Research program:
"Connectivity and urban regeneration: multiple sources of Big Data for socio-spatial integrated analysis"

Annex C

CST - Centre for Territorial Studies
Tutor: **Prof. Federica Burini, Giuseppe Psaila**
Supervisor: **Prof. Emanuela Casti**

Objectives of the research programme
The candidate will be involved in the research group of the University of Bergamo on the Excellence Initiative project "Urban Nexus", coordinated by Profs. Emanuela Casti and Federica Burini, at the CST-DiathesisLab. More specifically, the research entitled "Connectivity and urban regeneration: multiple sources of Big Data for socio-spatial integrated analysis", object of this call for a research grant (SSD M-GGR/01 Geography and M-GGR/02 Economic and political geography, Area 11 - Historical, philosophical, pedagogical and psychological Sciences, Sector 11 / B1 - Geography; and ING-INF/05 Systems for the elaboration of information, Area 9 - Industrial and Computer Engineering, Sector 09/H Computer Engineering). The candidate will have as scientific directors Professors Federica Burini and Giuseppe Psaila and will operate within the working group of this research project under the supervision of Prof. Emanuela Casti.
The objectives of the research program concern the identification of sources of Big Data that refer to urban areas of Bergamo, Lausanne and Cambridge, by applying intelligent modeling tools combined with cybercartography systems. In fact, Big Data represent a large potential coming from very different sources and require a reflection on their use; at the same time, cities cannot be analyzed by a center-periphery model, but rather assumed in their dynamism and Interference. Moreover, citing Michel Lussault, they should be taken as a learning city, namely creating databases that intersect both quantitative and quantitative statistical data coming directly from the inhabitants. Crossing multiple sources (Social media, mobile phones, large industrial databases, government data, health data, etc.), we will attempt to recover the spatial capital, ie. the set of skills that the inhabitants have in the place where they live, to be used as scenario on which to interpret the official statistical data.
The idea will not only be to analyze the flow and mobility of city users, but to extract qualitative data aimed at highlighting the individual and collective contributions of the inhabitants. It will be interesting to see if it is possible to cross, process through intelligent techniques data modelling from different sources, for example the data of mobile phones and ISTAT census of the population, to get a deeper analysis of urban dynamics finally recovering the authentic meaning of the relationship between society and cities.

Research project
The research project entitled "Connectivity and urban regeneration: multiple sources of Big Data for socio-spatial integrated analysis", provides for the following research program:
1) theoretical and methodological research setting: the candidate who will receive the grant will be formed on urban territorial analysis fundamentals through internal seminars to be held at the CST-DiathesisLab, in collaboration with the research group of Computer Engineering. The aim is to provide the theoretical and methodological tools, both in geographic and cartographic domain, as well as in ITC, to broaden the analysis of Big Data from the mere reference and location of users, to social and territorial deeper analysis;

2) Identification and development of the collection and management of Big Data software: the grant recipient will have to identify the most appropriate solutions to collect, manage and analyze heterogeneous Big Data;
3) Big Data Collection: we will proceed to the collection of multiple data-sets from different sources (social media, mobile, open data, etc.), to understand the habits, flows and needs of the inhabitants of that city users (residents, commuters, tourists, migrants, released by residential and related connotations to different ways of experiencing the world and to manage the distances within it);
4) Data processing and visualization: to make effective communication of the results of the research, as well as to create an interactive and dynamic cybercartography, online system.
5) Tutoring and interaction with the students: the grant recipient will act as tutor for students by monitoring TeamWork, as well as other project activities, in close collaboration with teachers of the teams of Bergamo, Lausanne and Cambridge;
6) Activities and journeys in partner cities (Cambridge and Lausanne): the research assistant will conduct research missions to foreign project partner universities (EPFL- Polytechnioque Ecole Fédérale de Lausanne and Anglia Ruskin University in Cambridge).

Research results
The research will be able to envisage an advancement of knowledge from a theoretical-methodological point of view, in the analysis of different sources of socio-territorial and urban Big Data. Furthermore, it will develop software technologies for the use and management of Big Data and the creation of communication tools - graphics, infographics, cybermapping - able to show the research results.