TEL AVIV UNIVERSITY
Faculty of the Arts – The Yolanda & David Katz

David Azrieli School of Architecture

אוניברסיטת תל-אביב
הפקולטה לאמנויות על שם יולנדה ודוד כץ
ביה"ס לאדריכלות ע"ש דוד עזריאלי

*2 June to
6 June 2013*

Smart Cities

A Five Session Workshop and Lecture Course
at Tel-Aviv University

Michael Batty

m.batty@ucl.ac.uk
@jmichaelbatty

http://www.spatialcomplexcity.info/
http://www.casa.ucl.ac.uk/

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The lectures are divided into five sessions with three lectures in each, lasting about 50 minutes. We have a break of 5-10 minutes in the middle of each session. And some lunch at noon between the second and third sessions – 1 to 2pm - In this first presentation, we will briefly sketch the topics.

Let me begin by saying this is not a technical course, it is an impressionistic set of lectures that introduces Smart Cities.

But by popular demand, I am going to digress after the second session to talk about modelling. Essentially in the second session we will talk about transport, data and smart cities and this will suggest to us that we need to model such data streams.

Thus in the third session the first two lectures will be devoted to methods of individual modelling.

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This first will be on cellular modelling, so-called cellular automata or CA modelling and then the second lecture, on agent based modelling (ABM) at the fine scale.

Smart Cities have many definitions. The one we will use is based on exploring the way information, specifically digital infor-mation is changing the physical as well as socio-economic structure of our cities. Computers and digital communications are being continuously embedded into the fabric of the city. The information they relay is changing the way we behave.

This is what the course is all about and we will define smart cities as embracing information cities, intelligent cities, virtual cities, wired cities, and digital cities. Smart is the current buzz word which pertains to cities becoming more intelligent with respect to the way their physical infrastructure is developed.

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SESSION I: THE CONTEXT

1. A Walk Through the Smart City

Examples of How the City is Being Automated and Instrumented. A Very Quick History of the Development of Wireless, TV, Computers, the Internet and Real Time Control in the City

2. Turing's Legacy

How Computers got Started, Miniaturization, and the Convergence with Telecommunications. The Underlying Technologies, Hardware, Software, Data and Orgware, Network Computation

3. Contemporary Computing and the City

The Rise of The Net, The World Wide Web, The Move to Miniaturization, Desktop, Tablet, Hand-Held Devices, Smart Phones, The Client-Server Model, Software, Modules, Apps, Multiple Operating Systems, The Cloud

SESSION II: SMART CITIES ARE ABOUT INFORMATION NETWORKS AND FLOWS

4. The Wired City: The Computable City
Graphics, and Convergence of IT and Communications. Automating, Instrumenting, Measuring, and Sensing How We Locate and Move in the City: Where the Hardware Really Resides, The Transformation of Physical Distance

5. Material and Electronic Networks: Transport
Cities as Flow Systems, Coupled Networks, Materials, People, Energy, Information

6. Public Online Network Data
Flow Data from the Public Domain, The Bikes Projects: Online Data
The Barclays Cycle Hire London Project, Real Time Visualisation of Origins and Destinations Activity

SESSION III: MODELLING & INFORMATION SYSTEMS

Two Digressions in Lectures 7 and 8 on Modelling
7. Cellular Automata (CA): 1 & 2-D Automata: The Beginnings of ABM:
The basic ideas of automata, the game of life, various developments and
   applications

8. Agent-Based Urban Models
Ideas about modelling based on individuals, the basic ABM, collective
   behaviour, swarming, pedestrian models, generic movement models,
   applications and the Notting Hill Carnival model

Back to Smart Cities
9. Urban Information Systems: From Small to Big Data
The Origins of Information, Transactions Processing, Municipal Information
   Systems, GIS and Interoperability: the Emergence of Big Data

SESSION IV: CITIES AS SERVICES DELIVERY AND DIGITAL PARTICIPATION

10. From Web Mapping to City Dash Boards
Integrating Data, Open Data, Coordinating Services, Emergency Response and Location-Based Services, Web Mapping, Real Time Sensing and Information

11. The Virtual City: GIS, 3D and Virtual Reality Representations
The Development of 2D maps to 3D Environments, Virtual Reality, Augmented Reality, Serious Visual Gaming

12. Urban Simulation and Prediction
Building Mathematical Models of the City, The Science of Cities, and the Synthesis of Simulation with Representation, Data Driven Models, Prediction and Forecasting

SESSION V: THE VIRTUAL CITY: REPRESENTATION, MODELLING, AND PREDICTION

13. Digital Participation & Social Media: Examples of Public Participation in Regeneration and Education, The Development of Virtual Reality, Virtual Cities, Virtual Worlds

14. City Dashboards: The Development of Interfaces to Enable Real Time Data to be Streamed into Intelligible Forms, The Provisions of Web Services, The Design of Dashboards

15. Finale: Open Questions: What We Have Not Covered: Social Media, Location Based Services and Non-Location Based, Digital Participation More Generally: PPGIS, APPS – Hand Held Devices and Access to the Web and Cloud, APIs in General and Those Related to Streaming

Background Reading

The web site http://www.spatialcomplexity.info/ is where the lectures will be placed is and a taste of the material is available there with some key background readings.

If you wish to read something now then download the following paper from the site
http://link.springer.com/content/pdf/10.1140%2Fepjst%2Fe2012-01703-3

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Smart cities of the future

M. Batty[1,a], K.W. Axhausen[2], F. Giannotti[3], A. Pozdnoukhov[4], A. Bazzani[5], M. Wachowicz[6], G. Ouzounis[7], and Y. Portugali[8]

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