ESR 4.4 Modelling and dealing with vague and sparse information using machine learning
A Research PhD position in the URBASIS ITN funded by the EC

Supervisors: Edoardo Patelli (University of Liverpool) - Michael Beer (University of Liverpool) - Philippe Guéguen (Université Grenoble Alpes)

Job Description
The aim of the post is to develop a computational framework able to deal “bad data” (i.e. limited, sparse or corrupted data), and propagate those uncertainty though different model in an efficient way. We approach this challenge with concepts of imprecise probabilities and the use of modern machine learning techniques that allows to construct a robust model based on available data. Tests and calibrations will be run on real-case data for selected sites provided by the partner of the consortium.

This approach will be suitable to deal with (i) model uncertainties of physical models, (ii) non-evenly sampled data; (iii) data records with gaps of various configurations; (iv) data with vague indications on dependencies; and (v) problems with only sparse data. The estimated evolutionary power spectra will significantly improve the reliability of performance predictions of structures and systems even if input information is sparse. The results will reflect the degree of indeterminacy from the sparse information and provide bounds for safe design. The developments will be pursued in close collaboration across the entire consortium on URBASIS and has a distinct interdisciplinary character in between civil engineering, geophysics, mathematics and computer science.

The student will join multi-disciplinary research groups at the University of Liverpool and within the URBASIS-EU consortium. The University of Liverpool’s School of Environmental Sciences and the Institute for Risk and Uncertainty are home to more than 200 PhD students from several disciplines in relation to science and engineering. This project will involve close collaboration with Université Grenoble Alpes, where the researcher will spend several months. The project will also involve secondment with AON Benfield partner.

Requirements and Application
The successful applicant must have a Master’s degree in engineering, mathematics, physics, geophysics, engineering seismology or similar. The project requires a strong background in mathematics, probability and statistics and scientific computation. An education in relevant fields from Mathematical Sciences Engineering and Computational Science or a combined education in these fields would be an advantage. Good computational skills (e.g. Matlab, Python, etc.) and interest on machine learning are essential. Excellent undergraduate and Master’s degree grades are expected as well as a high level of written and spoken English.

PhD stipends are allocated to individuals who hold a Master's degree. PhD stipends are normally for a period of 3 years. It is a prerequisite for allocation of the stipend that the candidate will be enrolled as a PhD student at the University of Liverpool. According to the URBASIS-EU, the progress of the
PhD student shall be assessed every 12 months. It is a prerequisite for continuation of salary payment that the previous progress is approved at the time of the evaluation.

The qualifications of the applicant will be assessed by the Selection committee. On the basis of the recommendation of the Selection committee, the Administration of University of Liverpool will make the final decision for allocating the stipend.

URBASIS-EU wishes to reflect the diversity of society and welcomes applications from all qualified candidates regardless of personal background or belief. We encourage applications from everyone irrespective of gender and ethnic group but, as women and members of ethnic minority groups are currently under-represented at this level of post, we would encourage applications from members of these groups. Appointment will be based on merit alone.

Application must be in a form of a single PDF file including a CV, a cover letter, academic transcripts, and the names and complete contact information and letter of two referees sent through:

- the consortium web-page https://urbasis-eu.osug.fr/?lang=en
- the EU EURAXESS portal https://euraxess.ec.europa.eu/

Vacancy number: URBASIS-EU ESR4.4 (to be reminded in the application form)

Deadline: February, 23rd 2019

Salary: According to the European Commission and local standards; minimum gross wage is 3500 euros before local taxes

Contact Information
You may obtain further information from:

- Philippe Guéguen, URBASIS project coordinator: philippe.gueguen@univ-grenoble-alpes.fr (ISTerre, Earth Science Institute, Université Grenoble Alpes) for general questions regarding the URBASIS consortium, concerning the scientific and training aspects of the ITN program.
- Edoardo Patelli: mda@liverpool.ac.uk (Institute for Risk and Uncertainty, University of Liverpool) or Michael Beer: michael.beer@liverpool.ac.uk (Institute for Risk and Uncertainty, University of Liverpool) concerning the scientific aspects of this PhD project.
- Florence Cataye, URBASIS project manager: florence.cataye@univ-grenoble-alpes.fr for administrative questions.