens.

Friday, 12 September

General Session | Aula Auditorium

Featured Speaker

Next Generation Disaster Management-Lessons learned from the Australia Disaster Management Platform

Abbas Rajabifard, University of Melbourne

Predictions of increased global population and urbanisation along with predicted increased frequency and severity of extreme weather events is prompting response from researchers around the world to tackle next generation disaster management. The newly established Centre for Disaster Management and Public Safety (CDMPS) at the University of Melbourne is a multi-disciplinary centre focused on both research and training and has a number of initiatives addressing themes associated with preparing for, responding to, recovering from and mitigating against disasters. One of these initiatives is the Australia Disaster Management Platform (ADMP) which is focused on developing a richer and smarter platform to support timely and effective decision making for disaster management. The ADMP aims to facilitate informed decision-making by communicating information via various channels and at appropriate levels of detail, to the wide spectrum of people involved in making emergency decisions. In addition to the ADMP project, another aspect the CDMPS is focusing on is urbanisation and the design of future cities in response to disaster management.

Discussion with Patricia Sendin, Raymond Feron and Abbas Rajabifard

Moderated by Shannon McElvaney, Esri Redlands

Networking Break

Aula Foyer

Lighting Talks - Quantifying Heritage Landscapes

Aula Auditorium

The power of geospatial technology to quantify, measure, and explain landscape composition and design is opening doors to new forms of landscape and heritage interpretation, documentation, and conservation. By translating landscape heritage meaning and value into quantifiable terms, it brings it to the fore and into the visions of planning and design practice.

3D Isovist Analysis – Discovering New Horizons in Architecture as Landscape

Arthur Van Bilsen, Aisophyst; Daniel Jauslin and Egbert Stolk, Delft University of Technology

The predictive power of 2D isovists and axial spatial analysis for pedestrian movement through cities and landscapes has been known for some time now. Yet, despite the increase in computing power, in particular from GPUs, we believe the current use of 3D isovists in research and design is still limited compared to the potential. The authors have tested the recently developed software of Aisophyst on an interdisciplinary study to understand the Rolex Learning Center at EPFL Lausanne, Switzerland that has been designed like a landscape. The Pritzker prize winning Japanese architects SANAA have created a spectacular 'leaning landscape' in a building that imitates a landscape setting indoors. To date this is one of the most profound studies of a building with GIS because it applies isovists to architecture, that are usually used for landscape and urban planning analysis. The technical challenges for 3D isovists analysis included irregular doubly curved floors and ceilings, holes providing surprising see-throughs, combined with both glass and opaque walls.

The architects activated the horizon as an alternative space divide in a new spatial concept that makes important connection to views across campus, city and the alpine landscape around Lake Geneva.

Our analysis covers both the outside and the inside space, and raises issues of 3D isovist definition, the role of transparency, the needed 3D-terrain information of the larger surroundings, the orientation of geometry and other technical challenges. Technical innovation should lead to merging of GIS and CAD as design tools and a feedback tool for designers. To this end, we compare our analysis results to some of the claims the architects have made and that are part of the larger study "Architecture with Landscape Methods".

1110–1120 ## The Role and Position of Wall and City Gates in Morphology of Iranian Cities

Amin Sediqfar, Urmia University

Cities, these fine phenomena of human society have acquired various features and characteristics as the first settlements of civil society. And due to the increasing global developments they have undergone various changes. With the analysis of most primitive cities of human civilization, such as Ur, Lagash, and Babylonia, we can identify a set of similar qualities among them, like proximity to water, natural endowments, endeavor to be safe, and other such issues. In this regard, an outstanding characteristic observed in morphology of Iranian cities until earlier centuries is their being enclosed; in that there exist percolated sites for arrivals and departures named "Gate". But now in today's modern world in which the whole world is considered as a global village, can the concept of gate and wall gain its former position and value? Or they will serve a new role such as the concepts of the sense of belonging and collective memory? In the present article, we have tried to locate walls and city gates in different eras, with the assistance of GIS and historical documents to determine its role and position in the past and present.

Applications of GIS in landscape design research

Steffen Nijhuis, Delft University of Technology

Despite its widespread availability and is recognized as a useful tool for mapping and planning, the potential of GIS is often still underutilized in landscape design research due to a lack of awareness and prejudice. This paper explores some concepts of GIS-based analysis which link to the very heart of landscape architecture in a natural and intuitive way. This paper exemplifies how GIS can be made operational connecting to four characteristic principles of study and practice in landscape architecture. Using practical examples this paper will elaborate on GIS-applications in landscape design research addressing: (I) Landscape as three-dimensional construction: this principle addresses landscape as a three-dimensional construction. Here the focus is on GIS-applications for exploring the landscape 'from the inside out', as it could be experienced by an observer moving through space using concepts of visibility analysis and 3D-modeling. (II) Landscape as history: the landscape is 'read' as a biography, as a palimpsest that evidences all of the activities that contributed to the shaping of that landscape. (III) Landscape as scale-continuum: this principle regards landscape to be a relational structure connecting scales and spatial, ecological, functional and social entities. Landscape is viewed as a scale-continuum. (IV) Landscape as process: the landscape is regarded as a holistic and dynamic system of systems. In that respect landscape is an expression of the dynamic interaction between ecological, social and economic processes. This principle of study and practice elaborates on models for understanding the landscape as system employing overlay analysis as well as process models.

Friday, 12 September

General Session | Aula Auditorium

1130–1140   **Landscapes of the long now: heritage landscapes informing geodesign practice**

Niels van Manen and Maurice de Kleijn, VU University Amsterdam; Jan Kolen, Leiden University; Carole Crumley, Kim von Hackwitz, and Daniel Löwenborg, Uppsala University

This paper will discuss how reconstructions of long term landscape dynamics can inform geodesign. It presents a protocol that incorporates (i) a conceptual framework for understanding long term landscape dynamics, (ii) an outline of spatial dynamic models that should be deployed to evaluate these dynamics, (iii) a spatial data infrastructure that provides the required data and tooling in support of the models, (iv) a knowledge hub that applies geospatial technologies to share the outcomes of the models in a format that is informative to all participants in geodesign practice (people of the place, geo scientists, landscape architects and planners).

In the coming two years this protocol will be implemented and tested in a number of European cultural landscapes, including the Dutch River Delta, Uppland in Sweden, Vooremaa in Estonia and Puglia in Italy through stakeholder interactions. This research regarding long-term landscape change and its place in geodesign practice is part of the European research project Sustainable futures for Europe's HERitage in CULtural Organizati: Tools for understanding, managing, and protecting landscape functions and values (HERCULES). The project follows the European Landscape Convention's call for transdisciplinary research and involves all stakeholders

in cultural landscapes of historical and archaeological value. It forms a consortium of 13 representing European universities and research institutes, small and medium-sized enterprises and non-governmental organisations, all of whom are experts in landscape science and practice. The overarching goal is to increase understanding of drivers, patterns, and values of European cultural landscapes and to use this knowledge to develop, test, and demonstrate strategies for their protection, management, and planning.

1140–1200   **Panel Discussion**

Moderated by Carl Steinitz, Harvard University Graduate School of Design

Friday, 12 September

Poster Exhibition | Aula Foyer

Hosted Lunch + Poster Exhibition

Aula Foyer

From metaplanning to 2nd generation Planning Support Systems

Michele Campagna, University of Cagliari

In spatial planning often the design of the planning process itself (metaplanning) is disregarded and in such cases tames and confuses complex multi-actor planning processes and procedures. On one hand, a lack of common understanding among the actors impedes collaboration, while on the other understanding how, why, when, and by whom planning decisions are made may become blurred to internal and external stakeholders and observers. The latter should be not considered a minor pitfall as both derive from advances in planning theory and are binding regulations on Strategic Environmental Assessment (SEA, Directive 2001/42/EC), which require the final plan but also a carefully documented and accountable process.

The importance of metaplanning, as the activity of specifying actors, activities, methods, tools, inputs and outputs, is also central to Steinitz's iterative Geodesign framework. Several attempts have been proposed by scholars to formally describe the planning process for diverse purposes, however these results appear to have affected neither the planning practice nor the design of Planning Support Systems (PSS). In fact, limitations in PSS may be attributed to lack of flexibility, thus of adaptability to contextual planning process settings. The author argues that PSS design should be process-driven, rather than technology-driven. To address this challenge, Business Process Management methods and tools have been applied by the author to implement the metaplanning concept in the urban and regional planning, and Strategic Environmental Assessment domain, arguing that metaplanning may both improve the process and ease customised PSS development accordingly (the 2nd generation PSS).

Towards a Formal Model for Geodesign using Model Driven Engineering

Thomas H. Kolbe, Andreas Donaubauer, Maximilian Sindram and Tatjana Kutzner, Technische Universität München

Geodesign aims at a tighter integration of planning and impact analysis leading to more agile design processes. Automated impact analysis requires a proper set of indicators, sufficient to compare alternative possible future situations and to establish an (at least partial) ordering on them. For automation, both a sufficiently rich model of the environment and computation methods for the derivation of the indicator values are required. The potential changes to the environment according to some design goals, must be known and modeled. Such a model would have to map planning actions which are defined in the domain of the planner/designer to (possibly complex) transactions on the model of the environment. Modeled planning actions would also comprise information about the required resources (time, money, goods) and the preconditions, which have to be met before an action could be carried out. Further important elements to be modeled are the actors/agents who plan and perform the changes of the environment. Also resources like goods, materials, and energy, and their flows need to be taken into account.

A novel formal framework for geodesign is introduced, based on the Model Driven Engineering paradigm of the OMG. The representation of the environment complies to the ISO191xx standards series and we will show how the CityGML standard can be used as a suitable base model. Our framework also defines abstract models (similar to the general feature model of ISO 19109) for the modeling of indicators, planning actions, and resources. They define domain specific application schemas for all of these. According to the MDE principle we link these models using model weaving. Computation rules for indicators are specified using OCL expressions. The entire model is platform independent and can be mapped to GML, GIS, and spatial database structures.

Friday, 12 September

Poster Exhibition | Aula Foyer

Tracing dikes – creating the dike map of the Netherlands using GIS

Michiel Pouderoijen and Steffen Nijhuis, Delft University of Technology

An all-encompassing and current overview of dikes in the Netherlands does not exist to date, although dikes play an important role in the water management system, and in the spatial structure of the Dutch landscape: dikes are the spatial backbone, that tell the story of its creation. Having information about spatial characteristics available for policymakers, designers and others is highly relevant, as the landscape is under continuous pressure for change. By choosing a stepwise approach with reuse of as much existing GIS-data as possible as a basis, and complemented by information from other sources, we were able to generate a dataset on the first nationwide overview of the spatial patterns of dikes, which offers a basis for further development and use in several fields.

The advantage is that a base map could be made with a reasonable effort and within a limited time frame, while the use of GIS makes the preliminary dataset flexible and expandable. Data for dikes that are part of the current flood defence and water management system are fairy accurate but rather technical and collected in a fragmented manner. Data on retired dikes or that have (partly) disappeared is far from complete, often more coarsely drawn and only available for specific regions, so we decided to edit the 'Polder Map of the Netherlands' as first source, complemented with other data sources. Within this approach the selection, acquisition, evaluation and modification of the data to make it suitable for our needs and the benefits and drawbacks of using publicly available or open GIS-data will be described. In the paper, the purposes and method of production of the dike map will be further elaborated.

Several examples of student work in Geodesign

Mel van Drunen, Marinus de Bakker and students, HAS University of Applied Sciences

The HAS University of Applied Sciences (bachelor level in agriculture, food en environment) started in 2012 with a new study program Geo Media and Design. The objective of the program is to link applications of geo-information (Geo) with spatial tools, geo-ICT and data (Media) aimed at efficient and modern visualization (Design). Due to the fast developments in these fields our overall mission is to integrate as much as possible with the professional world. Not specifically with the Geo-ICT technology, but more directed at the (end)users of Geo-information. It could be even people with needs of sophisticated maps and apps, without formulating questions and challenges in the geo-spatial domain. Although the concept of geodesign was not the leading principle in development, in practice many similarities can be seen. Our students are in the middle of the process of geodesign. This poster will show some of the student work, especially regarding Graphic Design in the context of Geo-information. The labormarket, especially management ask for infographics and dashboards that bring the message in a clear way. But some issues are still important: (i) relation between software and creativity (information design is not ArcGIS symbology, Photoshop, or Illustrator use), (ii) With 16 million map-users in the Netherlands, are academic rules of cartography still applicable? If not, how to deal with this in an educational context?

Friday, 12 September

Parallel Sessions | Faculty of Architecture

1330–1500   ## Changing Environmental Systems

Room P, Faculty of Architecture

As our cities and regions develop, they become increasingly measured and sensed by government and citizens who seek to monitor and evaluate changing urban environmental systems. By making sense of spatial data, we can better predict change, react to hazards and find better ways to mitigate them.

1330–1350   **Spatial Interaction between Land Use, Energy Consumption and Temperature on the City Scale**

Hung Chu Chen, Bauke de Vries and Qi Han, Eindhoven University of Technology

Today many research projects focus on energy reduction in the built environment in order to fulfill the international ambition with regards to CO_2 emission reduction. City energy models calculate the need for renewable energy technologies and other measures to reduce energy loss. In these calculations, the energy consumption is highly dependent on the outdoor temperature. Slight changes in outdoor temperature due to climate changes can have a great impact on energy consumption at the city scale. Outdoor tempera-ture in a city is also determined by exhaust of energy by the building themselves. This temperature effect is well known as the urban heat island (UHI) effect. Research has shown that spatial conditions such as the dimensions and distances of buildings have an effect on the outdoor temperature. Dependent on the time and place on earth the UHI effect can contribute negatively or positively to the heating/cooling load of the surrounding buildings. In this research project we aim to investigate the interaction between (1) Land use, (2) Energy consumption and (3) Temperature. By researching the interaction between these three parameters through GIS tools and

using observed data. With the implemented spatial interaction model, we intend to execute simulations under various scenarios where existing forecasting models on land use change, energy consumption change and temperature change will be used to study the effects at the city scale. The outcomes can be used by city planners and policy makers as input to city transition plans that aim at energy neutrality. In this research we take Rotterdam as a case study to use this spatial model in the practical way. Further study will investigate the potential use of spatial model in different climate zones.

1350–1410 **Planning for safety and managing emergencies**

Massimo Rumor, University of Padua; Eduard Roccatello, 3DGIS; Alessandra Scottà, Geodan

Environmental hazards occurrences in the last few years have been constantly increasing and risk management techniques and tools have assumed great importance both in planning, where safety aspects require more and more consideration, and managing emergencies. From our experience this set of tools can be provided by a comprehensive and integrated safety oriented WebGIS, which should be based on four main pillars: risk assessment, emergency oriented data collection, emergency management simulation and real-time emergency management and information collection.

Risk assessment is clearly the starting point, the second pillar provides the knowledge on what helpful resources are available and where, the third is needed to evaluate the alternatives in case of a real emergency and the fourth is crucial in order to ensure the resolution of the emergency and is based on data and simulation evaluated before. This is in our view the most effective approach.

Based on this approach and taking into account a methodology adopted by the Italian Civil Protection Department, we at 3DGIS have developed such a WebGis. So far it has been used by a number of Italian Local Authorities for the preparation of their Civil Protection Plans and for managing real situations of emergencies.

In this paper we will illustrate our approach and demostrate some of the main functions offered by the system. Finally the architecture of the system will be briefly illustrated to show its flexibility and robustness at the same time, and to highlight how the adopted architecture make it possible to achieve and extremely high level of availability, so important in case of an emergency.

1410–1430

Planting the SEED: towards an online Spatial Economic Ecologic Database for a shared understanding of the Dutch Wadden area

Michiel Daams, University of Groningen

In this paper we address the characteristics of a publicly accessible online-GIS based Spatial Economic Ecological Database (SEED) and its ability to support a shared understanding among planners and experts of the economy and ecology of the Dutch Wadden area. The purpose of the SEED is to integrate basic economic and eco-logic information in order to support both the resolution of strategic spatial policy questions and the spatial evaluation of development alternatives at the project level. Theoretical building blocks as well as the interactive design of the online policy evaluation support tool are discussed. Our SEED contains a comprehensive set of stake-holder validated spatially explicit data on key economic and ecologi-cal indicators. These data extend over various spatial scales. A SEED for the Wadden is valuable since it is a consensus-based common knowledge base on the economy and ecology of an area rife with ecological-economic conflict, including conflict in which scientific information is often challenged and disputed.

1430–1500

Panel Discussion

Moderated by Frank van der Hoeven, Delft University of Technology

Smarter Development

Room R, Faculty of Architecture

Where we once imagined, we can now experience a complete inventory of our physical environment, a central database of specifications that automatically matches development needs to existing infrastructure, enabling us to reuse what we've already built so that development costs less and is more sustainable.

Combining GIS and BIM for facility reuse - a profiling approach

Thomas Krijnen and Tong Wang, Eindhoven University of Technology

In the industrial sector, land and facility reuse is not widespread. The abundance of affordable land does not urge prospective clients, which are seeking to acquire new facilities for housing their activities, to redevelop or reuse existing vacant facilities. There is also a lack of awareness about existing vacant facilities and their potential for lower-cost reuse. Hence, new facilities are built where instead existing ones could have been reused. Reusing existing facilities is a more sustainable alternative since land would be conserved and reduces the amount of neglected and abandoned facilities.

This paper proposes a framework to match existing vacant facilities to potential customers aspiring to acquire them. Prospective owners are asked to provide detailed information, preferably a digital Building Information Model (BIM), about their ideal conception of a building, and to provide a reference location for this facility. The framework then composes a vector of quantitative measures that describes aspects of the building and its relation to geospatial

resources. Examples of these measures include properties like the floor area and ceiling height of the facility, derived from the document or BIM they provide. Proximity to public transport hubs and supply chain partners can be derived from a GIS. Lastly, derived properties can be included such as the outcome of simulation or measurement. Within this framework, a building profile is extracted by combining data from BIM and GIS (taking profile vectors that have the smallest Euclidean distance to the demanded profile vector). This framework enables a situation in where the requirements from the potential users are fulfilled and existing vacant facilities are matched for redevelopment or reuse, connecting supply and demand for a more sustainable future.

1350–1410   **Deploying Esri CityEngine in the interactive design of urban infill scenarios**

Petr Bocharnikov, Esri Finland

The intensification of land use through infill development is a growing task in urban planning in Finland. It allows municipalities to revitalize multi-storey apartment block residential areas built in 1960s - 1970s, and it plays an important support role in the development of public transport corridors based on light rail and bus rapid transit. Despite the strong positive impact of infill development, the majority of infill proposals are held by the lack of interest and resistance from local residents and the condominiums representing them. The task of municipalities requires, therefore, a design process which provides the rapid creation of various building configurations for a site, accompanied by visualization and reporting of key parameters.

To enable CityEngine to produce required scenarios, we implement a cascade of algorithms in CGA script which has two distinct production flows. One flow starts from the existing real estate lot divisions; another starts from the centroid lines of the road system. The rules of the flows are calibrated through the discussion of produced building configurations with planning practitioners. The

resulting design process allows users, envisioned as participants of open public workshops, to explore the potential building configurations by modifying input parameters of floor-to-area ratio, maximum height and parking provision for built space. The local stakeholders will, therefore, be able to judge the most suitable design solutions and co-design their environment. The project creates a flexible and realistic system for locating new buildings within the existing urban structure, which at the same time provides a sufficient level of control for the public participants. The inherent benefit of utilizing procedural modeling for urban planners is the possibility to extend a negotiated infill approach to the similar residential areas, assessing its impact there, or alternatively, across the entire urban area.

1410–1430 **An evaluation system of mixed land use on city scale**

Xiaoming Lyu and Bauke De Vries, Eindhoven University of Technology

During the past decades mixed-use development has become a key part in modern urban planning strategies, although with different labels such as 'compact city', 'New Urbanism' and 'sustainable development'. It is believed that mixed-use development has significant social, economic and environmental benefits, especially in reducing traffic, restricting urban sprawl and creating livable and sustainable urban environments. However, many take the benefits for granted, and they are mostly qualitatively analysed with only a limited amount of studies trying to quantitatively measure the benefits. The efficacy of mixed-use has not been proved sufficiently.

To examine the efficacy of mixed-use, research is needed on a district to city scale where a quantitative measure of mixed-use and its benefits are needed. The data reflecting benefits is relatively easy to obtain, and what we need to do is to build up an evaluation system of mixed-use in a whole city. A city is firstly divided into smaller spatial units, maybe at neighbourhood scale level, in which whether the land use is mixed or not could be clearly identified. After that, the mixed conditions are defined including not only the mixed functions

one single spatial unit, but also the interaction between the unit and its surroundings. Then, each condition will be given a score reflecting its mixed degree. After valuing all units of a city, a mathematical method based on the spatial analysis functions of GIS is developed to integrate these units and scores, ending with an average score as the mixed degree of the city. This paper takes Eindhoven as a case study, to check and adjust the evaluation system, and then discuss the meaning of mixed degree.

1430–1500 **Panel Discussion**

Moderated by Stefan van der Spek, Delft University of Technology

| 1330–1500 | # Crisis Management |

Berlagezaal 1, Faculty of Architecture

When a crisis hits, the messy challenges of communication and information sharing among first responders, victims, and decision-makers are unavoidable. However, with advances in geospatial technology, operations are now maturing towards shorter lines of communication and a common operational picture.

| 1330–1345 | **GEO Information as Something to Talk About. Negotiating crisis information through Common Operational Pictures.** |

Kees Boersma and Joeren Wolbers, VU University Amsterdam

In emergency management literature Common Operational Picture (COP) is often proposed as the solution for failing communication and information sharing practices between the different organizations. Potentially as integrated part of information systems, COPs offer the possibility for organizations to share the same information and – in practical terms – be on the same page. A substantial part of crisis information has a geographic component so COPs are often manifested as a geographical representation (GIS system) combined with a checklist that describes the characteristics of the response operation. Together and if flexible enough, it can be seen as a (pre)condition for creating situation awareness. However, proposing the COP as the solution leads to a focus on the end result (i.e. creating the perfect COP) and not to the ongoing process of information sharing. Consequently, the current generation of COP is treated as an "information warehouse" where its users can select

the information appropriate for their tasks. We need a sense-making perspective instead, to understand how COPs work in practice among different actors. Even if all the actors have access to the same information there is no guarantee that problems in information management and organizational collaboration can be overcome. In a previous article (Wolbers and Boersma, 2013), we introduced the "trading zone" as the alternative for the information warehouse approach. The trading zone is the real and virtual space where information is shared, given meaning to and talked about. We build upon that idea and the relative value of the COP (and GIS) information in crisis situations and how the different and heterogeneous actors talk about the information in the trading zone within its five key dimensions: Social, Cognitive, Semantic, Normative, Power.

1345–1400 **Net-centric information systems in incident management**

Jan Smits, Eindhoven University of Technology

Disaster Management and Traffic Incident Management involves the coordinated interactions of many public and private actors. On many levels, there is clearly a strong relation between the road infrastructure and the effective handling of large scale disasters. Location awareness plays an important role. To support the tasks in an effective way, net-centric information systems are increasingly being seen as an important enabler to improve the cooperation in the beacon sector. Different types of data need to be shared, such as location, responding personnel, victims, type of incident/crises, etc. Each category of data entails different legal responses as well as responsibilities. The reason, or the purpose for which the data are collected is a very important legal fundament for (person related) data gathering. In all such cases there are privacy issues, medical issues, public order issues. Apart from the directly related data there

is of course data stemming from sensors, social media, cameras and the like. How to incorporate this data into formal responses of the beacon sector is a challenge both from a technical as well as legal viewpoint. Then the phenomenon of Open data and Big Data come also into play adding even more (legal) complexity. This presentation will try to depict the relation as well as the challenges, from a (inter)national legal perspective.

1400–1415 **Geodesign and Multi-Layered Security**

Panayiotis Sophronides, National Technical University of Athens; John Steenbruggen, VU University Amsterdam, Ministry of Infrastructure and Environment; Henk J. Scholten, VU Amsterdam, Geodan; Maria Giaoutzi, National Technical University of Athens

Natural disasters cause enormous socio-economic impacts and sometimes fatalities. In the urban context natural disasters are treated as crisis situations. Floods are considered to be serious threats to basic structures or to the fundamental values and norms of a system under pressure and highly uncertain conditions, and require critical decisions to be taken in a timely manner. At the moment, much attention has been paid to preventing such crises. In the context of flood prevention, measures such as levees, dunes or dikes are employed. These structures increase the potential consequences of flooding but decrease the probability of occurrence of a flood. Are these preventive measures enough to effectively protect society and the environment from the impacts of a flood? Recent floods in Europe as well as hurricane Katrina have demonstrated that the flood protection policies have to broaden in scope rather than focusing only on the prevention of the floods.

For this, the multi-layer safety approach has been introduced. In the Netherlands, this multi-layered approach contains three flood protection levels. The first focuses on the establishment of flood prevention measures while the second is about spatial planning in a sustainable manner to minimize the potential human casualties and damages resulting from a flood. The third layer focuses on emergency management including organizational preparation and response. For all the three levels, almost all the information needs have a spatial component. The nature of the Information can vary between semi-static, dynamic and model information depending on the safety layer to which it corresponds. This study will attempt to identify the role of geodesign through its different stages in supporting the multi-layered approach regarding water security matters.

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Exchanging Incident Management Data: A practical approach

Leo van den Berg, University of Valencia

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Incident Management (IM) in the Netherlands was originally implemented as a legal and organizational framework. The main objective in the mid-nineties was to "clear the road" as soon as possible to reduce the economical impact of the incident. The framework provided the means to handle any traffic incident within clearly defined time limits while taking into account the safety of all involved persons (victims as well as roadside assistance). IM is already recognized as a highly effective traffic measure but Information and Communication Technology (ICT) could improve the IM-chain such as the exchange of real-time incident data between the involved agencies and personnel. Organisations need to extend the existing IM-framework with more technical levels to be able to

"talk" the same IM-language. Not only for human communication, but also for automated "Machine-To-Machine" interaction. The involved organisations must agree on the "what" (the data) and "how" of the communication (XML, webservice, messaging etc.). Although creating such a technical agreement seems to be a trivial activity, ingrained habits and reluctant IT-departments make it a difficult task. The University of Valencia was involved in several "IM data exchange" projects of the Rijkswaterstaat. The presentation will review identified semantic problems when exchanging between organisations with a focus on incident identification and localization, organisational and technical issues in a heterogeneous world, technological problems to tackle for mobile users, and several projects.

1430–1500	**Panel Discussion**
	Moderated by John Steenbruggen, VU University Amsterdam

Friday, 12 September

General Session | Aula Auditorium

1500–1530 | **Networking Break**

Aula Foyer

1530–1615 | **Keynote Speaker**

A Framework for Geodesign and its application to Post-tsunami Restoration in Soma City, Fukushima Prefecture, Japan

Carl Steinitz, Harvard University Graduate School of Design

It is clear that for serious societal and environmental issues, designing for change cannot be a solitary activity. Rather, it is inevitably a collaborative endeavor, with participants from various design professions and geographic sciences, linked by technology, from several locations for rapid communication and feedback, and reliant on transparent communication with the people of the place who are also direct participants. In the summit ending keynote, Prof. Steinitz will present an overview of his Geodesign framework, and a recent case study of its application. The framework has been used to organize diverse collaborative, multidisciplinary studies of important landscape regions undergoing significant change. It has also become a reference work on which many developments and curricula around geodesign anchor upon.

1615–1645 | **Discussion with Carl Steinitz**

Moderated by Henk Scholten, Geodan and VU University Amsterdam and Josef Strobl, University of Salzburg

1645–1700 | **Closing Message**

Henk Scholten, Geodan and VU University Amsterdam and Frank Holsmuller, Esri Europe

Notes

Notes

Notes

Downtown Delft

1 Delft Pottery Museum
2 Old Church
3 Prinsenhof Museum
4 Vermeer Museum
5 The Candelaer
6 City Hall
7 New Church
8 Boat Tours
9 The Veste Theatre
10 East Port Towers
11 Delft Train Station
12 Botanical Garden
13 Royal Delft
14 Delft University of Technology
15 Delft Science Centre
16 Maria van Jesse Church
17 The Delft Windmill
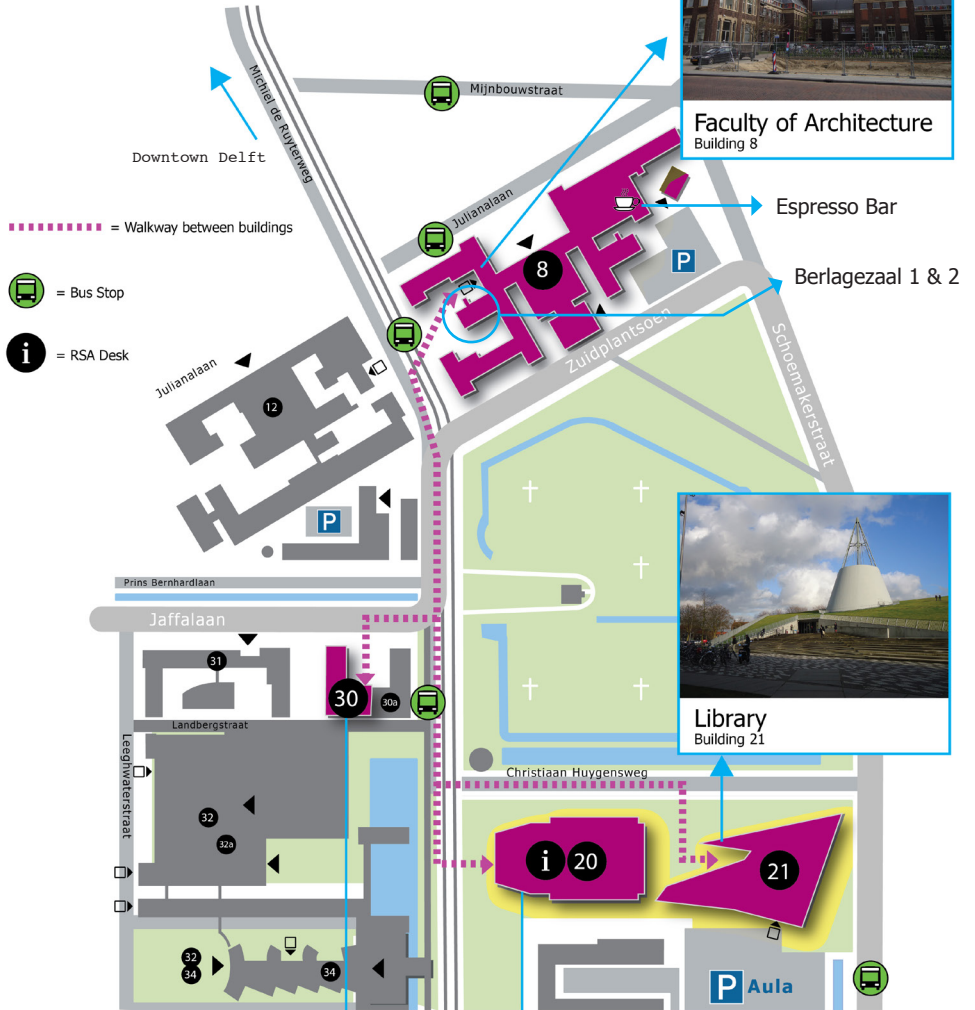18 Delft Lake park
19 Paul Tetar van Elven Museum

i Tourist Information Point
Tram Line 1
Tram stop
Hotel
P Parking Garage
Bus Platform
Bike Parking
WC Public Toilet

TU Delft Campus Map

Faculty of Architecture
Building 8

Espresso Bar

Berlagezaal 1 & 2

Mijnbouwstraat

Michiel de Ruyterweg

Downtown Delft

Julianalaan

= Walkway between buildings

= Bus Stop

= RSA Desk

Julianalaan

12

8

P

Zuidplantsoen

Schoemakerstraat

P

Library
Building 21

Prins Bernhardlaan

Jaffalaan

Leeghwaterstraat

31

30

30a

Landbergstraat

32

32a

32
34

34

Christiaan Huygensweg

i 20

21

P Aula

OTB Research Institute
Building 30

Aula Conference Centre
Building 20

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