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 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,
School of Architecture and the Visual Arts (AVA), UEL
Paul Coates, project coordinator

Centre for Geo-Information Studies, UEL
GIS data analysis and data cleaning

University of East London (UEL)

Centre for Evolutionary Computing in Architecture (CECA), UEL
Computational design consultants, detailed design services

Alternative Urbanism MA team, UEL
Design consultancy: urban form, architecture and technology in relation to social life and environmental sustainability, links between computational work at CECA, Aedas and UEL, development of urban codes and other design criteria

London Borough of Newham regeneration team
Design and development, input into case study

London Borough of Tower Hamlets regeneration team
Design and development, input into case study

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 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.

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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.

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:

1. a more intelligent accessibility planning tool for Area Action Plans and other policy and planning tasks;
2. the ability to test developers’ assumptions in pre-planning application meetings with developers;
3. the ability to test ways in which a development sits in its context;
4. 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 Dervix. Aedas has plans to further develop SSSP as a commercial service.

**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.