Towards an Integrated Web-based Visualization Tool

A Comparative Survey of Visualization Techniques for Enhancing Stakeholders' Participation in Planning

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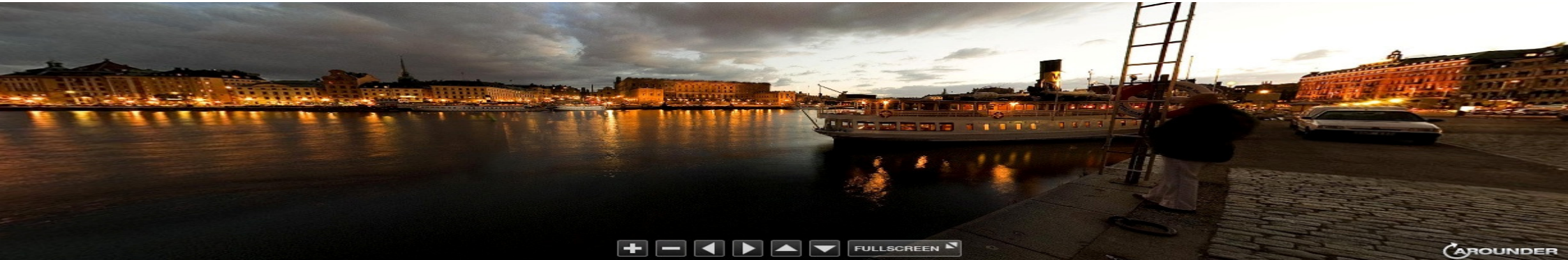
17th. November 2011



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- Proposal for the Integrated Web-Based Visualization Tool
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Visualization as a means for participatory planning

Communicative planning, collaborative planning and participatory planning [Hea03]

Planning tools: Search for more **comprehensive**, **informative** and **interactive** tools to enhance planer's facilitating role [CR04]

Visualization tools: A shift in planning paradigms to **more visual approaches** for a better **inclusion** [Sie06] [Sim01].

Digital visualization tools for planning: Maximum participation regardless of **temporal** or **spatial** distance [BCW08].

Contemporary visualization tools

Visualization environment for a participatory planning procedure:

- **Available** and **workable** for different groups of users
- Fairly **integrated** so as to bring all diverse planning issues together within a simplified and unified planning tool [Sta00].

Efficient
Integrated

Resource-Demanding Expensive

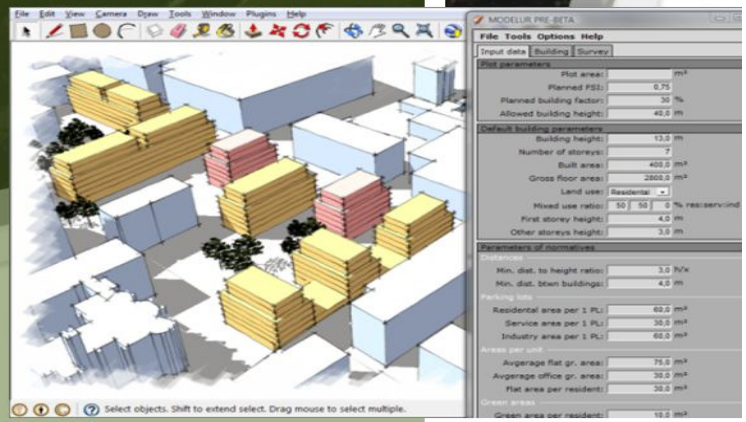
Stand-alone Environments
Virtual Landscape Theatre (VLT)
VR-cube
Simulators
Labs

CAD
GIS applications
Rendering Tools

Ubiquitous
User-friendly

Specific Limited

Online GIS
GoogleSketchUp



Digital visualization and modelling tools

Analytic comparison of capabilities and limitations of CAD and GIS applications

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CRITERIA

	CAD	**GIS**
Common Use in Planning and Design	Architecture, Urban Design	Urban Planning, Community Planning, Regional Planning
Scaling to Needs	Scales Not (Too Geometric)	Scales Well (Geography to Geometry)
Planning And Design Capabilities	Limited Flexibility And Possibility For Design	Suitable Instruments For Planning
Dominant Visualization Mode	High Realistic Visualizing Capabilities	Schematic Visualizing Capabilities
Analytic Strengths	Few Analytic Capabilities	Analytic Functions for Modelling Systems
Dominant Content	Physical Form	Natural and Socio-Economic Phenomena
Dominant Presentation Capabilities	High Virtual Reality Capabilities	Thematic Representation Capabilities
Number of Alternatives	Increase in Number of Alternatives	Increase in Number of Alternatives/Scenarios
Automated Modelling	Operator-Demanding Modelling	Semi-Automated Modelling
Accuracy	High Accuracy Due to Geometric Base	Limited Accuracy
3D Visualization	Workable 3D Environment	Mainly 2D, limited 3D

Aims, objectives and scope of the research

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- a search for a conceptual framework for an integrated web-based participatory planning tool
- ***What are the main characteristics of an integrated web-based visualization tool for enhancing stakeholders' participation in planning procedures?***
- solutions at urban scale

Background activities and institutional frameworks

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KTH Classroom Search Engine
& 3D KTH Virtual Campus

- Division of Geo-informatics in School of Architecture and the Built Environment of KTH – 2009)
- Footprint extrusion and enhanced with photorealistic mapping of the façades

ViSuCity (*Visual Sustainable City*)

Methodology

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- Bibliographical resources on visualization in planning and relevant disciplines

e.g. collaborative planning, city modelling, virtual reality, augmented reality, Geographic Information Systems, Public Participatory GIS, Web 2.0, neogeography, e-government and decision support systems

- Interviews and discussions

- Online search: websites, weblogs and web-catalogues of companies active in visualization and planning authorities + *Google Alerts*

Methodology

- Evaluation cube

- Evaluation and analysis of case studies

A number of prominent visualization applications were then selected, studied, categorized and examined contacts with developers and marketing agents through e-mail, phone call, net-meeting and meeting sessions

- Introduction of a back-casted visualization interface

June.-Aug. 2009	Sep.-Oct. 2009	Nov. 2009 – Feb. 2010	Feb.-Mar. 2010	Mar.-Apr. 2010	May 2010	Jun.-Jul. 2010	Aug.-Sep. 2010	Oct. 2010
BASIC INITIATIVE	**PROBLRM FORMULATION**	**INTERVIEWS/ TALKS**	**LITERATURE REVIEW**	**DATA ANALYSIS (1ST ROUND)**	**RECHECK AND SYNCHRONIZATION WITH VISUCITY**	**RADICAL ONLINE SEARCH (2ND ROUND)**	**DATA ANALYSIS (2ND ROUND)**	**FINAL PRESENTATIONS**
Experimental student project (KTH Classroom Search Engine & 3D KTH Virtual Campus) Optimal 3D presentation environment : - GoogleSkrthUp - Hyper Cosm - 3D PDF ...	- 3D KTH - Previous research and practice - ViSuCity An Inquiry into Optimal Web-Based Visualization Techniques for Enhancing Stakeholder s' Participation in Planning	- Experts from Participating groups and related firms/ organizations : KTH, SBK, SWECO - Technical issues - Delphi method **RADICAL ONLINE SEARCH (1ST ROUND)** - Existing visualization environments - Websites and weblogs of regional planning authorities,...	Articles on: - Visualization - City modeling - Virtual Reality - Collaborative planning - GIS - PPGIS - Web 2.0 - SIA	- Areas of concern - Report structure / Chapters - Plan for further contacts **REPORT COMPOSITION**	- Meetings - cooperation	- Search for participatory web-based visualization and planning tools	- Evaluation of existing environments including Nero 4 - Extraction of principles **CONCLUSION - OUTCOMES** - Conceptual framework for the optimal web-based visualization tool - Proposal for an integrated web-based tool for participatory planning - Proposal for a comprehensive framework for evaluation of visual tools	- Presentation at KTH -Presentation at SWECO

Evaluation cube

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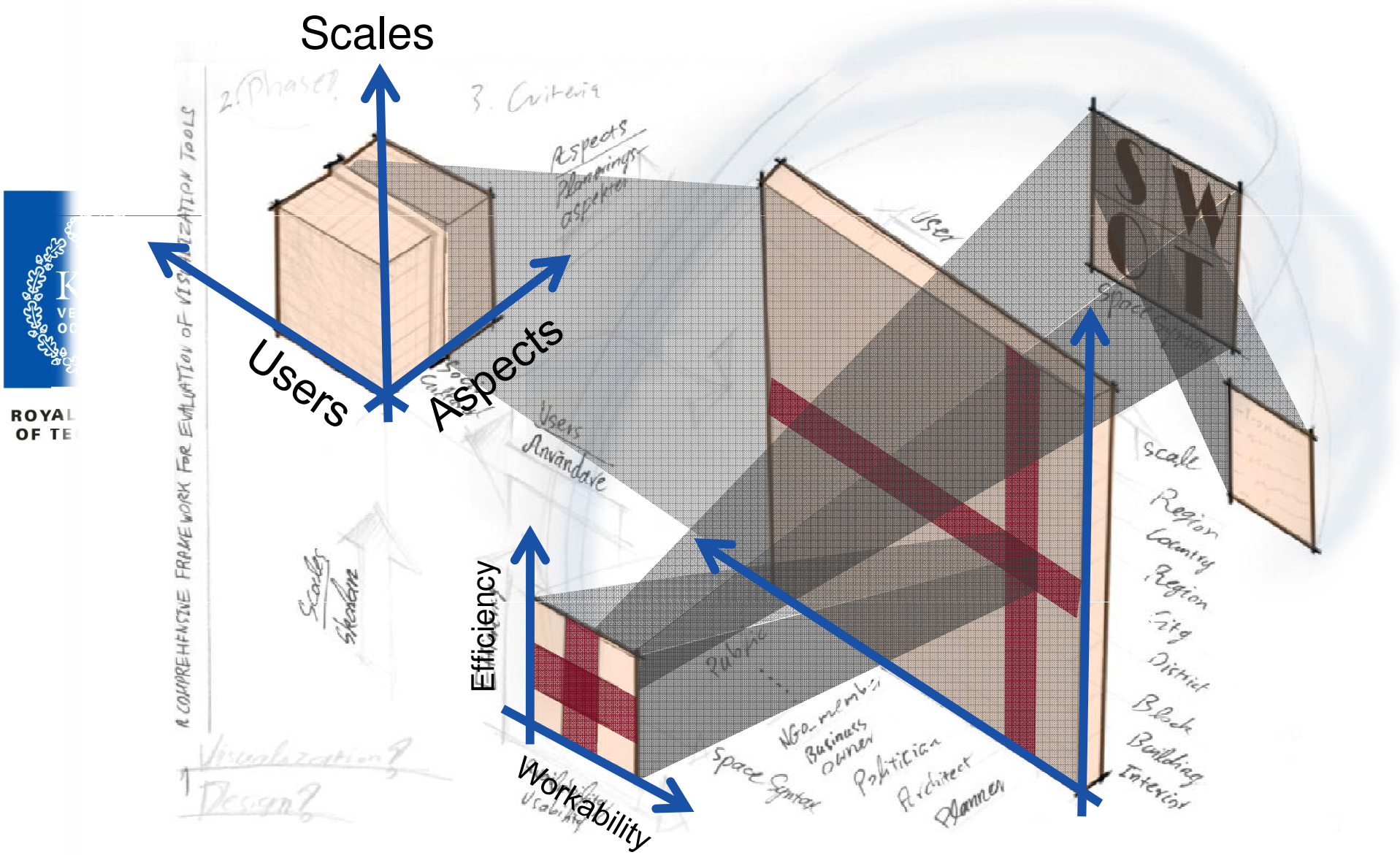
- **Efficiency** and **workability**
- SWOT analysis (strengths, weaknesses, opportunities and threats)
- The three factors of **user groups**, **planning aspects** *and* **planning scales**


Scales
Users
Aspects
Efficiency
Workability
Scale
Region
Country
Region
City
District
B.Block
Building
Interior
User
Users
Användare
Space Syntax
Politician
Architect
Planner
NGO_member
Business owner

Case studies

City Maker™

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- a multidisciplinary 3D visualization platform
- urban planning, management, administration, surveying, architecture, transportation, emergency, power and utilities

- Operates with GIS applications
- exchanges a DXF, DWG with planning
- Mass data processing, delicate visual effects and interoperability

- expert-oriented
- not workable and user-friendly enough for users.
- by Digital City Research Center of Beijing Tsinghua Urban Planning & Design Institute and Gvitech Technologies.

Case studies

City Engine

- an interactive interface
- Using **procedural** methods for rapid creation of urban fabric ruled by generic geometry-creation grammars
- real-time creation of photorealistic representations of a fictive city or district

- primarily focused on physical body of built environment
- should also be linked to dynamics of the city
- a stand-alone and not web-based application.
- By*Procedural Inc.*

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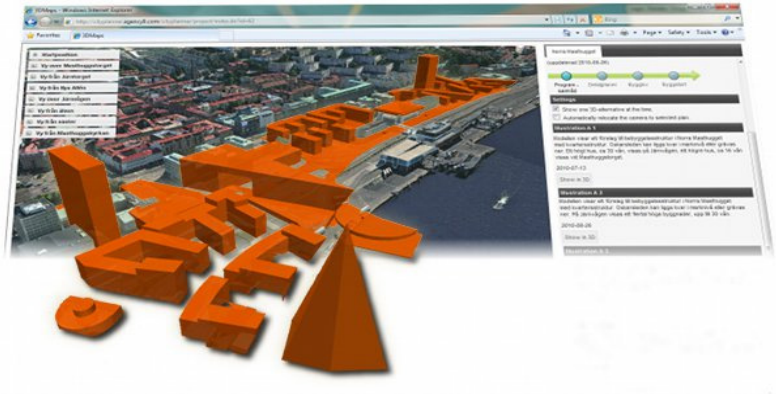
Case studies



City Planner

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- user-friendly, **web-based**
- for creating, sharing and communicating urban plans.
- Inputs: 3D models from SketchUp, Maya or 3D Studio Max.
- Digital models available online for being observed, visually analyzed and evaluated by stakeholders.
- Adding geo-referenced feedback to a developing urban plan
- Mainly for visualization of planning alternatives rather than actual urban planning practice
- not generally includes analytic functions.
- by *Agency 9 AB*

Case studies

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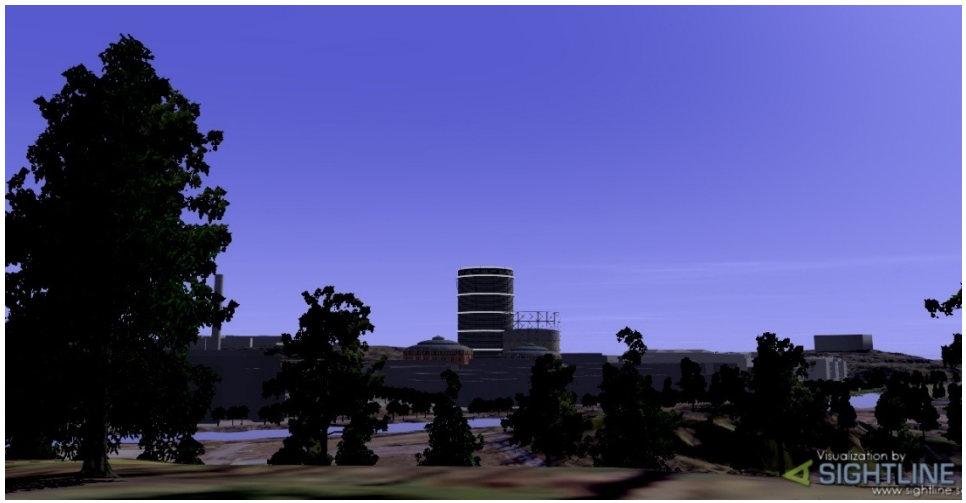
Neo4 Urban Planning

- realistic, static and animated outputs which includes analytic planning tools.
- supports a variety file formats such as COLLADA, CityGML and those of ESRI ArcGIS.
- By Sightline Vision AB



Case studies

Symbiocity

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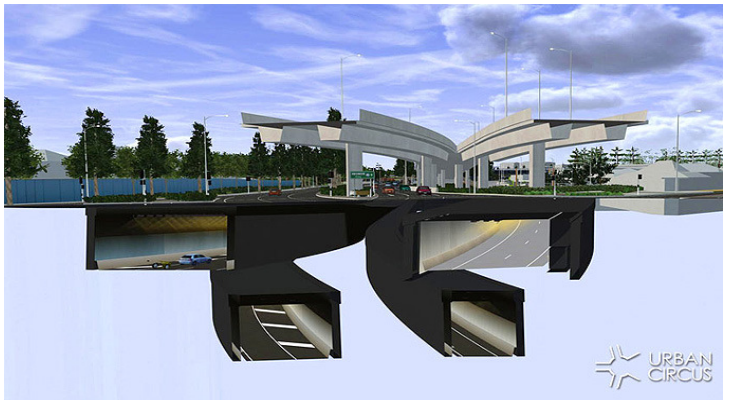
- is not basically a planning product but a trademark for sustainable planning products and services
- by *Swedish Trade Council*
- Symbiocity Scenarios: an online game within Symbiocity website
- visualizes consequences of a set of **planning strategies** on a virtual city **in real-time**.
- realistic representation of urban features and dynamisms
- availability through the Internet
- facilitates collaboration
- interactive and workable interface

Case studies



Urban Circus

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- realistic details in real-time and within **a four-dimensional environment**.
- a variety of planning issues in different phases
- highly interoperable
- not very participatory
- its interactivity is mostly limited to navigation tools and presentation modes rather than decision-making and alteration possibilities.
- Takes input from 3DSMax, Maya and ArchiCAD among all.
- Outputs range from 2D rendered scenes, 3D panoramic view, 3D videos, 4D planning environments and interactive web pages.
- By Urban Circus Company

City Engine

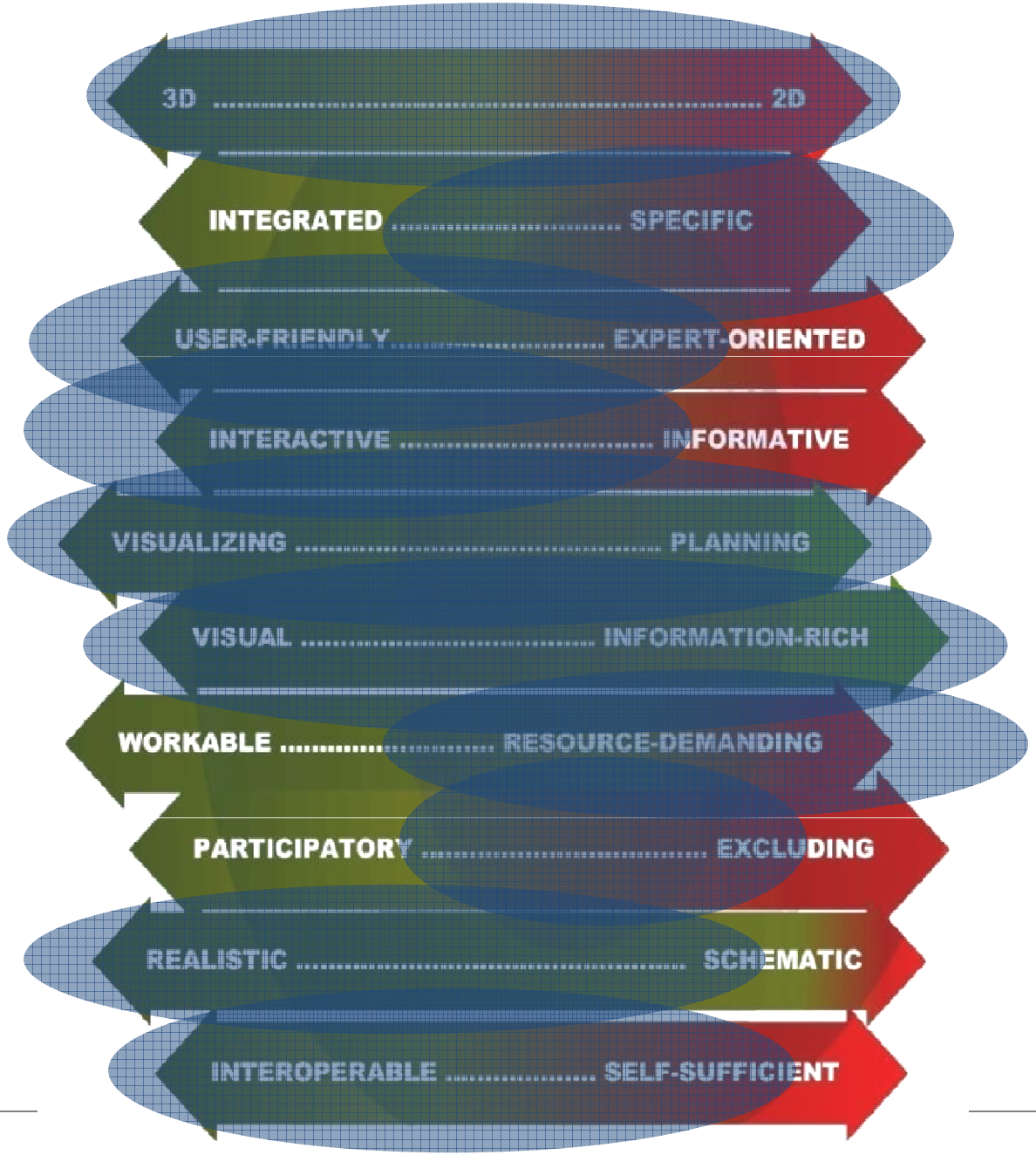
City Maker

City Planner

Neo 4

SymbioCity

Urban Circus



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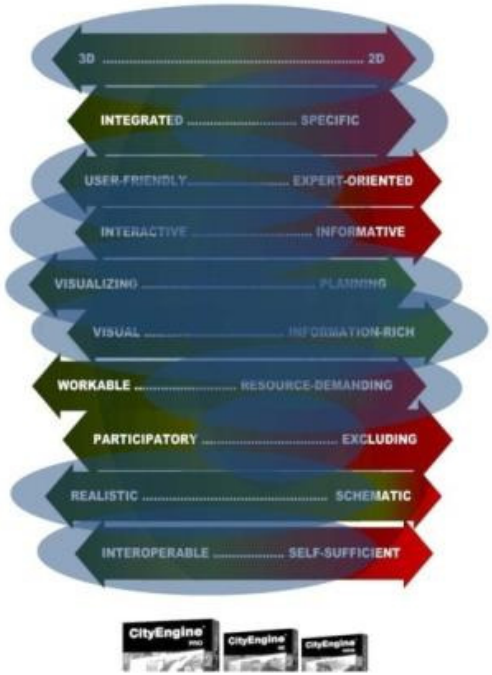

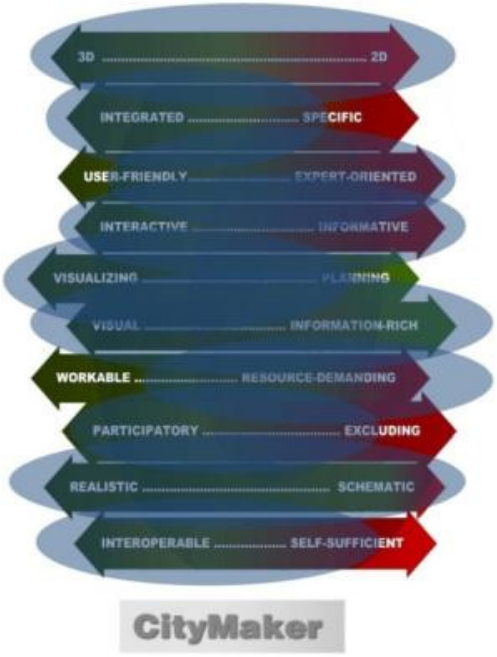

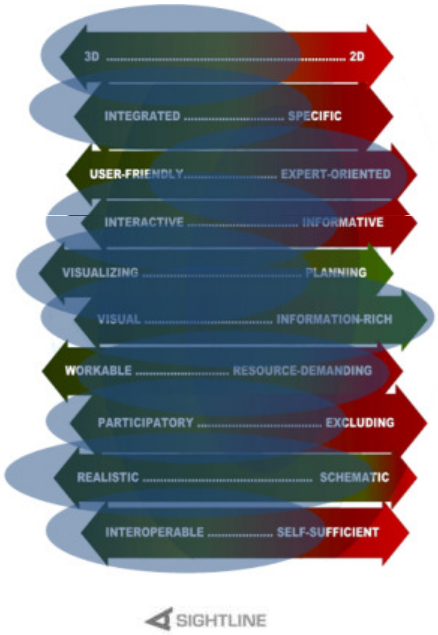

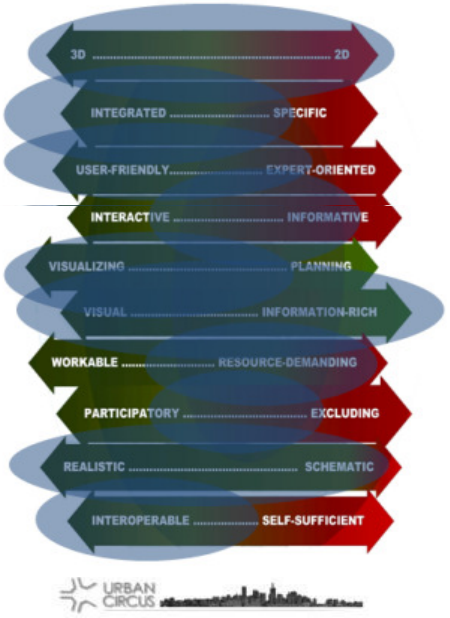

Conclusion

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- **Three-dimensional** visual interfaces
- **Realistic visualizations** plus **schematic representations**
- **Fairly interoperable** and **interactive**, exchanging inputs and outputs
- **User-friendly**
- **Information-rich,** required for an integrated visualization media
- **Workability** is the quality that a few examples possess.

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Proposal for the Integrated Web-Based Visualization Tool


KTH
VETENSKAP
Vartahamnen.neo - Neo4.25
District Level
Reset To Defaults
Basic Factors
Average Height: 1 6
Density: 2000 6000
Green area: 30% 70%
Transportation Mode: Motorway Railway
Advanced Factor
Major Land Usees:
Commercial
Recreational
Residental
Tenure:
Private
Rental
Student Housing
Preview
Cancel
Vote
Visualization by
SIGHTLINE
www.sightline.se
3D model may contain some discrepancies.
Ready
9 FPS
Fly
Speed: 0.0 km/h
Max speed (+/-): 2187.0 km/h
-1620.25 m, 794.11
2 Interne...
fr_sightline
Network
0-0-Master...
Neo4.pptx
Oxford Ad...
Adobe Ph...
image001.j...
Vartahamn...
EN
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Vartahamnen.neo - Neo4.25
District Level
Reset To Defaults
Basic Factors
Average Height: 1 6
Density: 2000 6000
Green area: 30% 70%
Transportation Mode: Motorway Railway
Advanced Factor
Major Land Usees:
Commercial
Recreational
Residental
Tenure:
Private
Rental
Student Housing
Preview
Cancel
Vote
Ready
9 FPS
Fly
Speed: 0.0 km/h
Max speed (+/-): 2187.0 km/h
-1620.25 m, 794.11
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Proposal for the Integrated Web-Based Visualization Tool

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" All users are thus free to compose their own planning alternatives through an intelligent and fully customized visualization/planning tool instead of choosing among a limited set of planning alternatives. "

Discussion

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- The perpetual risk of using outdated data, literature, reports, software tutorials, technical recommendations, etc
- Differentiating between visualization, planning, presentation, drafting and enhancement tools:

  According to definitions of the term visualization the concept is closely intertwined with data representation and thus goes far beyond the mechanical act of virtual construction of an urban element in a schematic or realistic manner [BAS00][SDD98][OHD99].

- Avoiding contradictions when defining criteria for an efficient visualization tool: eg. Integrated + user-friendly

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