EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

Report on the outcomes of a Short-Term Scientific Mission[1]

Action number: CA20111

Grantee name: Ciarán Dunne

Details of the STSM

Title: From Dedukti to MMT: A Comparative Study of Modular Frameworks for Logical Systems

Start and end date: 14/03/2025to 21/03/2025

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.

On the first day of the STSM, I met with Michael Kohlhasse and took part in their weekly group meeting. I introduced myself to the team and gave a talk on my current work with Deducteam at ENS Paris-Saclay.

Throughout the week, I had several working sessions with Florian Rabe. I was introduced to MMT and its theory library. Florian also showed me a programming language he has been developing called UPL, which is a potential successor to MMT. We compared the differences between how MMT, UPL, Dedukti and LambdaPi represent mathematical theories and proofs.

The main themes of the working sessions were the use of MMT theories in the Dedukti ecosystem, the representation of set theory within logical frameworks, and the set-theoretic semantics of MMT.

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.

[1] 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.

cost
EUROPEAN COOPERATION
IN SCIENCE & TECHNOLOGY

A main result of the working sessions was sketching out the details of a set theory based theorem proving environment equipped with automation techniques inspired by type-theoretic techniques. We proposed the development of the mathematical notion of *structure* and *inductive types* by interpreting MMT theories as set-theoretic records with urelements used for record names.

Due to funding constraints, the length of the STSM had to be cut from 2 weeks to 1 week. As such, we did not meet the goals of the original proposal. However, we were able to make significant progress in our research and are planning to collaborate on a paper which details our work more rigorously.

Prof. Dr. Michael Kohlhase
Wissensrepräsentation
und -verarbeitung
Universität Erlangen-Nürnberg
Martensstr. 3, 91058 Erlangen