

Work And Budget Plan

CA20111 Grant Agreement Period 1

01/11/2021 to 31/10/2022

Action Profile

Action General Information

Action Code	CA20111	MC Chair	Mr Frédéric Blanqui
Action Title	CA20111 - European Research Network on Formal Proofs		
MOU	051/21	Draft MOU	OC-2020-1-24593
CSO Approval Date	2021-05-25		
Action Start Date	2021-10-11	Action End Date	2025-10-10
Science Officer	Dr Ralph Stuebner	Administrative Officer	Ms Cassia Azevedo

Participating COST Members:

	ITC		Non-ITC		Total
	Number		Number		
COST Members (countries) having accepted the MoU	Number	22	Number	18	40
	% of ITC in Action	55%	% of non-ITC in Action	45%	
	% of all ITC	100%	% of all non-ITC	105.88%	
Number of Action MC members	22		29		51

COST Member and Acceptance Date		
AL 23/06/2021	HU 23/06/2021	PL 23/06/2021
AT 23/06/2021	IS 23/06/2021	PT 23/06/2021
BE 23/06/2021	IE 23/06/2021	RO 23/06/2021
BA 23/06/2021	IL 23/06/2021	RS 23/06/2021
BG 23/06/2021	IT 23/06/2021	SK 23/06/2021
HR 23/06/2021	LV 23/06/2021	SI 23/06/2021
CY 23/06/2021	LT 23/06/2021	ZA 23/06/2021
CZ 23/06/2021	LU 23/06/2021	ES 23/06/2021
DK 23/06/2021	MT 23/06/2021	SE 23/06/2021
EE 23/06/2021	MD 23/06/2021	CH 23/06/2021
FI 23/06/2021	ME 23/06/2021	TR 23/06/2021
FR 23/06/2021	NL 23/06/2021	UK 23/06/2021
	MK 23/06/2021	
	NO 23/06/2021	

DE 23/06/2021
EL 23/06/2021

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International cooperation

	NNC	IPC	Specific Organisation	Total
Number of entities formally approved to join Action	0	0	0	0
Number of countries	0	0	0	0

Working Groups

	WG Title	WG Leader	Number of WG members
WG1	Tools for proof systems interoperability	Dr Jesper Cockx	64
WG2	Automated theorem provers	Prof Pascal Fontaine	72
WG3	Program verification	Dr Alicia Villanueva	97
WG4	Libraries of formal proofs	Dr Claudio Sacerdoti Coen	76
WG5	Machine learning in proofs	Dr Cezary Kaliszyk	51
WG6	Type theory	Dr Benedikt Ahrens	87

MoU objectives, Action deliverables and Grant Agreement Period Goals

Action Objectives from MoU

Aim/primary Objective
boost the interoperability and usability of proof systems
Secondary objectives
<ol style="list-style-type: none"> 1. Express new proof systems in the Dedukti logical framework. 2. Promote the output of detailed, checkable proofs from automated theorem provers. 3. Make techniques for program verification more effective and more accessible to all stakeholders. 4. Gather proofs translated in Dedukti into a FAIR database. 5. Provide tools for searching large libraries of formal proofs. 6. Develop the use of artificial intelligence and machine learning techniques on proofs. 7. Develop a modular theory of type theories. 8. Develop the use of natural or controlled languages in proof systems. 9. Bring together members of the different communities working on proofs in Europe. 10. Act as a stakeholder platform in the field of formal proofs from its theoretical grounds to its industrial applications. 11. Create an excellent and inclusive network of researchers in Europe with lasting collaboration beyond the lifetime of the Action. 12. Ease access to formal verification techniques in education and other areas of science. 13. Actively support young researchers, the under-represented gender, and teams from regions with less capacity. 14. Transfer knowledge in terms of expertise, scientific tools and human resources across the different disciplines and between academia and industry. 15. Prepare competitive EU researchers for a fruitful career in an international environment through intensive use of Short Term Scientific Missions (STSM) and joint educational programs with industry. 16. Disseminate the results of the Action activities to the scientific community, the industry, the certification bodies, the European institutions and to the general public.

Action Deliverables

Deliverable	Month
1. D9 Database gathering proofs from the proof systems Coq, HOL-Light and Matita, and their translations.	12
2. D3 Inventory of automated theorem provers producing proofs, description of proof formats, and inventory of checking tools for these proof formats.	18
3. D5 Comparison of the approaches used in the international Software Verification competition SV-COMP.	18
4. D14 Definition of a mathematical framework for modular reasoning about type theories and their extensions.	18
5. D1 Release of software for translating proofs coming from important proof systems based on type theory like Isabelle, Agda, PVS, Lean or Minlog, to Dedukti and back.	24
6. D6 Software prototype for the automated inference of program specifications as logical axioms.	24
7. D10 Tools for managing the dependencies between proofs, and querying and searching the database.	24
8. D12 Detailed technical report on the evaluation of techniques for learning proof search guidance and premise selection in automated theorem provers.	30
9. D4 Software for translating proof formats used by automated theorem provers to Dedukti.	40
10. D2 Release of software for translating proofs coming from important proof systems based on set theory like Mizar, Atelier B or TLAPS to Dedukti and back.	48
11. D7 Collection of verification challenges with summary of working recipes for verifying them.	48
12. D8 Technique for syntax-semantics interface for program verification with or without type systems.	48
13. D11 Extension of the database and associated tools to other systems like Agda, Minlog, PVS, Lean, Mizar, Atelier B, TLAPS.	48
14. D13 White paper on including restricted natural language proof formats to existing proof libraries.	48
15. D15 Prototype implementation of the mathematical framework, with basic user interface, user documentation and gallery of examples of type theories.	48

Grant Agreement Period

Grant Agreement Period Start Date	01/11/2021	Grant Agreement Period End Date	31/10/2022
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Grant Agreement Period Goals

Number	Grant Agreement Period Goal	MoU Objective(s) it relates to
GAPG 1	Advertise EuroProofNet to the different communities working on proofs	<ul style="list-style-type: none"> • Secondary objective 10 • Secondary objective 11 • Secondary objective 12
GAPG 2	Provide to all proof system developers the necessary knowledge to be able to encode the logic and proofs of their system in Dedukti and start writing a translator from their system to Dedukti	<ul style="list-style-type: none"> • Challenge • Secondary objective 1 • Secondary objective 2 • Secondary objective 4
GAPG 3	Provide to young researchers the necessary knowledge to be able to produce detailed, checkable proofs by using theorem provers, and to understand the differences between different proof systems and the key characteristics for a good combination with formal automatic verification techniques	<ul style="list-style-type: none"> • Secondary objective 2 • Secondary objective 3
GAPG 4	Evaluate the techniques for learning proof search guidance and premise selection in automated theorem provers	<ul style="list-style-type: none"> • Secondary objective 6
GAPG 5	Teach how to formalize mathematics in the Naproche system, what is its underlying linguistic theories and techniques, and its type theory	<ul style="list-style-type: none"> • Secondary objective 8
GAPG 6	Identify verification techniques used in the Software Verification competition SV-COMP and start the analysis and characterization of the different approaches	<ul style="list-style-type: none"> • Secondary objective 3
GAPG 7	Build an inventory of works on type theory, evaluate the existing works towards usability as the basis of an implementation, and create a roadmap towards an implementable theory of type theories	<ul style="list-style-type: none"> • Secondary objective 7
GAPG 8	Write the Progress Report 1 on the compliance to the COST policy, and the work plan and budget for the second grant period	<ul style="list-style-type: none"> • Secondary objective 13
GAPG 9	Identify concept alignments between different implementation of the same mathematical objects	<ul style="list-style-type: none"> • Secondary objective 4 • Secondary objective 5
GAPG 10	Present and discuss the possible gender balance issues and subconscious biases that may occur in computer science and, more specifically, in the field of logic and proof	<ul style="list-style-type: none"> • Secondary objective 13
GAPG 11	Help action members to work together on the challenge and research coordination objectives of the action.	<ul style="list-style-type: none"> • Challenge • Secondary objective 1 • Secondary objective 2 • Secondary objective 3 • Secondary objective 4 • Secondary objective 5 • Secondary objective 6 • Secondary objective 7 • Secondary objective 8

		<ul style="list-style-type: none">• Secondary objective 13• Secondary objective 15
GAPG 12	Start the inventory of automated theorem provers producing proofs, description of proof formats, and inventory of checking tools for these proof formats	<ul style="list-style-type: none">• Secondary objective 2

Work and Budget Plan for the Grant Agreement Period

Work and Budget Plan Summary

A. COST Networking Tools	EUR
(1) Meetings	39,870.00
(2) Training Schools	46,750.00
(3) Short Term Scientific Missions (STSM)	22,000.00
(4) ITC Conference Grant	0.00
(5) COST Action Dissemination	0.00
(6) Other Expenses Related to Scientific Activities (OERSA)	0.00
B. Total Science Expenditure (sum of (1) to (6))	108,620.00
C. Financial and Scientific Administration and Coordination (FSAC) (max. of 15% of B)	16,293.00
Total Grant (B+C)	124,913.00

Meetings

Overview

Meeting Title	Meeting Type	Dates	Location	ITC	Total Cost(EUR)
WG3 kick-off meeting	Working Group Meeting	27/01/2022 - 28/01/2022	Valencia (Spain)	No	5,500.00
WG6 meeting on Syntax and Semantics of Type Theories	Working Group Meeting	28/03/2022 - 29/03/2022	Stockholm (Sweden)	No	7,970.00
WG2 meeting at PAAR 2022	Working Group Meeting	12/08/2022 - 12/08/2022	Haifa (Israel)	No	7,800.00
EuroProofNet-AITP Conference on Artificial Intelligence and Theorem Proving	Workshops/Conferences	04/09/2022 - 07/09/2022	Aussois (France)	No	18,600.00
2nd Management Committee Meeting (online)	Management Committee Meeting	26/09/2022 - 26/09/2022	Online (France)	No	0.00
				Total	39,870.00

Details

Meeting Type	Working Group Meeting		
Title of the Meeting	WG3 kick-off meeting		
Grant Period Goal(s) it will address	Identify verification techniques used in the Software Verification competition SV-COMP and start the analysis and characterization of the different approaches		
Description	This activity consists of a two-day meeting for WG3 to bring together members of the different communities working on proofs and verification in Europe. It aims to foster collaborations and to build synergies among participants to ease the path to more fruitful results of the Action. The identification of verification techniques used in the Software Verification competition SV-COMP will be the topic around discussions and sessions will be organized. The action members who will be reimbursed will be chosen by taking into account the following criteria in order: importance wrt the research coordination objectives (except for school trainees); inclusive target countries; age; gender; team with low resources; balance over the action life time between people, teams, countries and working groups.		
Output(s)	Codified knowledge: Catalogue of techniques identified and a description of steps to follow towards the achievement of the period goal. Tacit knowledge: Participants will actively interact among them, building collaborative synergies.		
Location	Valencia (Spain)	ITC	No
Start Date	2022-01-27 09:00:00	End Date	2022-01-28 17:00:00
Duration	2 days		
Number of expected total participants	20	Number of participants to be reimbursed from COST funds	10
Average	500.00	Total Reimbursement	5,000.00

reimbursement(per participant)(EUR)		costs (EUR)	
Local Organiser Support (EUR)	500.00		
Total cost of the meeting (EUR)	5,500.00		

Meeting Type	Working Group Meeting		
Title of the Meeting	WG6 meeting on Syntax and Semantics of Type Theories		
Grant Period Goal(s) it will address	Build an inventory of works on type theory, evaluate the existing works towards usability as the basis of an implementation, and create a roadmap towards an implementable theory of type theories		
Description	Kickoff event for WG6 with a focus on syntax and semantics of type theories, to provide reasoning principles on extensions of Martin-Löf type theory, which is at the basis of many proof systems. The action members who will be reimbursed will be chosen by taking into account the following criteria in order: importance wrt the research coordination objectives (except for school trainees); inclusive target countries; age; gender; team with low resources; balance over the action life time between people, teams, countries and working groups.		
Output(s)	<ul style="list-style-type: none"> • Codified knowledge: Share (via presentations) different established/recently proposed frameworks for general mathematical type theories and their implementations, and other related work. • Tacit knowledge: Help re-establish research networks within the field following the Covid-19 hiatus, especially for young researchers who have had less chance for face-to-face interaction, networking, and sharing of their results and techniques. • Technology: plan and lay groundwork towards Sep 2025 deliverable, implementation of mathematical framework(s) for general type theories. 		
Location	Stockholm (Sweden)	ITC	No
Start Date	2022-03-28 09:00:00	End Date	2022-03-29 17:00:00
Duration	2 days		
Number of expected total participants	30	Number of participants to be reimbursed from COST funds	11
Average reimbursement(per participant)(EUR)	670.00	Total Reimbursement costs (EUR)	7,370.00
Local Organiser Support (EUR)	600.00		
Total cost of the meeting (EUR)	7,970.00		

Meeting Type	Working Group Meeting		
Title of the Meeting	WG2 meeting at PAAR 2022		
Grant Period Goal(s) it will address	Advertise EuroProofNet to the different communities working on proofs, Start the inventory of automated theorem provers producing proofs, description of proof formats, and inventory of checking tools for these proof formats		
Description	A one-day meeting co-located with the PAAR workshop on Practical Aspects of Automated Reasoning at FLOC 2022, a major event that happens every 4 years and gathers many of the conferences and workshops in the field of logic and proofs (see https://floc2022.org/ and		

	<p>http://www.eprover.org/EVENTS/PAAR-2020.html for the previous edition of PAAR). It will provide a forum for action members who are developers of automated reasoning tools to discuss and compare different implementation techniques, and for users to discuss and communicate their applications and requirements. It will bring together different groups to concentrate on practical aspects of the implementation and application of automated reasoning tools. Work in progress, new implementation techniques and applications will be particularly welcome. Discussions on proof formats and the generation of proofs will be organized. This will allow action members to start the inventory of automated theorem provers producing proofs, description of proof formats, and inventory of checking tools for these proof formats. The action members who will be reimbursed will be chosen by taking into account the following criteria in order: importance wrt the research coordination objectives (except for school trainees); inclusive target countries; age; gender; team with low resources; balance over the action life time between people, teams, countries and working groups.</p>		
Output(s)	<p>The outputs of the PAAR workshop will essentially target the deliverable “Inventory of automated theorem provers producing proofs, description of proof formats, and inventory of checking tools for these proof formats”, and to a much lesser extent, the further deliverables of WG 2 (that will be the target of further meetings) • Codified knowledge: a first skeleton for a draft of the inventory will be written, following the event; • Tacit knowledge: we will organize and distribute tasks for fulfillment of the work needed for the further deliverables of WG 2.</p>		
Location	Haifa (Israel)	ITC	No
Start Date	2022-08-12 09:00:00	End Date	2022-08-12 17:00:00
Duration	1 day		
Number of expected total participants	40	Number of participants to be reimbursed from COST funds	12
Average reimbursement(per participant)(EUR)	650.00	Total Reimbursement costs (EUR)	7,800.00
Local Organiser Support (EUR)	0.00		
Total cost of the meeting (EUR)	7,800.00		

Meeting Type	Workshops/Conferences
Title of the Meeting	EuroProofNet-AITP Conference on Artificial Intelligence and Theorem Proving
Grant Period Goal(s) it will address	Advertise EuroProofNet to the different communities working on proofs, Evaluate the techniques for learning proof search guidance and premise selection in automated theorem provers, Identify concept alignments between different implementation of the same mathematical objects
Description	AITP is an annual workshop created in 2016 gathering researchers working on the application of AI and machine learning methods to mathematical proof corpora (see http://aitp-conference.org/). The main scientific goal is the advancement of combinations of AI and reasoning methods and tools deployed over large mathematical and scientific corpora. It does not normally have formal proceedings. It only gathers the abstracts of talks. Instead, it has the form of talks describing novel exploratory work and discussion/panel sessions. The next edition will be organized as an EuroProofNet WG5 meeting. Indeed, most core topics of discussions at AITP are either the same or very close and related

	to the research topics of WG5. AI methods in theorem proving and mathematics do directly correspond to the WG 5 research topics of machine learning for proof representation and automated theorem proving. The AITP core topic of "alignment and joint processing of libraries" corresponds to the WG research on "identifying concept alignments between different implementation of the same mathematical objects" described in the MoU. Furthermore, the linguistic-based methods for mathematics (core topic of AITP) is again directly related to representing proofs with controlled natural languages (WG 5). Finally, one of the deliverables in WG5, is a detailed technical report on the evaluation of techniques for learning proof search guidance and premise selection in automated theorem provers. The action's involvement with AITP is going to be instrumental in the creation of this report, as AITP has been serving as the main meeting point for researchers working on the topics of this report. The action members who will be reimbursed will be chosen by taking into account the following criteria in order: importance wrt the research coordination objectives (except for school trainees); inclusive target countries; age; gender; team with low resources; balance over the action life time between people, teams, countries and working groups.		
Output(s)	• Codified knowledge: We plan for informal proceedings of AITP 2022 that will contain the publications corresponding to the meeting. • Tacit knowledge: Social interaction among COST action members.		
Location	Aussois (France)	ITC	No
Start Date	2022-09-04 09:00:00	End Date	2022-09-07 17:00:00
Duration	4 days		
Number of expected total participants	50	Number of participants to be reimbursed from COST funds	17
Average reimbursement(per participant)(EUR)	800.00	Total Reimbursement costs (EUR)	13,600.00
Local Organiser Support (EUR)	5,000.00		
Total cost of the meeting (EUR)	18,600.00		

Meeting Type	Management Committee Meeting		
Title of the Meeting	2nd Management Committee Meeting (online)		
Grant Period Goal(s) it will address	Write the Progress Report 1 on the compliance to the COST policy, and the work plan and budget for the second grant period		
Description	This second management committee meeting will assess the activities and results of the first grant period, discuss the the compliance to the COST policy (first progress report of the action to deliver on November), and the work plan and budget of the second grant period (November 2022 - October 2023).		
Output(s)	First progress report of the action. Work plan and budget of the second grant period.		
Location	Online (France)	ITC	No
Start Date	2022-09-26 09:00:00	End Date	2022-09-26 09:00:00
Duration	1 day		
Number of expected total participants	55	Number of participants to be reimbursed from COST funds	0

Average reimbursement(per participant)(EUR)	710.00	Total Reimbursement costs (EUR)	0.00
Local Organiser Support (EUR)	0.00		
Total cost of the meeting (EUR)	0.00		

Training Schools

Overview

Title of the Training School	Dates	Location	ITC	Total Cost(EUR)
Dedukti school & Women in EuroProofNet	24/06/2022 - 25/06/2022	Nantes (France)	No	24,750.00
EuroProofNet-VTSA School on Verification Technology, Systems & Applications	25/07/2022 - 29/07/2022	Saarbrücken (Germany)	No	11,900.00
School on Natural Language Formalizations (SoNaLF)	18/09/2022 - 22/09/2022	Bonn (Germany)	No	10,100.00
			Total	46,750.00

Details

Title of the Training School	Dedukti school & Women in EuroProofNet		
Grant Period Goal(s) it will address	Advertise EuroProofNet to the different communities working on proofs, Provide to all proof system developers the necessary knowledge to be able to encode the logic and proofs of their system in Dedukti and start writing a translator from their system to Dedukti, Present and discuss the possible gender balance issues and subconscious biases that may occur in computer science and, more specifically, in the field of logic and proof		
Description	This event is twofold: to organize a school on Dedukti (1.5 day) and a half-day meeting on women in EuroProofNet. The school on Dedukti will introduce the implementations of Dedukti, the methods to express a theory in Dedukti, to write a translator to and from Dedukti and to share a library. Women in EuroProofNet will consist of an invited talk and a few contributed talks by women followed by a discussion on gender balance issues and subconscious biases that occur. The action members who will be reimbursed will be chosen by taking into account the following criteria in order: importance wrt the research coordination objectives (except for school trainees); inclusive target countries; age; gender; team with low resources; balance over the action life time between people, teams, countries and working groups.		
Output(s)	Dedukti School: • Tacit knowledge: increasing the level of expertise of the participants on the subjects addressed during the school. Women in EuroProofNet: • Codified knowledge: depending on the number of contributed talks, we consider organising a special issue of a journal. This issue could be have an open call to other contributions by women working on the action, on top of the ones attending the event. • Tacit knowledge: this event aims at providing a platform to disseminate the achievements of female researchers; provide positive interactions with peers and more established faculty; increase their connections and collaborations within the action research community. These aspects are particularly relevant to early career researchers and researchers from ITC countries.		
Location	Nantes (France)	ITC	No
Start Date	2022-06-24 09:00:00	End Date	2022-06-25 17:00:00
Number of trainers	8	Number of trainees	40

Number of trainers to be reimbursed	5	Number of trainees to be reimbursed	35
Average trainer Reimbursement(EUR)	610.00	Average reimbursement per trainee(EUR)	610.00
Total trainer Reimbursement(EUR)	3,050.00	Total trainee Grant(EUR)	21,350.00
Local Organiser Support (EUR)	350.00		
Total cost of the Training School(EUR)	24,750.00		

Title of the Training School	EuroProofNet-VTSA School on Verification Technology, Systems & Applications
Grant Period Goal(s) it will address	Provide to young researchers the necessary knowledge to be able to produce detailed, checkable proofs by using theorem provers, and to understand the differences between different proof systems and the key characteristics for a good combination with formal automatic verification techniques
Description	<p>The VTSA-EuroProofNet summer school on Verification Technology, Systems & Applications is a 5 days school where different speakers offer training on verification technology, systems and applications. The training school will last five days with lecture sessions (7.5h/day, total 30h) and discussion/students sessions (4h total). This activity is planned as a face-to-face event. The expected number of attendees is between 30 and 45. The student sessions will give all participants the opportunity to discuss their Ph.D./Master topics with the trainers, which will be high-experienced researchers, organizers and further senior researchers. These interactions might ease the path for future STSMs or collaborations. The objectives of the VTSA-EuroProofNet school are: - to raise awareness about CA20111 objectives among the younger researchers (the objectives of CA20111 will be discussed during the school); - give them access to the specific knowledge required to reach the CA20111 action scientific objectives with a particular focus on WG2 goal of promoting the output of detailed, checkable proofs from automated theorem provers, and on WG3 goal of strengthening synergies and interoperability between different proof systems to combine the benefits of the different methodologies underlying the proof systems to facilitate formal verification of both software and mathematics; - train a new generation of young researchers with the main aim of CA20111 in mind: boost the interoperability and usability of proof systems. VTSA is a series of schools that exist for a few years now (see http://resources.mpi-inf.mpg.de/departments/rg1/conferences/vtsa21/). In 2022, in coordination with EuroProofNet, it will be particularly tailored to the CA20111 objectives, reusing the infrastructure of the school and its budget (14k€ for the 2021 edition) as a vector of success for CA20111. The program will be chosen to adopt the CA20111 topics and the CA20111 priorities. In particular, there will be one industrial actor using proofs for verification of industrial systems, one lecturer using/developing automated reasoning tools with proof production, one academic lecturer applying proof tools for the verification of computer systems. The action members who will be reimbursed will be chosen by taking into account the following criteria in order: importance wrt the research coordination objectives (except for school trainees); inclusive target countries; age; gender; team with low resources; balance over the action life time between people, teams, countries and working groups.</p>
Output(s)	Tacit knowledge: The EuroProofNet-VTSA training school will contribute to a better qualification of Action participants in topics that can be applied to reach the Action objectives. Moreover, the Student sessions will give all participants

	the opportunity to discuss their Ph.D./Master topics with the trainers, which will be high-experienced researchers, organizers, and further senior researchers. These interactions might ease the path for future STSMs or collaborations among participants in the context of the Action.		
Location	Saarbrücken (Germany)	ITC	No
Start Date	2022-07-25 09:00:00	End Date	2022-07-29 00:00:00
Number of trainers	5	Number of trainees	40
Number of trainers to be reimbursed	2	Number of trainees to be reimbursed	12
Average trainer Reimbursement(EUR)	850.00	Average reimbursement per trainee(EUR)	850.00
Total trainer Reimbursement(EUR)	1,700.00	Total trainee Grant(EUR)	10,200.00
Local Organiser Support (EUR)	0.00		
Total cost of the Training School(EUR)	11,900.00		

Title of the Training School	School on Natural Language Formalizations (SoNaLF)		
Grant Period Goal(s) it will address	Teach how to formalize mathematics in the Naproche system, what is its underlying linguistic theories and techniques, and its type theory		
Description	The natural language of mathematics can be restricted to a rich natural sublanguage with a fully formal non-ambiguous grammar. This allows to carry out strict formalizations in an intuitive and readable language, which should make formal mathematics accessible to every mathematician. The Naproche system is a partial realization of these ideas. Current research is investigating whether the Naproche approach is also applicable to other formal mathematics systems like Isabelle. The proposed school will teach formalizing in Naproche through an intense tutorial with exercise classes. There will be supplementary lectures on underlying linguistic theories and techniques, on the type theory of Naproche, and on the perspectives of the use of natural language in formalization. The action members who will be reimbursed will be chosen by taking into account the following criteria in order: importance wrt the research coordination objectives (except for school trainees); inclusive target countries; age; gender; team with low resources; balance over the action life time between people, teams, countries and working groups.		
Output(s)	• Codified knowledge: Example formalizations to be included in a public repository. • Tacit knowledge: Social interaction among COST action members from various working groups.		
Location	Bonn (Germany)	ITC	No
Start Date	2022-09-18 09:00:00	End Date	2022-09-22 17:00:00
Number of trainers	5	Number of trainees	20
Number of trainers to be reimbursed	2	Number of trainees to be reimbursed	10
Average trainer Reimbursement(EUR)	800.00	Average reimbursement per trainee(EUR)	800.00
Total trainer Reimbursement(EUR)	1,600.00	Total trainee Grant(EUR)	8,000.00
Local Organiser Support (EUR)	500.00		

Total cost of the Training School(EUR)	10,100.00
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Short Term Scientific Missions (STSM)

Number	Average cost per STSM(EUR)	Total cost(EUR)
22	1,000.00	22,000.00
Grant Period Goal(s) it will address	Help action members to work together on the challenge and research coordination objectives of the action.	
Description	A call for Short-term scientific missions (STSMs) will be done every 3 months. The budget for STSMs may be used also to cover Virtual Networking Grants, if becoming available through COST and if deemed suitable for the Action. The action members who will be reimbursed will be chosen by taking into account the following criteria in order: importance wrt the research coordination objectives (except for school trainees); inclusive target countries; age; gender; team with low resources; balance over the action life time between people, teams, countries and working groups.	
Output(s)	Codified knowledge: common publications and software developments. Tacit knowledge: Create an excellent and inclusive network of researchers in Europe with lasting collaboration beyond the lifetime of the Action Technology: improvement of existing software, and developments of new software.	