Mapping Thematic Research Interests at Future Cities Laboratory (FCL), Singapore-ETH Centre (SEC):
Self-Organising Maps (SOMs)

Mapping Themes
This study seeks to capture the thematic distribution of research being conducted at Future Cities Laboratory. It aims to supplement a parallel study that charts the geographical distribution of FCL research case studies globally. This thematic study employs Self Organising Maps (SOMs). The study is based on data gathered from all PhD researchers in February 2012 via a questionnaire. The questionnaire asked each researcher to rank their relative interest in a range of 50 keywords relevant to the FCL research programme as a whole.

The keyword questionnaire represents a quick sampling of research interests and affiliations in FCL. There are various ways of visualising the responses. Figure 1 shows the keywords in 'wordle' format where the size of the typography represents the relative interest in that word within the research group. So 'Building', 'Planning', 'Data', and 'Design' are the largest words as most researchers expressed a high degree of interest in these words.

Self Organising Maps
Our approach uses Self Organising Maps. SOMs are a powerful means to record, visualise and analyse a wide variety of data in nonlinear ways. They offer a more precise way of mapping the tendencies, overlaps and thematic affiliations and distances between researchers' interests than other techniques, such as a wordle snapshot. In this work we used SOMs to visualise the researcher interest in each of the 50 keywords. These generated individual coloured maps known as 'component planes' (Figure 2). Each map represents the responses of all researchers to one keyword. The white points in figure 2 represent individual researchers, and the colours show the degree of interest individual researchers expressed for that keyword. This degree of interest is measured on a numerical scale of 0-10 where 0 (blue) represents low interest to 10 (red) represents high interest.

The main image (right) shows a series of 50 maps representing responses from all researchers to each of the keywords in the form of component planes. The relevant keyword is noted under each map.

Visualising Thematic Research Affiliations
When all 50 keyword responses (the component planes) are overlaid and 'stacked', a collective map for all researcher responses to all keywords is developed. This is known as the 'U-Matrix'. This collective image (Figure 3, below) can be understood as a semantic landscape in which researchers with similar interests are 'located' in common thematic 'catchment basins'. A number of 'watersheds' between catchments can be identified. This technique has the potential to enable researchers to see thematic affiliations within FCL, and to supplement the formal module-based system for organising research. It also has the potential to extend our collective understanding of the intellectual and methodological synergies within FCL, both dynamically and geographically.