

Report on the outcomes of a Short-Term Scientific Mission¹

Action number: CA20111

Grantee name: Thomas Traversié

Details of the STSM

Title: Translation templates for Dedukti

Start and end date: 22/02/2025 to 01/03/2025

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)

We discussed the strengths and weaknesses of the different translation mechanisms for the lambdaPi-calculus modulo rewriting: theory morphisms, logical relations, and mutually-recursive morphism and relation. In particular, the mutually-recursive theory morphism and logical relation proves to be complex to manage in practice as invariants are inserted everywhere, that is why we preferred using theory morphisms with dependent pairs instead.

We collected examples of translations inside the lambdaPi-calculus modulo rewriting, namely translations from hard-sorted logic to soft-sorted logic, from soft-sorted logic to unsorted logic and from natural numbers to integers. These translations require additional features, like dependent pairs, dependent implications and proof irrelevance. We implemented these new examples inside Dedukti.

Additionally, the grantee presented his work to the Kwarc team and discussed with several members about translating informal knowledge.

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.

¹This 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.

(max. 500 words)

The STSM achieved its planned goals and outcomes:

- We formalized new challenging translations between theories, and we implemented them inside Dedukti (<https://github.com/Deducteam/TranslationTemplates>).
- We continued and finished the writing of a journal or conference paper about these translation mechanisms for the lambdaPi-calculus modulo rewriting and Dedukti.

This STSM contributed to WG1 (Tools on Proof Systems Interoperability) with a connection to WG4 (Libraries of Formal Proofs), as this implementation can now be used to mechanically translate proofs between different Dedukti theories.

A future follow-up collaboration will focus on extending the lambdaPi-calculus modulo rewriting with Sigma-types, and proving that such Sigma-types can be eliminated later. Sigma-types allow us to easily express some translations between theories.



Florian Rabe

01/03/2025