SSSP: Smart Solutions for Spatial Planning

Lead organisation
University of East London

Project coordinator
Paul Coates

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Total UrbanBuzz funding
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£31,605

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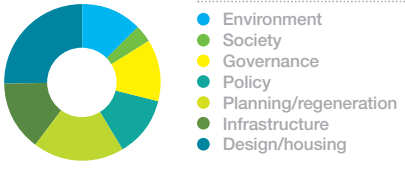



# Digital masterplanning

## SSSP is exploring ways in which planners, policy makers, urban designers and computational designers can work together to generate and analyse masterplans using digital workflows

### The context: joined up masterplanning

The masterplanning process is not currently 'joined up', says project coordinator Paul Coates, UEL, with no possibility of integrating planning and design information. There is a 'disconnect' between GIS data, social infrastructure data, planning data and site information, resulting in 'jerks and breaks' between various stages of the masterplanning process. Digital links, supporting efficient data exchange, would enable the widespread use of efficient computer-based analysis. Such scenario testing capability could quickly answer complex 'what if' planning questions, allowing the development of well-informed design options.

### Key project objectives

The project aimed to create new ways of exchanging knowledge and data between planners, policy makers, urban designers and computational designers. The team plugged in GIS data, social infrastructure planning data (from the 2001 census and Index of Multiple Deprivation, or IMD), urban design best practice and planning policy guidance to create urban development simulations for case study sites in east London. The project set out to outline how such a digital approach can work, using techniques and processes created at Aedas' Advanced Modelling Group and at UEL, for the testing of connectivity, visibility, walking distances and spatial integration studies within a masterplanning context. The project aimed to:

01 create a series of digital tools enabling the integration of GIS and social infrastructure data into the design process, facilitating the focused application of spatial analysis techniques and scenario testing;

02 demonstrate how urban planning can benefit from the use of design systems currently in use in the engineering and architecture sectors;

03 enable feedback between generative and analysis processes, and GIS data, so as to develop sustainable social and environmental infrastructure models;

04 provide a new feedback loop from simulation to urban planning data;

05 seed new thinking regarding design processes. The idea that urban layouts can be generated from mapping data and digital urban codes is unfamiliar to many stakeholders in the design and planning process;

06 enable and support greater participation in urban design and planning via a series of user-friendly tools;

07 involve local authorities, with differing planning policy and data collection and processing policies, in the development and use of a 3D digital design simulation model for assessing spatial planning and speeding up the masterplanning process;

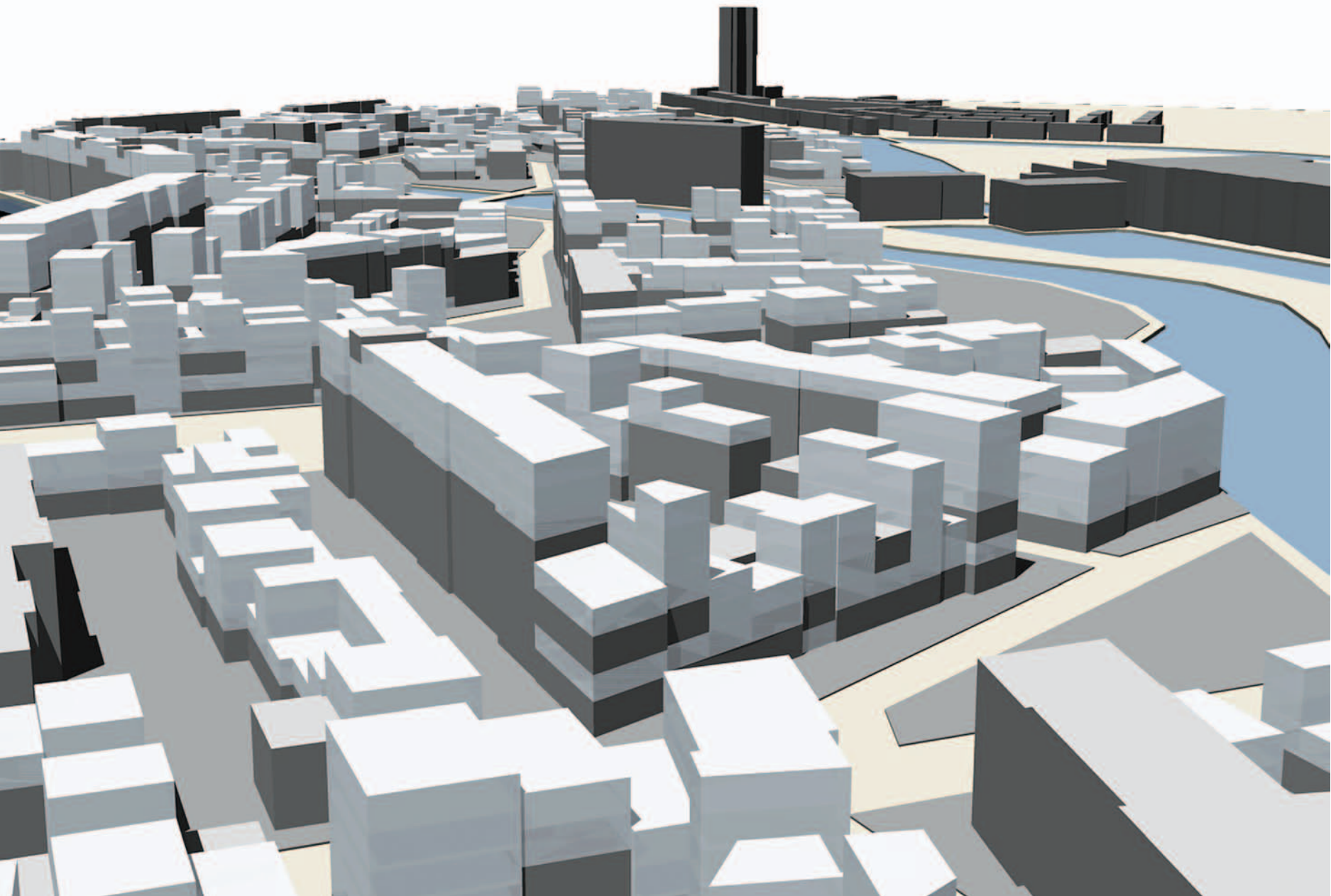
08 build an interactive website running live demos of the software.

## The project response

The project team has successfully created a set of digital tools that enable the analysis of accessibility, pedestrian mobility, density, urban structure and block generation during the masterplanning process. 'We've creating digital processes that can improve the speed and flexibility of masterplanning at the urban block scale,' adds Derix. The new digital tools were used to explore design issues in relation to a site straddling the border of Newham and Tower Hamlets, a cross-borough site that highlights both masterplanning and data manipulation challenges for any digital workflow.

The SSSP analysis and scenario testing tools can be used to generate initial design scenarios, to assess existing plans, and to ask key 'what if' questions. 'For example, if I need 5,000 houses, all a maximum of three minutes' walk away from the nearest bus stop, I could run a scenario test to see if – and how – this is possible for a specific site,' says Coates. 'SSSP can quickly generate and analyse a range of different potential scenarios, both for 'tabula rasa' sites and those with development constraints.'

A classic example is a developer stating that a particular housing development is no more than 15 minutes away from open space, and illustrating this with a circle drawn around an epicentre. 'But that's not the way it works,' says Coates. 'Roads bend and wriggle around, and sometimes there's no access due to a river or a



railway line. Our software will tell you exactly how far you can get in 15 minutes, based on actual site conditions.

The participating boroughs identified a set of performance indicators for the test scenarios, for example 'what if' exercises for specified uses and densities, and improvements in walking times for designated areas. The SSSP outcomes were compared with current TGLP/GLA published plans. The goal of the case study was to show how the SSSP tools could be used to generate spatial planning scenarios that add value for local authority teams exploring sustainable outcomes.

Project partner Jennifer Currier works on Newham's regeneration team. The value of some of the SSSP tools was immediately apparent, she says. For example, one tool can predict and visualise on a map how far people can actually walk in a given time, according to actual conditions. Another can assess site permeability, specifying and visualising specific points on the map where an 'intervention', such as a bridge or a new crossing, needs to be placed. 'In terms of using the tool, the application that we really liked is assessment of real time walking distances. If every planner could have a desktop tool to analyse this, then that would be really useful.'

Mandar Puranik, project partner and an urban designer from Tower Hamlets, was keen to see how the generative SSSP tools could be aligned with designers' skills and expertise. For the project team, this is not an issue. 'Using SSSP is a technical matter. We are not removing the need for designers' skills or judgement,' says Coates. 'We've simply developed a framework in which they can manipulate variables more effectively. Planners, designers and local residents know things about their environment. What we're doing is finding ways to define and use all available data on the actual dynamics of an urban system, plug these into a model and then let it do its work in finding effective solutions.'

### Project impact

The team has overcome many of the technical problems that have traditionally prevented data exchange between planning policy data and the GIS, digital mapping and urban modelling systems used by designers and developers. The development of the new tools could help to overcome barriers between planners,

'We've creating digital processes that can improve the speed and flexibility of masterplanning at the urban block scale'
Christian Derix, Aedas

**Aedas**
**Christian Derix**
Development of the urban generative models and urban codes; implementation of the model with inputs from GIS; outputs to architectural design generative models; design and implementation of simulation systems and generative models of urban form and structure

**Judit Kimpian**
Advisor and liaison with local authority partners

4D Architects and Urban Planners
Masterplanning advice and subsequent design development in collaboration with Aedas

Slider Studio
Computational design consultants, detailed design services

CABE
Advisor on the interpretation of project outputs

Urban Initiatives
Liaison with partners and local authorities, review of data requests, input of sustainability criteria from national and good practice guidance

'Our take on sustainability is it has to be somehow measurable. If it isn't measurable, then we are not moving towards evidence-based design. If you can't measure something, you don't know whether you've achieved it or not'
Paul Coates, project coordinator


‘The application that we really liked is assessment of real time walking distances. If every planner could have a desktop tool to analyse this, then that would be really useful’
Jennifer Currie, London Borough of Newham

developers, architects and urban designers by creating a series of digital workflows that span the design and evaluation process, developing new digital tools to perform key tasks such as scenario testing and accessibility analysis. ‘The key thing that we learned is that people don’t want to be given a design solution to a complex problem. They want to explore the parameters of the problem to see what different sorts of solutions might be more or less appropriate. This is what SSSP can offer,’ says Coates.

The creation of such a digital chain has enabled, for the first time, the impact of urban spatial design on social and environmental sustainability to be analysed. The use of traditional, non-digital methods precluded such analysis as there is no easy way to interrogate non-digital models. ‘Planners tend to rely on generally accepted best practice guidance and standards that are not well-defined, and the use of which rules out monitoring and evaluation.

With our tools, says Coates, input data has to be rigorously examined. ‘Our take on sustainability is it has to be somehow measurable. If it isn’t measurable, then we are not moving towards evidence-based design. If you can’t measure something, you don’t know whether you’ve achieved it or not. So we’re saying it’s got to be measurable, it’s got to be explicit, it’s got to be open for discussion and transparent. If what comes out at the end of the generative process doesn’t appear to be working, then maybe we haven’t used the right data, or haven’t made the right judgments.’

The computer models developed by the project team represent useful training tools that will aid the demonstration of new possibilities in terms of urban analysis. The project documentation is moving towards a software specification for creating models of this nature. In effect, SSSP has created a new workflow and data exchange that can speed up the design cycle, as well as providing an audit trail for the impact of different variables on the design process.

### Knowledge exchange

During the development of the tools, significant knowledge exchange took place between planners, policy makers, urban designers and computational designers. Initially, the project team reported unexpected problems with data access and map data due to a lack of understanding of GIS data and formats. Project partner Dr Yang Li, UEL, worked closely with the local authorities to overcome this problem, and invested much more time than originally planned in cleaning and preparing data. Finally, Dr Yang and Paul Coates and the Aedas programming team collectively developed methods of exporting and reformatting data from GIS to CAD.

The team realised that, given the power and effectiveness of the computer in evaluating large amounts of data, it is best deployed in the widest possible context. With this in mind, the team extended the study to allow better use of contextual information.

When drawing up parameters for the SSSP tools, the project team found it interesting to see how local authorities work with design principles. They found it difficult to design numerically (to quantify and calculate a design rather than see it graphically). Drawing up a performance specification for the case study was therefore an interesting challenge to their way of working.

### Education and training

Experience taken from this project will be taken forward into the teaching materials of Dr Muki Haklay, UCL Department of Civil and Environmental and Geomatic Engineering.

Collaborating with UCL's Development Planning Unit (DPU), the team will provide 40 MSc students with a better understanding of urban sustainability and equality in practice at local level, and to expose them to participatory mapping, among other techniques, with a focus on Hackney Wick and the Olympic Site. Two MSc students (funded by bursaries) worked on this project as part of their studies, and acted as knowledge transfer ambassadors to their peers.

### The future: towards new policy

While each aspect of the SSSP process provoked much discussion, the local authority representatives were confident that, provided that the tools could accept a wider range of inputs and planning policy criteria in future, they could form the basis for useful enhancements to the tools available. These would include:

01 a more intelligent accessibility planning tool for Area Action Plans and other policy and planning tasks;

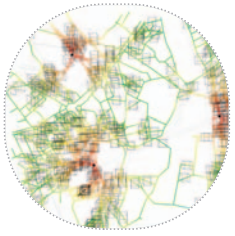
02 the ability to test developers' assumptions in pre-planning application meetings with developers

03 the ability to test ways in which a development sits in its context

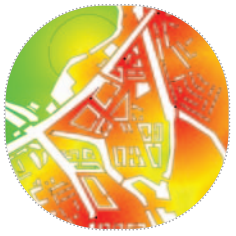
04 the possibility of conducting in-house studies to explore site-loading possibilities in redevelopment areas.

As the usability of SSSP is teased out, it's clear that it could have a variety of applications, particularly in the private sector – it was also noted that development pressures derive from private partners rather than public partners such as local authorities. 'SSSP could be useful for designers and developers seeking investors to get a scheme up and running. It can estimate how much development can take place on a specific site, what infrastructure would be needed and how much would need to be invested,' says Derix. Aedas has plans to further develop SSSP as a commercial service.

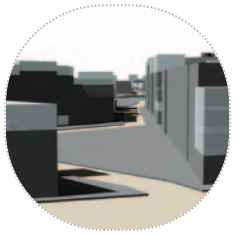
Overall, the SSSP tools generated useful outcomes and scenarios in three main areas:



**Accessibility and connectivity**
Fine tuning access levels, and proposing new connections within the network, worked well and there was a good match between the outcomes from the software and the proposals in the existing plans



**Movement framework**
The automatic generation of main routes and second order pathways using the software was a good match with the proposals outlined in the plans. The results showed that SSSP would be able to analyse and report on much wider areas than the case study areas



**Site density and land use**
This component worked as expected, using the supplied performance targets from the planning documents. However, the SSSP tools did not provide for more 'global' outcomes

**Project resources**
www.sssp.com (to come)
The team has created a website which features project documentation, videos, blogs demos and future workshops. As the SSSP tools develop, information and demos will be uploaded, and interesting parties will be invited to comment