



THE WHITE ROSE GRID

e-Science Centre

Modelling and Simulation for e-Social Science

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Introduction

MoSeS (Modelling and Simulation for e-Social Science) is a research node of the National Centre for e-Social Science (NCeSS). MoSeS aims to use e-Science techniques to develop a national demographic model and simulation of the UK population, specified at the level of individuals and households. The specific aims of the MoSeS project are as follows:

- 1) To create a flagship modelling and simulation node, in which the capabilities of Grid Computing are mobilised to develop tools whose power and flexibility surpasses existing and previous research outputs.
- 2) To demonstrate the applicability of grid-enabled modelling and simulation tools within a variety of substantive research and policy environments.
- 3) To provide a generic framework through which grid-enabled modelling and simulation might be exploited within any problem domain.
- 4) To encourage the creation of a community of social scientists and policy users with a shared interest in modelling and simulation for e-social science problems.

Benefits offered by MoSeS

There are an abundance of simulation games relating to people, cities and societies (past, present and future). We pose the question of what would be the impact of transferring these simulations into

a real world environment. Our specific interest is in cities and regions, with an aim of building simulation models of interactions between individuals, groups or neighbourhoods within large metropolitan areas. Such simulations can form the basis of a wide range of applications in both e-Research and public policy analysis, with potentially substantial benefits such as:

- 1) A big policy impact through the generation of effective predictions.
- 2) A potential ‘wind tunnel’ or ‘flight simulator’ analogy: planners can gauge the effects of development scenarios in a laboratory environment.
- 3) The use of simulations as a pedagogic tool allows planners to refine understanding of systemic behaviour and alternative futures, thus aiding clarity of thinking and improved decision-making.

MoSeS scenarios

Specifically, MoSeS aims to develop scenarios in the domains of *health*, *transport*, and *business*. For example, one health scenario would be to provide perspectives on medical and social care within local communities for a dynamic and ageing population. A scenario in the transport domain might concern the sustainability of transport networks in response to demographic change and economic restructuring: for example, what kind of transport network is capable of sustaining long-term economic growth in West Yorkshire, Greater Manchester, and the intervening areas – the ‘Northern Way’.



A scenario in the business domain might include the impact of diurnal population movements on retail location and profitability; or the impacts of a changing retirement age on personal wealth and living standards.

MoSeS portlets

In order to allow users – both expert and novice – to interact with MoSeS in order to perform experimentation, and analyse and

visualise results, a series of JSR-168 compliant portlets have been developed.

Portlets are pluggable user interface components that are managed and displayed in a web portal, and function by producing fragments of markup code (usually HTML) that are aggregated into a portal page.

JSR-168 refers to the Java Portlet Specification, designed to define a

contract between a portlet container and portlets, as well as to provide a convenient programming model for portlet developers. In our case, we have developed a MoSeS portal page using the Gridsphere [NOV04]

portal framework, thus allowing any user with a web browser and an account to be able to interact with MoSeS.

Each individual MoSeS portlet can be plugged into this portal to form functioning applications, depending on the role of the user. Work is currently being performed to

incorporate a Google Maps interface to MoSeS; this interface has in part been developed using “Google Map Creator”

technology provided by UCL Centre for Advanced Spatial Analysis as part of the *GeoVUE* project.

The role of e-Science

The MoSeS project stands to benefit from e-Science technologies in a number of ways; in particular, the simulation model will draw on diverse, virtualised data sources, will deploy models which are richly specific and therefore computationally intensive, and will provide outputs to a spatially distributed community of researchers and policy-makers. MoSeS is building relationships with policy users in Social Services, Health Care Trusts, urban planning, consultancy and other domains in order to demonstrate the viability and potential impact of simulation modelling, enabled by e-Science.

Future work

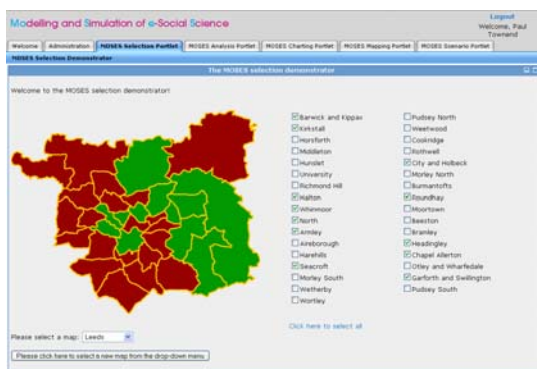
Future work consists of continuing to improve the portlet interface, in addition to further refining the simulation models. A particular area of concern are the security requirements that arise from both hosting and processing confidential UK Census, health and map data – not only in terms of the raw data but also the ensuing forecasts (for example, it may be possible to reverse engineer a forecast in order to obtain the original data).

Acknowledgements

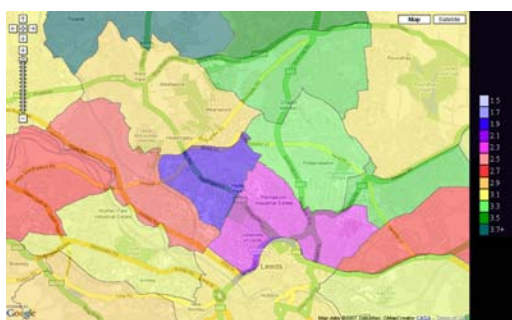
This research has been funded by ESRC through the National Centre for e-Social Science. Census output is Crown copyright and is reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland.

Further Information

Contact:
Dr Paul Townend (pt@comp.leeds.ac.uk)
<http://www.ncess.ac.uk/research/nodes/MoSeS/>



Screenshot of MoSeS 'selection' portlet
Source: 2001 Census, Output Area Boundaries. Crown copyright 2003.



MoSeS Google Maps Interface showing Diabetes incidence per Ward in Leeds