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Education

1994 -
Through the years I have received a couple of courses within management and leadership and I also received a two year course in the theory of education. As a researcher the continuous learning process is an essential part of the job.

1994 - Ph.D. Degree, Title of Thesis: Multidynamic Design of Cross-roads.

1994 - HD, Graduate Diploma in Commerce at Aalborg University. (http://www.evu.aau.dk/hd/)

1987 - Master of Science degree in Civil Engineering at Aalborg University. (http://www.civil.aau.dk/)

Professional Occupation

2008 -
Director of the Centre for 3D GeoInformation. (http://www.3dgi.dk).
After Lars Bodum had directed this lab since its start in 2001 he chose to be vice head in our department which gave me the opportunity to succeed him. At the moment the number of staff members is increasing due to project funding's. Please visit the centres own web page for more information.
2000 - 2007
Director of the VR Media Lab. (http://www.vrmedialab.dk).
I have been directing the VR Media Lab trough 8 years. The Lab was primarily a facilitator for research and exploration within the domain of virtual reality. When the lab was inaugurated it held the largest collection of VR related equipment like a 6-sided CAVE and a Panorama. For more information about the lab please use the link provided in the headline.

1997 -
Associate Professor in road design and GIS. Teaching road design and GIS on different semesters. In the field of GIS I focused on basic GIS-skills and grid-based GIS whereas the research part is focusing on 3D GIS.

1994 - 1997
Assistant Professor in road design at Aalborg University. Teaching road design and CAD in general. During my Ph.D. studies and the period as an assistant professor I focused more and more on the use of GIS and 3D modelling. I left the area of core road design as a research field during this period.

1991 - 1994 Ph.D. Student at Aalborg University. In the same period I did a lot of teaching and worked as a consultant for the Consulting company Ramb¿ll and for the County of North Jutland. My consultancies were given in regards to the Novapoint CAD system and geometrical road design.

1989 - 1991 Secondary to my work at the County of North Jutland I worked as a teaching assistant in road design at Aalborg University.

1988 - 1991 Working as a civil engineer with road design at the County of North Jutland. I designed and carried out all kinds of projects from small bicycle lanes through

cities and open land areas to 4 lane highways. A lot of the assignments were adjustments of existing roads ex. widening the road or mending curved alignments. I also designed a lot of cross-roads and roundabouts. During this period I started working with CAD for road design and 3D landscape modelling.

1982 - 1987 Study period at Aalborg University

Research

New project description are coming up soon

Energibyen Frederikshavn (2008- 2010)

InfraWorld (2008 – 2012)
http://www.vianovasystems.no/Brukermoeter/Brukermoeter-2012/InfraWorld#.U-thDEgRV90

My time in VR Media Lab (2000 – 2007)
Listed below you will find some major projects I have been involved in during my period at Aalborg University. During my time as a director of the VR Media Lab I have also been involved in a huge number of small and medium-sized projects where VR and 3D visualization has been the main focus. These projects have primarily been carried out together with the staff at VR Media Lab and private companies. Further these projects had the main purpose to try VR as new technology or media in a wide range of usage. Take a brief look here:

VR Media Lab / projects
Stålcentrum - RTC (2006 - 2008) Visualisering som kommunikationsværktøj mellem kunde og leverandør Projektet er finansieret af Videnskabsministeriet og bliver ledet af Teknologisk Institut i Kolding. Delprojektet som jeg deltager i fokuserer på visualisering af produktionsudstyr til fødevareindustrien, idet vi benytter både Cave'n og Panoramaet til at visualisere de dele, der indgår i produktionen. Vi bruger visualiseringen som led i kommunikationen mellem udstyrsleverandøren og fødevareproducenten. Herudover tager vi de første skridt til at optimere indretningen af arbejdspladsen, hvor denne er meget belastende for kroppen. Denne del er forarbejdet til en ansøgning i Højteknologifonden i 2007.

IT in the Building Industry (2004 - 2007)
VR Media Lab is part of a Consortium which contains of the major consulting engineering company Rambøll in Copenhagen as the lead contractor, Arkitema representing architects and coming from Århus and finally NCC representing the interests of the entrepreneurs. The consortium has the assignment to describe the demands of digital data within the building industry in a way that project data can be used all the way from the architectural competition over the consulting engineering part to the entrepreneur. The data should be able to handle 3d information and be identified as objects without being connected to any propriety software package.
The project is financed by 2/3 from the danish "Erhvervs- og Boligstyrelsen". Further information can be obtained from the following link: Det digitale byggeri

3D GeoInformation (2001 - 2006)
At the moment most of my research time goes to the 3d GeoInformation knowledge centre. This project was initiated in the late nine-tees and the application was granted in 2001.
In this centre we have an ongoing project where we want to build a platform and a virtual model of the world and in particular of North Jutland. This model is than supposed to be used as a new spatial visualization platform, where all kind of information and visual aspects like for instance planning issues can be presented.
The goal is to build a landscape model with all its features like buildings, vegetation etc. or at least as many features as possible. We want to be able to represent those features as objects in a database where it is possible to retrieve them again in real time. Together with the geometry of the objects it is possible to retrieve information which are connected to the features. The feature can be pointed at and selected in a 3d view on a display system. The system developed for that purpose goes under the name of GRIFINOR. GRIFINOR is a open source platform.
Even if the funding has stopped now the knowledge centre continuous. Please go to the web page for GRIFINOR for further information.

Earlier Work
3D Visualization for Decision-Making (2002 - 2005) In connection with the new "House of Music" in Aalborg the VR Media Lab has been involved in the decision-making process. All incoming projects have been visualized and presented in the Panorama following a well defined schema for the presentation. These visualizations where supposed to give an idea of the shape and volume of the different projects placed in the town model of Aalborg. After this process three projects where chosen for further negotiations and visualization work. So all three projects where modelled with the interior and again presented to the jury. Finally the winner was found.

Virtual Reality In Planning (1998 - 2002)Creating 3D-Models for the Purpose of Planning
Why can our children move around in artificial Worlds playing the conqueror of the world, driving hazardously through virtual cities or killing outrageous monsters in a castle without getting even a scratch? The market of computer-games is huge and the people behind have developed smooth techniques making it possible to move around in virtual

environments with very high refresh-rates between the computer-generated pictures. In the field of urban and regional planning or civil engineering 3D-modelling and animations have been produced in big numbers through the years. But it is very expensive and time-consuming building a good computer-model. Moving to virtual reality makes it even harder to use these techniques. This project faces the problems of building a good 3D-model, gives some ideas of how it can be done much easier and present a piece of software where these ideas have been implemented. This work shows that it is possible with very little 3D-modelling knowledge to use virtual reality as a tool in a planning process.

Road-Pricing (1998 - 2001)
At DTU in Copenhagen a big road-pricing project started early 1998. The project had the goal to develop a road pricing system different from those used world wide where you pay at a toll-ring at the outskirts to the inner city or simply for using a highway. The road-pricing system in this project calculates a price for every meter you drive on a specific road, which is divided into several price classes. I.e. driving on a highway in an open area is very much cheaper then driving in the inner city on a local road. This pricing system has the ability to control traffic around the city much more precise and hopefully convince as many as possible to use public transport instead of using private cars from and to work in the cities, or at least getting the motorist using major ways instead of the ways in the inner cities. At Aalborg University a prototype has been developed during spring 1999, which basics is a portable PC with a GPS attached giving the co-ordinates in the GIS system which is the heart of the system. In the GIS system the calculations will be done while the GPS is the positioning system which can be exchanged with another technology anytime. The prototype area is the city of Aalborg. The System was then: Toshiba Satellite Pro 490XCDT (PII 266, 160Ram), Trimble GPS NAV-GUIDE+, ArcView 3.1 and Tracker Analyst for ArcView. (About 4000$ all together). The prototype has been developed by Jesper Kruse during spring 1999, who wrote his master about this prototype to become a chartered surveyor. His diploma work can be downloaded at road-pricing.pdf (2,6Mb, only in Danish). This project has been going on since then. New dedicated boxes with cpu and gps included have been developed and other functionality like speed control has been implemented. For more information look here: TRG

Publications

Software Tools Supporting Advanced Design Requirements for Digital Twins
Kjems, E. & Arthur, J. K., 2021, *Proceedings of the 38th International Conference of CIB W78, Luxembourg, 13-15 October.* Kubicki, S. (ed.). ITC, p. 214-223 22. (Proceedings of the 37th International Conference of CIB W78; No. 2021, Vol. w78).

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Kjems, E., 2019, In: Trafik & Veje. 96, 12, p. 39-41

Augmented Reality er kommet til vejsektoren
Kjems, E. & Hansen, L. H., 2018, In: Trafik & Veje. 8, August, p. 58-61 9029.

Energy-efficient cruise control – a pre-project study
Kjems, E., Bolet, L., Agerholm, N. & Plausinaitis, D., 2016, *Proceedings of 11th ITS European Congress, Glasgow, Scotland, 6-9 June 2016.* ITS European Congress, 11 p.

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Kjems, E., May 2015, In: Trafik & Veje. 5, p. 12-15 4 p.

Undlad spild af god plads
Kjems, E., Frederiksen, A. B. & Bolet, L., 2015, In: Trafik & Veje. 91, 9, p. 52-55 4 p.

A 3D City Model as User Interface Connected to an Energy Model
Kjems, E. & Østergaard, P. A., 2014, *Technologies for Urban and Spatial Planning: Virtual Cities and Territories.* Pinto, N. N., Tenedório, J. A., Antunes, A. P. & Cladera, J. R. (eds.). IGI Global, p. 228-246 19 p.

A 3D City Model with Dynamic Behaviour Based on Geospatial Managed Objects
Kjems, E. & Kolář, J., 2014, *Innovations in 3D Geo-Information Sciences.* Isikdag, U. (ed.). Springer, p. 159-173 15 p. (Lecture notes in geoinformation and Cartography).

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Kjems, E., 20 Mar 2011

A 3D City Model Used as User-interface for an Energy-System
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A 3D City Model Used as User-interface for an Energy-system
Kjems, E., 2011, *12th International Conference on Computers in Urban Planning and Urban Management : Book of Abstracts.* Hunt, J. D. & Abraham, J. (eds.). Alberta: University of Calgary, p. 37-37 1 p.

InfraWorld
Kjems, E., 2011, In: Trafik og Veje. 06/07, p. 44-47

Real world 3D modelling
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Managed Objects for Infrastructure Data
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Object Oriented Visualization of Urban Energy Consumption
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Object oriented roads in modelmaps
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Virtual Reality for training and collaboration in emergency management
Kjems, E. & Bodum, L., 2008, *Geospatial Information Technology for Emergency Response.* Zlatanova, S. & Li, J. (eds.). London: Taylor & Francis, p. 203-216 (International Society for Photogrammetry and Remote Sensing (ISPRS) Book Series, Vol. 6).

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From mapping to virtual geography
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VR applications in an architectural competition: Case: House of Music in Aalborg
Kjems, E., 2005, *Realitat Virtual a l'Arquitectura i la Construcció: Taller 2.* Khora ll, p. 47-58

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Kjems, E., 2000, In: Dansk Vejtidsskrift. 77, 5, p. 2-

Creating 3D-models for the purpose of planning
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Digital projektering
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Multi-Dynamic Design Method
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Tracering
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Kjems, E., 1997, *Vejteknik : Kompendium.* Thagesen, Bent (red.) (ed.).

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Brugervejledning til vejprojektering i NovaCAD
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Multidynamisk konstruktion af vejkryds
Kjems, E., 1993, In: Dansk Vejtidsskrift. 70, 12, p. 26-27

Vejprojektering i fremtiden
Kjems, E., 1992, In: Dansk Vejtidsskrift. 69, 1, p. 20-22

Projects

3D Visual Data Mining (3DVDM)
Stenholt, R. (Project Participant), Kjems, E. (Project Participant) & Granum, E. (Project Participant)
19/05/2010 → …

3d visualisering og VR til beslutningsstøtte
Kjems, E. (Project Participant)
19/05/2010 → 19/05/2013

BLING: Bling - Blockchain in Government
Tsiulin, S. (CoI), Reinau, K. H. (PI), Stakenaite, D. (Project Participant), Agerholm, N. (CoI) & Kjems, E. (CoI)
01/01/2019 → 01/07/2023

Digital Construction. Builder's requirements 3D Models
Carlsen, M. (Project Participant), Christiansson, P. (Project Participant), Svidt, K. (Project Participant) & Kjems, E. (Project Participant)
02/02/2004 → 31/12/2006

InfraWorld
Kjems, E. (Contact), Kolar, J. (Project Participant), Bodum, L. (Project Participant), AS, V. (Project Manager), es, I. (Project Participant), AS, N. (Project Participant), Healthcare, V. (Project Participant), Kommune, D. (Project Participant) & SF, S. (Project Participant)
VERDIKT, under Norges ForskningsRåd
01/05/2008 → 01/05/2012

Integrated Project Development for Road Infrastructure Education
Øhlenschlæger, R. (PI), Stakenaite, D. (Contact) & Kjems, E. (PI)
01/09/2020 → 01/09/2023

Maritimt Block-Kraft
Tsiulin, S. (CoI), Reinau, K. H. (PI), Agerholm, N. (CoI), Kjems, E. (CoI), Stakenaite, D. (Other) & Karam, A. (CoI)
08/04/2019 → 31/12/2020

Ny general datamodel til digitale infrastrukturdata
Kjems, E. (Project Participant), Overby, J. (Project Participant), Kolar, J. (Project Participant) & Ilsøe, P. M. (Project Participant)
19/05/2010 → 19/05/2013

Støtte til udarbejdelse af kursusgange om jernbane transport
Reinau, K. H. (PI), Kjems, E. (CoI), Agerholm, N. (CoI) & Stakenaite, D. (Contact)
01/08/2019 → 30/06/2021

The Staging of Virtual Inhabited 3D Spaces
Bodum, L. (Project Participant) & Kjems, E. (Project Participant)
31/12/2003 → 31/12/2003

Videncenter for 3D GeoInformation
Kjems, E. (Project Participant), Sørensen, E. M. (Project Participant), Overby, J. (Project Participant), Nielsen, A. H. (Project Participant), Bodum, L. (Project Participant), Ilsøe, P. M. (Project Participant) & Kolar, J. (Project Participant)
01/09/2001 → 31/12/2005

Virtual Reality in Design, Construction and Operation
Svidt, K. (PI), Jensen, R. L. (PI), Kjems, E. (PI), Hansen, L. H. (PI) & Wyke, S. (PI)
COWIfonden
01/01/2017 → 30/09/2019

VR Media Lab, Virtual Reality Media Lab
Kjems, E. (Project Participant) & Granum, E. (Project Participant)
19/05/2010 → 19/05/2013