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The CIRAIG is an interdisciplinary research center on the life cycle assessment of product, processes and services conducting leading edge research in modeling and assessing the sustainability of production and consumption systems to support strategic decision making toward a full circular and carbon neutral sustainable transition (<http://www.ciraig.org/en/>). We invite applications for a PhD scholarship at Polytechnique Montréal in the field of statistics applied to environment impact assessment to develop an operational methodological framework to account for the overall uncertainty in life cycle impact assessment models.

Project description and responsibilities

Life cycle assessment (LCA) is a methodology to assess potential environmental impacts of emissions and resource consumption occurred along the life cycle of product and services, from raw material extraction to product use and disposal, and is widely used to support decision making. The translation of environmental interventions (emissions and resource consumption) into environmental impact scores is performed through a life cycle impact assessment (LCIA) phase by applying intervention specific characterization factors (CF) contributing to different impact categories (impacts on climate change, ecosystem quality, human health, etc.). CFs are obtained from characterization models, which are natural science-based models assessing cause-effect relationships linking environmental interventions and category indicators. Some impact categories are regionalized, i.e. the impact score vary depending on the location where the environmental intervention occurs, and so are the CFs. Novel LCIA methodologies, such as IMPACT World+, provide regionalized CFs with a global coverage at different spatial resolutions (native and aggregated) for different impact categories.

Poorly addressed uncertainty of LCA results is one of the main current limitations for ensuring robust decision making. Part of this uncertainty comes from the CFs, which sources of uncertainties come from LCIA models and from the spatial variability associated with aggregated CFs. So far, the quantification of CF uncertainty has been poorly addressed and existing estimations are not operational in LCA calculation. Specifically, existing spatial correlations across CFs and impact categories have never been considered. The PhD candidate will develop an operational framework for the quantification of the overall uncertainty of characterisation model and CFs and will apply it to the IMPACT World+ LCIA methodology as a proof of concept. This timely and important research work will contribute to increase the robustness of results and conclusions of LCA.

Working environment and conditions

We offer a challenging and rewarding position in an internationally recognized research center for its solid scientific research and applied experience working in partnership with industry and governments. We strive for academic excellence performed in a dynamic and pleasant working environment characterized by collegial respect and academic freedom.

The PhD candidate will be working in close collaboration with leading experts in impact assessment and developers of the globally regionalized life cycle impact assessment methodology IMPACT World+. Moreover, there are rich opportunities to establish ties with external collaborators and organize internship with academic partners of the project.

The PhD candidate will be enrolled in the Mathematical and industrial engineering doctoral program at Polytechnique Montreal. A 3 years financial aid is granted based on research founding amount recommended at Polytechnique Montréal (<https://www.polymtl.ca/futur-etudes-superieures/en/finances>).

Requirements and application

A strong background in statistics or engineering with knowledge in environmental science and coding is required. The PhD candidate should preferably have experience in one or more of the following fields: statistics, data science, environmental engineering or modelling, life cycle assessment and should be open to work in an interdisciplinary environment.

Interested candidates should send their pre-application to manuele.margni@polymtl.ca and laure.patouillard@polymtl.ca no **later than 31 August 2019**. A preliminary application in English or French must be submitted as one PDF file containing the following information: a letter motivating the application (cover letter), curriculum vitae, grade transcripts and BSc/MSc diploma.

Please note that the scholarship for the PhD degree is subject to academic approval following an official application through the Office of the Registrar at Polytechnique Montreal.