The Integrated Assessment (IASTE) research group of the Universitat Autònoma de Barcelona (UAB) is an interdisciplinary group dedicated to the development of innovative tools for quantitative analysis across multiple scales and multiple dimensions, that are based on alternative narratives about the interaction socio-economic systems/nature. The group deals with a broad spectrum of applications: (i) integrated analysis of the nexus between food, energy, water and land, linking socio-economic analysis to environmental accounting; (ii) diagnostic-simulator tool-kit capable of checking the viability, desirability, feasibility of scenarios (e.g. decarbonization); (iii) protocols characterizing the quality of alternative energy sources and energy systems; (iv) procedures for quality assurance on the production and consumption of quantitative information for decision making. We want to strengthen our ability in data visualization and therefore we look for a:

PhD Student

in Multi-Scale Visualization of the Sustainability of Human Societies

Research field

The IASTE research group has developed an innovative method of accounting called Multi-Scale Integrated Analysis of Societal and Ecosystem Metabolism using principles of Complexity Theory capable of keeping coherence in datasets referring to different dimensions and different scales of analysis.

This accounting method can be used as: (i) a diagnostic tool to learn about expected characteristics of societal metabolic pattern – YES, societies as human beings do have a metabolic pattern, they need a continuous flow of inputs (energy, materials and water) and they must dispose of a continuous flows of outputs (solid wastes, liquid effluents, gas emissions); and (ii) a simulator tool to characterize the desirability, viability and feasibility of scenarios. The MuSIASEM system of accounting describes at the same time the metabolic pattern of (1) the whole society (at the level n); (2) the functional compartments of society (at the level n-1); (3) the sub-compartments of the compartments (at the level n-2); (4) functional parts of sub-compartments (at the level n-3). For this reason it can establish a relation of congruence between the profile of allocation of the endowment of production factors available to society (e.g. human labor, power capacity, energy inputs, land, etc.) across the various compartments, sub-compartments and functional parts. The need of congruence implies a Sudoku effect in the multi-scale representation of the metabolic pattern. A simplified application of the analysis of the metabolic pattern of modern societies using the accounting method MuSIASEM can be found here: http://beta.thesustainabilitysudoku.info/

PhD research project and tasks

We welcome students that are interested in working on the modeling of the complex, multi-scale relations between societies and ecosystems. In particular our systems of accounting is based on a set of expected relations between individual numbers (e.g. total energy) that can be expressed also as vectors (or as data array – electricity, fuels, process heat) when considering qualitative differences. In turn, these vectors and data arrays can be expressed as matrices or multi-level tables – when looking at the lower level elements determining the values found in the vector/data array. We are particularly interested in the development of analytical tools (simple programs, software or applications) that can help the visualization of quantitative information within this method of assessments.
The PhD research project developed within IASTE research group will include:
a) Getting familiar with the literature on societal metabolism, complexity theory and thermodynamics, foundations of MuSIASEM;
b) Developing applications by working on practical cases study tackled in the ongoing work of the group – e.g. Ecuador, Spain, Catalonia, South Africa, Botswana, Namibia, etc.
c) Getting familiar with the analytical tools used to quantify the case;
d) Developing simple visual interfaces capable of establishing and illustrating the relations between the various elements used to analyze the multi-scale relations present on the concrete case;

e) Developing more comprehensive tools of multi-scale multi-dimension visualization of human societies.

The PhD student is also expected to help the research group in the organization of practical activities. In particular, the candidate will be coordinating to the activities related to data visualization.

Conditions

The selected candidate will receive the endorsement of the IASTE research group and ICREA Prof. Mario Giampietro, director of the group, to her/his application to the FI-DGR 2015 scholarship from the research agency of the Catalan government (AGAUR).

Requirements

* A university-level Master's degree in Visual Computing, Computer Engineering or related field of study. A double major or work experience in areas related to Data Visualization is an additional plus.
* An excellent academic record (average record of 7/10 in the Spanish system is a minimum).
* Good English is essential; good Spanish is not essential but an additional asset.
* Not afraid of being challenged by complex issues.
* Team oriented working style.
* Compliance with all requirements of the FI-DGR 2015 call to apply for the PhD program.

Selection test

Candidates should write a short text (500 words max.) on the challenges of multi-scale representation of the sustainability of human societies in terms of data visualization (an example of an ongoing attempt in this direction done by our group can be found in the Sustainability Sudoku website - http://beta.thesustainabilitysudoku.info/). This text will serve as the basis for the application to the FI fellowship of the selected candidate.

FI-DGR 2015 grant application page:

http://www10.gencat.cat/agaur_web/AppJava/english/a_beca.jsp?categoria=predoctorals&id_beca=20703 (EN)
http://www10.gencat.cat/agaur_web/AppJava/catala/a_beca.jsp?categoria=predoctorals&id_beca=20701 (CAT)

Your application:

Please send your CV, your text and all application documents required by the FI grant (preferably by email) to:

Dr. François Diaz-Maurin and **ICREA Prof. Mario Giampietro**
ICTA-ICP
Edifici Z, Office Z/125
Carrer de les columnes
Universitat Autònoma de Barcelona
E - 08193 Bellaterra (Cerdanyola del Vallès – Barcelona)
Emails: Francois.Diaz@uab.cat and Mario.Giampietro@uab.cat

Deadline for application: 12/09/2014, 5pm Central European Time.

Deadline for submission of applications to the AGAUR funding agency: 22/09/2014

If successfully funded by the AGAUR agency, PhD fellowship contracts are expected to start by the 01/02/2015.

For additional information, please visit our web page at: http://iaste-researchgroup.org/

We look forward to receiving your application!