COSMIC:
COmplexity in Spatial dynaMICs

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Michael Batty
University College London

m.batty@ucl.ac.uk
http://www.casa.ucl.ac.uk/

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Outline

- The Focus of the Pilot

- The Partners: VU, NUI Maynooth, UCL (lead)

- The Centres: Spatial Economics, NCG, CASA

- Themes: Urban Processes, Interaction, Movement, Networks, & Online Fine Scale Data

- The Three Pilot Projects: Demonstrators

- The Workshops and Inter-Working

- Towards a Program in Cities and Complexity Science

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The Focus of the Pilot

- Fine scale electronic data collected digitally from the ground up, from the bottom up, about individuals

- A focus on movement and interaction in 2D geographical space

- A focus in networks, developing network science for spatial systems based largely on planar graphs

- A focus on flows built on top of graphs and networks

- A focus on the dynamics of these flows

- All with a view to enabling us to see how such data can inform theories and applications of spatial models and how such models and their data can reveal emergent structures

The Partners: VU, NUI Maynooth, UCL (lead)

Three groups all versed in spatial science

VU (Free University) Amsterdam is a centre of expertise in spatial economics, which build on mathematical theories of how cities and regions function and change in terms of markets and prices

UCL (University College, London) is a centre of expertise in applications of computer models to urban systems and their planning, from a more physicalist perspective – architecture, built form and transport, with a strong focus on visualisation

NUI – National University of Ireland – at Maynooth is a centre of expertise in spatial statistical analysis, and GIS from fine scale geometries as well as spatial aggregates such as regions

The Centres: Spatial Economics, NCG, CASA

The three centres at each of these universities are

Spatial Economics: Nijkamp (Co-I), Reggiani (visiting Professor from Economics U Bologna), Roberto Patuelli, Giovanni Russo, Jaap de Vries

NCG (National Centre for Geocomputation): Fotheringham (PI), Charlton (Reader, Geography), Demsar, Pozdnoukhov (Lecturers)

CASA (Centre for Advanced Spatial Analysis): Batty (PI), Wilson (Professor in CASA), Medda (Reader in Transport, Civil Eng), Hudson-Smith (Lecturer, CASA)

All there groups have long track records in working with urban and regional analysis, models, linking to complexity theory

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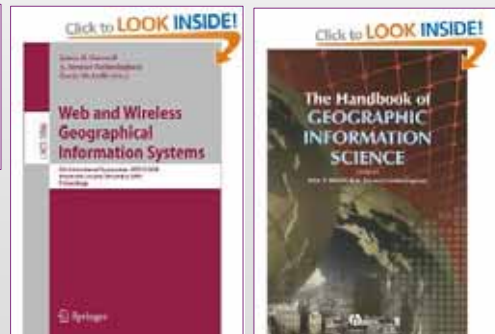
Themes: Urban Processes, Interaction, Movement, Networks, & Online Fine Scale Data

We intend to develop *a classification of dynamic urban processes based on interactions and networks* during the project

These will be defined in terms of the physics of city systems

This will serve to define our wider field as there are many other groups in Europe who are working in a similar way in similar domains

This will help us extend our network to others such as the S4 – Spatial Simulation in the Social Sciences – network run by Denise Pumain (Paris 1) and related groups

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Our basic focus will be in networks at many scales and on new digital data sources as we have noted above

Essentially the three groups will work on their own demonstration projects to cover the range of network applications

CASA on telecoms and subway data, with possible extensions to social-spatial networks, all acquired online

NCG on spatial interaction patterns derivable from mobile phone data sources and supplemented by more traditional data sets, with some links to GPS tracking data and relevant model

Spatial Economics on two scales – first migration data from Germany using neural net and related models, and second mobile phone data in Holland in the Ratti tradition

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The Three Pilot Projects: Demonstrators

CASA Telecoms

We are working with a large provider of telecoms mining some of their data on calls between network equipment handling an average of approximately 8,000 users and modelling this data using various flow and network models. We have not yet mined the data completely but here is similar work from NYTE
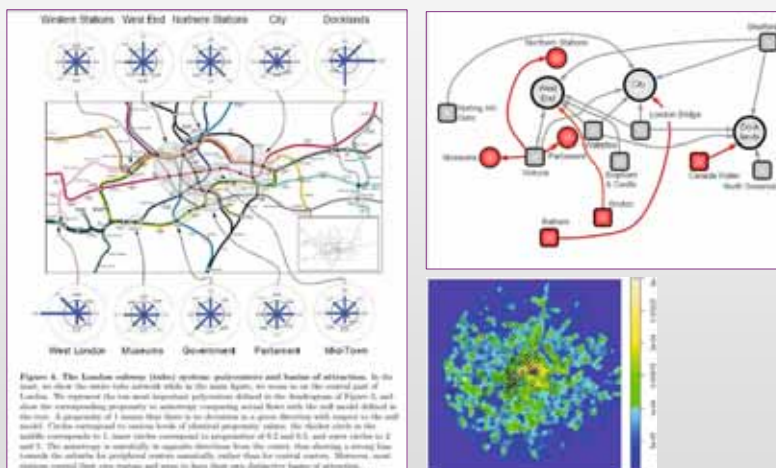

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The Three Pilot Projects: Demonstrators

CASA Subway Data – London Tube, and London data generally

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The Three Pilot Projects: Demonstrators

NCG Mobile Phone Data

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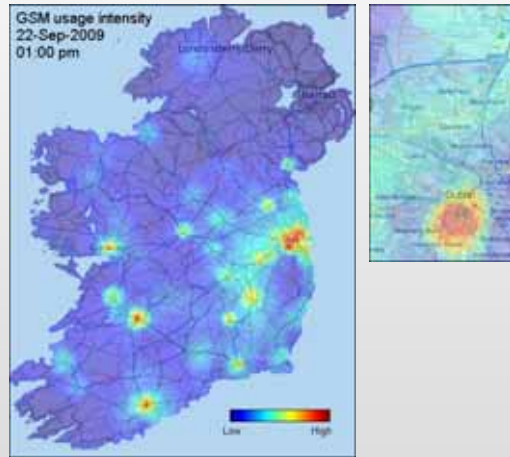
NCG Human space time trajectories at different scales and generative models of human mobility
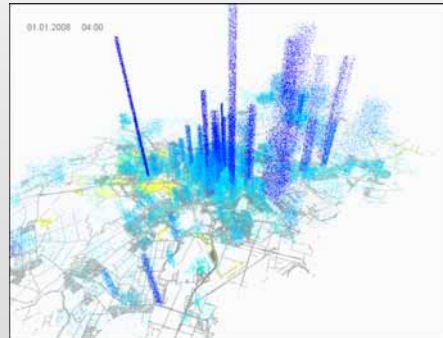

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The Three Pilot Projects: Demonstrators

Spatial Economics

Mobile phone data in Amsterdam visualised using the Ratti techniques from MIT. The group are also modelling migration in labour markets

The Workshops and Inter-Working

First an Introductory Workshop – January 2011 probably in UK where the groups do what I am doing today but in considered and elaborate detail

Last (third) a Workshop-Conference at the end once the work is completed where we extend all this to the European context and involved S4 and related groups such as CityDyne, groups at ETHZ and so on

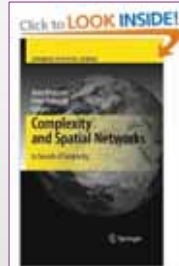A mid term workshop to assess and monitor progress

In the second and third meetings, we will invite people from the rest of Europe – i.e. other than ourselves with a view to building the wider network

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We already have good track record of working together and
some of us (Batty, Fotheringham; Nijkamp, Reggiani, Medda)
have already worked in the same place together

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Towards a Program in Cities, Spatial Analysis and Complexity Science

We hope to progress this science through Complexity-Net and
involve groups internationally that is outside Europe per se

We have good links with groups in Santa Fe and Los Alamos, links
with the network groups particularly through MIT and
Imperial College

We have links with groups in visualisation of information and of
course very good links with GIS, spatial analysis and regional
science groups worldwide

We intend the project to be a focus for this field and the
continued scientisation of ideas about future cities

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If there is time,

I will answer any immediate

Questions

www.casa.ucl.ac.uk

We will establish a dedicated web site for the project

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