



Working Group 4 Libraries of Formal Proofs

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1. WG1 Tools on Proof Systems Interoperability
2. WG2 Automated Theorem Provers
3. WG3 Program Verification
4. **WG4 Libraries of Formal Proofs**
5. WG5 Machine Learning in Proofs
6. WG6 Type Theory

Objectives:

1. investigate various approaches to efficiently **maintain** libraries of formal proofs
2. to make a collection of proofs that can be **modified, extended, and queried** . . .
3. . . .by users who **do not have expert knowledge of the entire collection nor of the system** that was used to develop the proofs.

Tasks:

1. discuss challenges of **maintaining and using** existing libraries of formal proofs;
2. contribute to creating **database** of already formalised mathematics;
3. develop the **tool for querying** libraries of formal proofs with respect to the semantic of search object;
4. that the tool can be efficiently **used** with Dedukti and within software formalisation efforts.

Deliverables:

1. (month 12): **Database** gathering **proofs** from Coq, HOL-Light and Matita and **their translations**.
2. (month 24): Tools for managing the **dependencies** between proofs, and **querying** and **searching** the database.
3. (month 48): Extension of the database and associated tools to **other systems** like Agda, Minlog, PVS, Lean, Mizar, Atelier B, TLAPS.

WG4 meeting in Tblisi (Georgia), 23-24/09/2022:

- ▶ “EuroProofNet Workshop on the development, maintenance, refactoring and search of large libraries of proofs”
- ▶ 2 days meeting, 19 on-site + 28 on-line = 47 participants
- ▶ 15 talks, 1 round table, social dinner
- ▶ part of the Computational Logic Autumn Summit - CLAS 2022
(6 conferences + 3 schools + the EPN workshop)
- ▶ also advertised as a workshop associated to the 15th Conference on Intelligent Computer Mathematics (CICM 2022)
- ▶ total cost: 9929 euros

STSM:

- ▶ last call for STSM with a focus on WP4
- ▶ notably: an STSM on the **transfer and reuse of contextual procedural knowledge (HOW TO USE THIS RESULT?)** from one system (Coq) to another (LambdaPi)

Hiring:

- ▶ INRIA has tried to hire on its budget an **ingénieur de recherche** to take care of engineering issues (e.g. for WP4 deliverable 1)
- ▶ **no applicant was suitable** for the position

Actions Planned for Second Year

- ▶ **Dependency management:** Dedukti dev meetings in Jan and Apr (join with WP1 and WP3), 3 days, 11669 euros each
- ▶ **Indexing and search database of proofs:** Dedukti dev meetings in Jan and Apr (join with WP1 and WP3), 3 days, 11669 euros each
 - ▶ at Tbilisi three groups interested in applying their techniques
 - ▶ one prototype under development
- ▶ One **meeting** in Bologna (IT) in June 2023 (2 days, 10800 budget)
- ▶ Focus on **gender aspects** in searching mathematical libraries