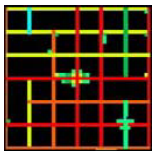
International Housing Database Newsletter

Hosted by the Space Syntax Laboratory/UCL
Inaugural Issue
Summer 2005

OUR VISION

For the past year, Professor Julienne Hanson from University College London (UCL) has been working closely with Dr. Edja Trigueiro, from the Universidade Federal do Rio Grande do Norto (UFRGN), Brazil, to develop a simple and robust working methodology for comparing the spatial layouts and social attributes of residential districts from different parts of the world. Our objective has been to see if differences in spatial and architectural variables such as housing density, built form, the syntactic layout of the buildings, the arrangement of private and shared open spaces, the design of pedestrian and vehicular routes, and how the dwellings relate visually and permeably to the public domain can provide a useful indication of how vulnerable the area will be to crime, how secure residents will feel in their own homes or when moving around their neighbourhood, and how likely it is that particular parts of the neighbourhood will be targeted by vandalism or anti-social behaviour.



1.1

We have developed a methodology for gathering and representing qualitative and quantitative data, which has been successfully piloted by M.Sc. AAS students across eighteen residential districts in Clerkenwell, London. Examples of the housing schemes studied range from early 19th century street layouts to Modernist housing estates and Postmodern mixed use urban blocks. We are now seeking to extend this collaboration to the wider space syntax community, by inviting individuals and institutions with an interest in housing design and layout to try out the method on residential districts that have interesting spatial and / or social characteristics in order to contribute data on housing from different parts of the world to an International Housing Database (IHD) that will be 'owned' and managed by the research community as a central reference point for comparative studies in housing morphology.

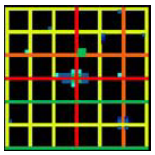
Terminology

Data have been gathered in the IHD at different urban scales; the super-neighbourhood, the urban block or blocks in which the residential district that is under scrutiny is embedded and the individual dwelling units that make up the residential district. To avoid ambiguity, the meanings given to the different scales of development in the IHD are defined below.

Super-neighbourhood. This is the 3 kilometre area that surrounds and contains the study area in which all our residential districts in Clerkenwell are located. In the case of a small study of an individual cluster of houses or one small housing estate, it will not be necessary to consider the super-neighbourhood but just the neighbourhood.

Neighbourhood. This is the immediate area in which cases are located, in our case Clerkenwell.

Urban block or blocks. This is the actual residential district under scrutiny, plus any additional plots and buildings that are contiguous with the housing and surrounded by the adjacent grid of streets. In the case of a housing estate, the whole of the urban block could well be zoned for housing and so be mono-functional, though this is not invariably the case. A large housing estate may spread out over several adjacent urban blocks. In the case of a traditional streets and squares layout, the urban blocks are more likely to be clearly delineated, but to contain a mix of uses and so be polyfunctional. In the case of a Postmodern mixed use block, there may be a mix of uses, but the boundaries of the development are likely to be clear and to coincide with the surrounding street grid. The basic rule of thumb is to consider the whole of the urban block and its surrounding road grid, even if the actual scheme you wish to study does not take up the whole of the block



1.2

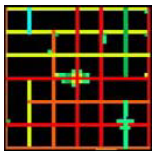
Residential district. Because this may be a traditional urban streets and squares layout, a housing estate or a mixed use scheme that contains a mix of housing and non-residential uses, we have decided to refer to individual case study examples as residential districts. Depending on the characteristics of each residential district, it can also be refereed to by its more common name, such as a housing estate, mixed use development or a street layout. We have not used the term housing estate, because that implies that we are not equally interested in traditional and vernacular layouts, which of course we are.

Dwelling, dwelling unit, home. These are the individual units of accommodation that aggregate together with non-residential uses to form the residential district.

Clerkenwell Pilot Study

Between December 2004 - April 2005, MSc AAS students studying on Julienne's Decoding Homes and Houses Module carried out a detailed survey of housing morphology within the Clerkenwell area of London. Reem Zako, the Research Fellow who is coordinating the project at UCL, has made a study of one estate in order to refine the methodology for data capture. Edja has made a detailed study of another housing estate in Clerkenwell in order to develop the prototype Safety Indices. The housing areas varied considerably in age, built form and housing typology, tenure and social mix. In this way, we have been able to test the method for its robustness in dealing with residential districts of many different types and morphologies, before opening it up to the wider space syntax community.

We should like to thank all the students who contributed to the pilot study. Delegates to the 5th International Space Syntax Symposium are welcome to visit the Exhibition of Posters displaying the students' work. A field trip to Sheffield is planned for next year's students, to carry out a similar exercise in a different geographical, social and economic context.



Quantitative Analysis

As with the development of space syntax itself, a major challenge that has to be overcome before a comparative housing database can be assembled is the issue of size. Some residential districts in the database may contain only a small number of dwellings; others could extend to many thousands of homes. Data therefore have to be compared proportionally, rather than by reference to metric areas. However, we still need to collect baseline information on the metric sizes of different housing areas so that we can differentiate larger and smaller examples from one another.

1.3

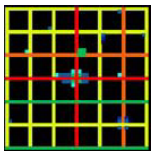
Quantitative data on individual case studies are stored and represented on the posters in two ways: proportionally, as a pie chart, and numerically, as a table. For example, the proportions of different road types in a residential district are shown as a pie chart. Integration values for the super-neighbourhood area in which the residential district is embedded are shown in a table. Because each individual housing development needs to fit into the standard poster format, it is inevitable that the illustrative examples reproduced in the IHD will be drawn at different scales and sizes, reflecting the size, shape and extent of each development. Each illustration should therefore be accompanied by a scale and a north point.

1. Neighbourhood and Super-neighbourhood Scale

This level of the poster collects standardised information about land uses, axial maps, road types and other supporting data, such as a quantitative table of values and a description of the history and character of the area under scrutiny. There is usually room to support this account by photographs of the area and its housing.

Land Use Classification

A detailed land use map of Clerkenwell has been produced by Irini Perdikogianni as part of the VivaCity 2020 work package Evolution of Land Use Diversity, led by Professor Alan Penn. This enabled us to show the mix of uses at ground level, first floor level, and on a typical upper floor for buildings with three or more storeys for an area immediately around each residential district. The land use classification we used is based on and comprises 19 different uses. We may need to agree a simpler, robust land use classification for the IHD. We did not show the proportion of land uses present at the neighbourhood scale, as this would be dependent on the size of the neighbourhood studied, though of course we can do this if we wish.



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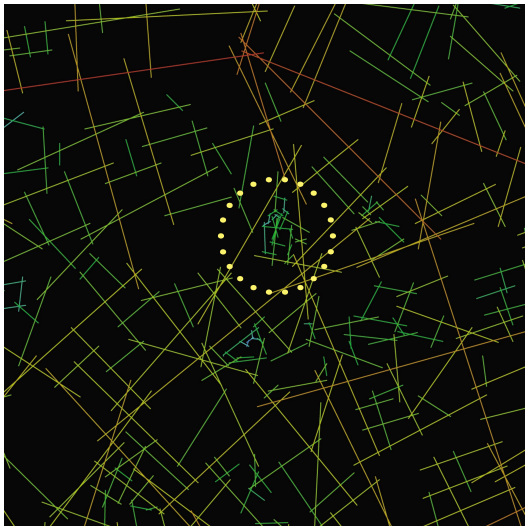
Axial Map and Integration

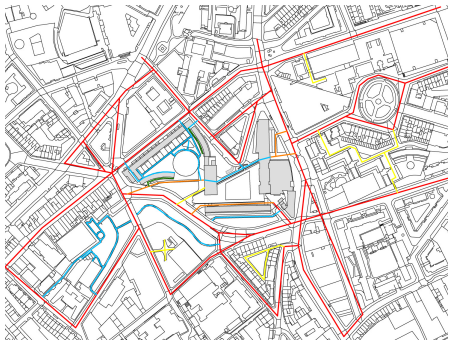


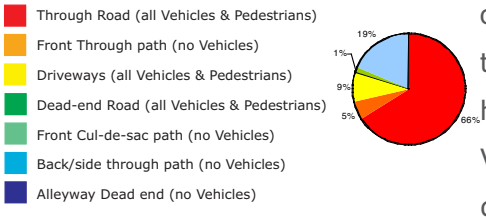
In our pilot study, we followed good practice by embedding Clerkenwell in a larger urban hinterland stretching 3 kilometers away from the actual study area. This was to minimise any 'edge effects' when calculating integration measures for the area. Axial analysis was carried out at this super-neighbourhood scale, on the basis of radius-radius integration. The axial map was checked for accuracy before calculating integration values for the

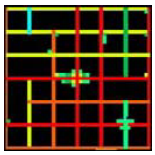
area and, where the residential district under study had a complex interior public realm as in the case of many of the modern housing estates in Clerkenwell, this additional layer of information was added to the axial map beforehand. Wherever possible, these practices should be followed when compiling data for the IHD. There is sufficient space on the poster to zoom in and cut out a part of the super-neighbourhood axial map, centring on the residential district under consideration, to depict integration at radius-radius, or possibly at various different radii. We have provided a text box in which to insert a description of the neighbourhood in question. A basic data table at the neighbourhood scale records the number of axial lines, the mean global RRA, mean Local RRA, mean integration radius-radius, mean depth from the most integrated line and the number of dead end lines.

Road Types

During the second half of the 20th century, theories of zoning led to propositions about street hierarchies (Buchanan, 1963, Traffic in Towns) that differentiated arterial roads from local distributors and pedestrian routes. The different levels in the hierarchy were zoned for different urban uses. Elsewhere, (McClusky, 1968, Road Form and Townscape) analysts have drawn attention to the invention during the 20th century of new ways of relating housing to the public realm through Radburn style layouts and grade separated tartan grids. These new forms of urban space have led to new typologies for classifying pedestrian and vehicular routes. The typology of roads used in the methodology builds on the work of Dr. Chih-Feng Shu, who received his Doctorate on 'Housing Layout and Crime Vulnerability' from UCL in 2000. The typology differentiates through roads used by both vehicles and pedestrians from dead end roads and driveways used by both vehicles and pedestrians, and front and rear through paths for pedestrians only, from front or rear dead end pedestrian paths and dead end real pedestrian alleyways. We have shown the proportion of different road types, as this can be considered comparable, provided that the road typology is restricted to the urban block/s that will studied in the next level down in the urban hierarchy and its immediately surrounding streets.





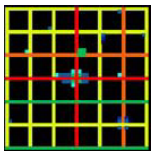


1.5

2. Urban block

Like space syntax morphologists, traditional urban morphologists also conceive of the city as a fabric composed of a continuous street grid that surrounds a set of discrete urban blocks (insulae), which in turn comprise plots, on which stand the buildings. The grain of the urban fabric can be described as loose or tight knit, depending on the density. Urban morphologists compare urban fabrics systematically, by measuring shape and form properties of the urban block.

Unlike many previous studies of residential districts, the urban block has been selected in preference to the site as the basic unit for analysis in the IHD. This is because the premise derived from previous syntactic studies at the urban scale is that in an organic, bottom up urban system, similar land uses aggregate along axial lines but land uses differ on the different faces of the urban block. If we look at the grid of streets as a basic urban element, the same land uses tend to continue along an axial line and to change when the angle of alignment of the line changes. Different land uses are juxtaposed, but uses change at the turn of the corner. It is historic urbanism's own secret formula for mixing uses without their getting in one another's way. It is how the urban grid turns an aggregate of buildings into a living city



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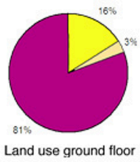
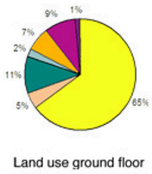
Because the process is line based it also means that different faces of each urban block acquire different types and grades of land use, rather than the whole block being devoted to a single function or use as was the case when land uses were allocated by zoning. This is unproblematic at the level of the street, as uses on opposite sides are the same, but potential conflicts can arise in the backlands of the urban blocks, where the interior of the block will need to reconcile potentially conflicting uses between different urban functions that are responding to the axial orientation of the adjacent streets.

At this level in the poster format, we have shown a series of representations and pie charts showing the proportions of different land uses at ground, first and upper levels respectively of the urban block/s under consideration, an analysis of the open space of the block/s, the location and type of primary and secondary boundaries for the buildings and open spaces in the block/s, the location of building entrances and axial and convex integration maps for the urban block under scrutiny. A table is also provided, in which to record the type of housing, the year of the original build and any subsequent remodelling, the total site area, building footprint area, residential density as dwellings/ha. and people/ha., number of car parking spaces etc. There is usually space left to include additional descriptive data and / or photographs.

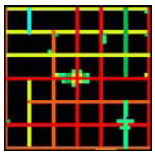
Land Uses for the Block and the Surrounding Faces Opposite Each Side

Here we directly address the concept of monofunctional versus mixed use, by recording the proportion of each function in the urban block in question, using the same typology as before. The functions of the blocks across each street that bounds the urban block are also noted, but not included in the pie chart.





Open Space Analysis



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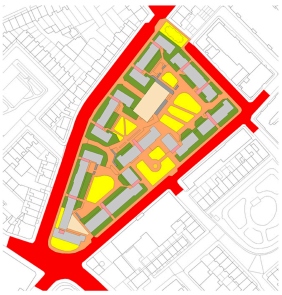
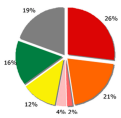
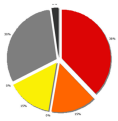
This utilises a typology of open space developed by Alain Chiaradia, Director at Space Syntax Limited for a consultancy to advise on the design of 'problem' housing estates in Southwark, London. It enables the 'ownership' of spaces, plots and buildings to be identified, as unclear ownership of spaces in the public domain has been identified with social malaise. The typology differentiates between roads, paths, vertical access, car parks, common green areas and hard landscaped spaces, private yards and gardens, areas of restricted access that no one can use, buildings and other spaces. The proportions of each type of space in residential district are calculated and presented as a pie chart.



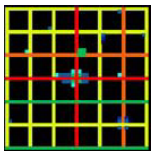




Analysis of Primary and Secondary Boundaries

Surveillance has been identified as a safety enhancing feature of residential districts, whether this is through 'eyes on the street' as postulated by Jane Jacobs (Death and Life of Great American Cities, 1961) or Oscar Newman (Defensible Space, 1973) or through doors giving access to the street as suggested in the Social Logic of Space and subsequent syntactic accounts, (Hillier and Hanson, 1984). Whichever viewpoint is adopted, the maintenance of a direct interface between buildings and streets, the mingling of strangers and inhabitants locally, and good inter-visibility between the buildings and the street are all thought to be key ingredients of urban sustainability. At this level in the poster, we therefore record exactly how each building façade and secondary boundary is constructed, with reference to its height, transparency or opacity, and permeability with respect to doors and windows.

Primary (building) boundaries are differentiated according to whether they are active (shop) frontages, doors and windows, just doors or just windows, upper level visibility only, or blank walls. Secondary (open space) boundaries or barriers are differentiated according to whether they are a high opaque fence, a high see through fence, a low fence or a very low fence that one could step over. Ideally, it is good to produce separate overlays for primary boundaries, secondary boundaries and building entrances, identifying main and secondary entrances on this last overlay. Pie charts show the proportion of the total boundary length devoted to each type of boundary.



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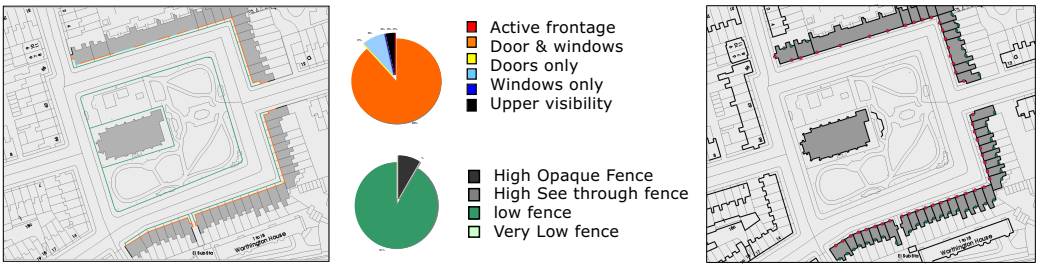
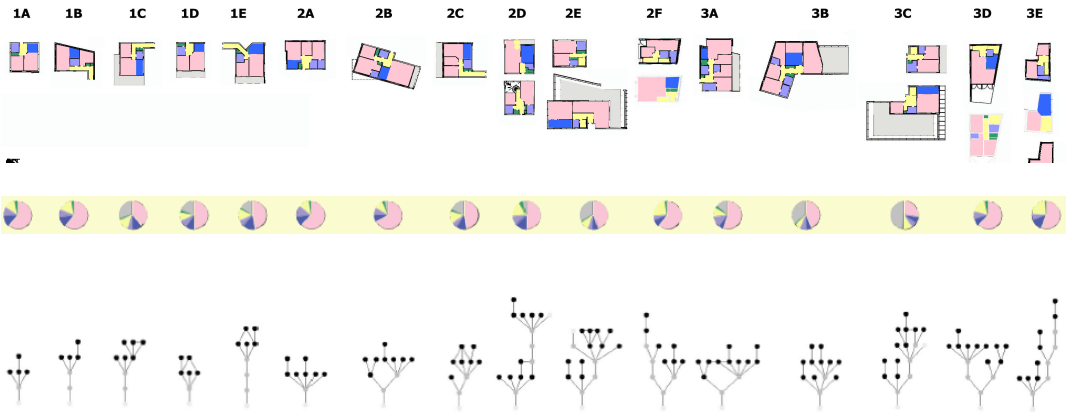


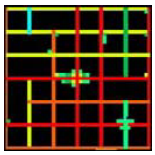
Syntactic and interface analysis

Each poster shows an analysed axial analysis of the layout of the residential district under consideration with integration set at radius (n), and a convex analysis of the residential district also set at radius (n). Data have been included on six pre-syntactic measures. These are described as 'pre-syntactic' because they capture elementary properties of the layout. A table is provided in the poster to record the main syntactic variables required for the IHD.

3. Home

In addition to gathering information on the layout of a residential district, data have also gathered on the interior layouts of its constituent dwellings. This is important because the way that the individual units of housing are designed influences the emergent distribution of doors, windows and blank walls, which form the facades that line the open spaces of the neighbourhood. As well as showing the types of dwellings and the proportion of habitable space to that of the kitchen, bathroom, circulation and storage, on the plans and as pie charts, there is space to complete a data table for each dwelling type that provides information on basic syntactic configurational variables. Space is also provided to insert j-graphs and tabulate the mean depth and mean integration of the dwellings.





1.9

Poster Presentations

For convenience, and to ensure that all the relevant data are gathered and assembled together in a standard way, we have devised a standard A-sized poster template, produced as a one page PowerPoint document that can be loaded with all the relevant graphics and quantitative data that are required for the International Housing Database. Because A sizing is a system based on proportions, this means that the actual poster can be printed out later at A1, A2, A3 or A4, depending on whether it is for display or to hand out as a flyer. Reflecting the way data have been gathered, the poster is divided into three equal parts, displaying information at the neighbourhood scale, the scale of the urban block and the scale of the individual dwelling. Provided that all the essential features of the template are complied with, the actual arrangement of the poster is a matter of graphic design.

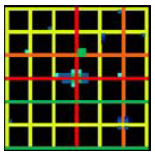
The poster has been designed to incorporate graphical and statistical representations in a user friendly and universal interface. Researchers can carry out their graphical analysis in whichever modes or software packages they prefer, includ-

ing architectural CAD packages such as AutoCad, VectorWorks, ArchiCad or similar. Others might prefer the purely graphic packages such as PhotoShop. Statistical data can be incorporated using Microsoft Excel, StatView or similar. On the other hand, we strongly recommend that researchers with access to GIS software like MapInfo or ArcGIS to use it, as it provides both the graphic and statistical information required.

International Housing Database Website

Posters produced using the methodology can be viewed on a secure BSCW interactive website, hosted by UCL. If you wish to contribute to the IHD or to view its associated website, please email Reem Zako (r.zako@ucl.ac.uk), who will be pleased to invite you to join. Members can upload posters onto the website. A blank poster template, with detailed instructions on how to compile and upload a poster, can also be found on the IHD website, together with relevant published articles and working papers.

Liveability



1.10

The quality of the local environment is a key factor in whether a good home is also regarded as a good place to live. The next step in our research will be to correlate syntactic and built form variables with the occurrence of things that are generally regarded as environmental problems that are bad for neighbourhoods, such as nuisance from street parking, heavy traffic, poor ambient air quality, intrusion from arterial roads, noisy railways or flight paths overhead, litter and rubbish, poorly maintained landscaping, vandalism, graffiti, vacant buildings, intrusive industry, vacant sites or non-conforming uses and the presence of drug dealers or gangs of unsupervised and unruly children.

Safety Indices

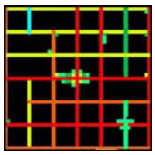
As a first step towards quantifying aspects of design that may relate, either positively or negatively, to potential safety and security in urban space, Dr. Trigueiro has developed a first stage model that can be used to identify those buildings and routes that would appear to be at a higher than average risk of design-related crime. The prototype Safety Indices are based on a thorough review of the literature on how specific design features may increase or decrease vulnerability to crime and anti-social behaviour in respect of buildings and also pedestrian and vehicular circulation.

The safety index for buildings is based on an unweighted score that sums values for the vulnerability of the main entrance, any secondary exposed facades with a door or a window, the way the axial line onto which the building opens is

constituted, the degree of integration of that axial line and the mean values of three pre-syntactic measures for the residential area in which the building is located. The safety index for routes is based on an unweighted score that sums values for each axial line in terms of its road type, radius-radius integration in the larger urban context, radius n within the neighbourhood, constitutedness, character of the adjacent boundaries and building facades and the number of connecting axial lines.

The objective of this exercise is to extend morphological and configurational analysis in the direction of a tested and validated procedure for representing and identifying safety-related morphological features in residential areas, in order to assess varying levels of vulnerability not only in existing housing areas but also with respect to housing schemes that are still at the design stage. A paper explaining how the Safety Indices currently are calculated, Trigueiro, E., (2005) 'Housing in Central London: assessing safety-related design elements in New Calthorpe Street Estate', can be viewed on the IHD website. The next stage will be to relate these scales to the Liveability scores that record the presence of anti-social behaviour (vandalism, graffiti, fly tipping etc.).

Urban Transformations



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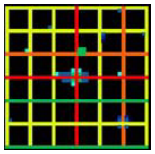
Some of the measures used in the methodology are simple, pre-syntactic measures that were developed by Professor Julienne Hanson in a study of the evolution of housing estates from the traditional urban neighbourhood of Somerstown, London,that originally took place in 1978. Sharp eyed readers will recall that two of Julienne's drawings, illustrating changes in the urban interface of Somerstown between the late 19th century and the late 1970s, were featured in The Social Logic of Space, (Hillier and Hanson 1984, CUP, pp134-137). In the 1990s, the interior layouts of Somerstown's 22 housing estates, several of which had been remodelled during the second half of the twentieth century, were re-visited and classified along an evolutionary sequence. The results of this study were published in Urban Design International, (2000, Vol. 5, pp. 97-112) as 'Urban Transformations: a history of design ideas'. This article can be read on the IHD website, together with definitions and illustrative examples of how to calculate the various measures described in the article.

Space Syntax

Collaboration between Space Syntax Laboratory and Space Syntax Limited

Most of the representational and analytic tools that are utilised by the International Housing Database are based on modelling techniques that have been developed in the Space Syntax Laboratory at UCL in association with Space Syntax Limited. Individual components of the toolkit have already been applied to a variety of urban issues, mostly related to urban vitality and social sustainability. We are grateful to Space Syntax Limited for allowing us to make use of ideas that have been developed in the context of research-based practice.



EPSRC

Engineering and Physical Sciences Research Council

VivaCity2020

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VivaCity 2020

The UCL / UFRGN collaboration has taken place within the context of an Engineering and Physical Sciences Research Council (EPSRC) funded Sustainable Urban Environments (SUE) research consortium, VivaCity 2020: Urban Sustainability for the Twenty Four Hour City. This £2.75 million research consortium led by the University of Salford, comprises academics from Salford, UCL, London Metropolitan University and the University of Sheffield working together to solve urban problems with over thirty non-academic partner organisations from London, Manchester and Sheffield, which are the host cities for VivaCity 2020 research projects. The headline issues that are being investigated by the Consortium's eight work packages relate to sustainable urban design, conflict resolution in the twenty-four hour city and socially responsible design. Professor Hanson's work package six is to to develop a Community Pattern Book for Housing through examining the design issues that relate to housing for social inclusion. Reem Zako is the Research Fellow working on this topic. In 2004, Dr. Edja Trigueiro received sponsorship from CAPES/MEC Brazil, which allowed her to join VivaCity 2020 as an Honorary Senior Research Fellow, based at the Bartlett School of Graduate Studies,UCL, where she was attached to this work package.