

## Report on the outcomes of a Short-Term Scientific Mission<sup>1</sup>

Action number:

Grantee name:

### **Details of the STSM**

Title: Reconstruction of incomplete theorems and incomplete proofs with Larus

Start and end date: 15/07/2023 to 22/07/2023

### **Description of the work carried out during the STSM**

Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section.

*(max. 500 words)*

During the STSM, Predrag Janicic and I worked on finding and solving issues with automatic parsing and generation of hints. Hints are an extension of the TPTP format that allows encoding of specific proof steps that must appear in the proof built by Larus. For example, we found that GeoCoq proofs are not always formatted in the same manner, having hidden case splits (or at least, hidden when reading the file line by line) or cases that should be put in another order. We enumerated those problems and provided a solution for each, building an algorithm to create hints from GeoCoq files.

### **Description of the STSM main achievements and planned follow-up activities**

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

*(max. 500 words)*

Unfortunately we couldn't work on the export of proofs from the theorem prover Larus to TSTP, nor support for abducts: all of our time was allocated to work on the hints support. With our new algorithm, which is not naive anymore, we finally could prove more theorems with hints than without: it was not the

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<sup>1</sup> This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

case before my STSM. Because of that, we believed that hints were bugged and needed to be rethought, but it was not the case: we only needed to understand how proofs are constructed by Larus, which specificities it has got, and how to accommodate them. We could prove 81 theorems with hints, while we could only prove 78 without. It is still a small difference, but before my STSM the best that we could do was to prove approximately 40 theorems with hints.

Because this was my first M2 internship, we don't plan on collaborating further for the moment being.