

## Short-Term Scientific Mission Grant - APPLICATION FORM<sup>1</sup> -

Action number: CA20111

Applicant name: Julien Narboux

### Details of the STSM

Title: Porting proofs using constraint solving

Start and end date: 02/05/2023 to 05/05/2023

### Goals of the STSM

The goal of this research visit is to work toward the automatic formalization of proof sketches and the automatic translation of formal proof from one system to another one by reconstructing a proof using our automatic theorem prover *Larus* which is capable of using proof hints and exporting formal proofs which are both checkable by Coq and quite readable.

### Working Plan

Description of the work to be carried out by the applicant.

*The work plan will be the following:*

- 1. Extend the implementation of Larus to allow exporting proofs to an encoding of coherent logic in Lambda-pi modulo.*
- 2. Extend the implementation of Larus to allow exporting proofs to other proofs assistants than Coq, either using the Logipedia technology or by direct translation to preserve the readability of the generated proofs.*
- 3. Design a tool to translate pieces of information gathered from an informal or formal proof to proof hints usable by Larus' prover, such as: intermediate statements or name of lemma to be used.*
- 4. Experiment with our corpus based on Tarski or Euclid's geometry, which is in the scope of our system and a good source of aligned documents between different proof assistants, and also natural language proofs.*

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<sup>1</sup> This form is part of the application for a grant to visit a host organisation located in a different country than the country of affiliation. It is submitted to the COST Action MC via e-COST. The Grant Awarding Coordinator coordinates the evaluation on behalf of the Action MC and informs the Grant Holder of the result of the evaluation for issuing the Grant Letter.

**Expected outputs and contribution to the Action MoU objectives and deliverables.**

Main expected results and their contribution to the progress towards the Action objectives (either research coordination and/or capacity building objectives) and deliverables.

This short-term visit will contribute to the objectives 1 and 8:

- 1/ Promote the output of detailed, checkable proofs from automated theorem provers.
- 8/ Develop the use of natural or controlled languages in proof systems.

This short-term visit will contribute to the deliverable: “*Software for translating proof formats used by automated theorem provers to Dedukti.*”, but also to general objective of the action to improve interoperability between proof assistants.