



PROJECT PERIODIC REPORT

PROJECT MANAGEMENT AND USE OF RESOURCES

Grant Agreement number: 243381

Project acronym: CERCo

Project title: Certified Complexity

Funding Scheme: STREP

Date of latest version of Annex I against which the assessment will be made:

Periodic report: 1st 2nd 3rd 4th

Period covered: from 01 February 2011 to 31 January 2012

Project coordinator: Prof. Claudio Sacerdoti Coen

Alma Mater Studiorum – Università di Bologna

Tel: +39 051 2094973

Fax: +39 051 20 9 4510

E-mail: claudio.sacerdoticoen@unibo.it

Project website address: <http://cerco.cs.unibo.it>

Table of contents

3.4 Project management.....	3
Management activities	3
3.5 Dissemination and use of the knowledge.....	6
3.6 Explanation of the use of the resources	9
Justification of major cost items and resources.....	9
Beneficiary 1 – UNIBO	9
Beneficiary 2 - UPD	13
Beneficiary 3 - UEDIN.....	14
Budgeted versus Actual Costs	16
Planned versus Actual effort	18
3.7 Financial statements – Form C and Summary financial report.....	18
3.8 Certificates on the financial statements	19

3.4 Project management

Management activities

CerCo is a relatively small project with three partner and a small number of work packages. Management activities are included in WP1, whereas WP2, 3, 4 and 5 correspond to research activities.

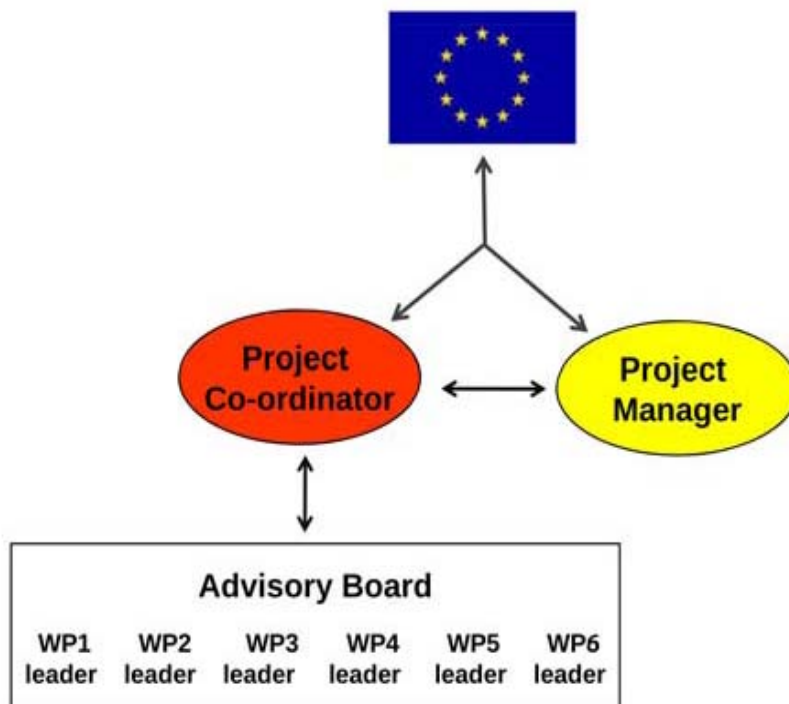
The overall objective of WP1, as indicated in Annex I of GA is the smooth implementation of the CerCo project and in particular:

- to coordinate and supervise activities to be carried out;
- to carry out the overall administrative and financial management of the project;
- to manage contacts with the European Commission;
- to monitor quality and timing of project deliverables;
- to establish effective internal and external communication procedures.

Consortium management tasks and achievements

Consortium structure

The project management and administrative structure is described in Annex I of GA Section B2.1. No changes occurred with respect to the management structure. For convenience, a graph illustrating the project management structure is reproduced below.



Financial Management and Coordination

The coordinator UNIBO was in charge of the overall administrative and financial tasks for CerCo.

The activities during this second period included:

- the general financial management of the EC funding, i.e. transmission of the second payment to all beneficiaries;
- collecting and checking partner's financial information, submission of financial statements through NEF system;
- gathering all necessary information and materials for the preparation and submission of management report, activity report and deliverables.

WP leaders have had an important role for the preparation of project deliverables, acting as intermediary between beneficiaries and coordinator. They have also been responsible for the monitoring of WP activities and the quality check of deliverables and reports

Consortium Agreement

No changes or amendments required.

Communication Management

The communication strategy for the second year has remained merely the same requiring rather tools for communication in order to guarantee the exchange of information and data between partners, such as simple e-mail communication, website and consortium meetings.

Organisation of Periodic Meetings

The organisation of meetings was one key aspect for both coordination of future research activities and exchange of information between partners. All partners agreed that it is necessary and helpful to have direct contact between the involved research units especially for the purpose of a better integration among units. The project meetings allowed WP leaders and coordinator to monitor the project activities, prepare deliverables and plan future steps for the implementation of tasks.

During the second period of CerCo we have organised 3 project meetings:

- **Project meeting, Edinburgh, Scotland, February 2011.** This meeting was scheduled at the beginning of the second period to discuss and schedule the activities for the second year and to review the decisions taken during the implementer's meeting in Bologna. In particular, we discussed the global proof strategy and the particular techniques to be adopted in the proofs. The objective was to guarantee the smooth integration of the proofs for the front-end (WP3) with those for the back-end (WP4). We also started a discussion on the tasks to be done in WP5, that had previously not been initiated. All beneficiaries were represented.
- **Project meeting, Paris, France, September 2011.** The meeting was a federated meeting of the CerCo and Eternal projects. There have been common public dissemination sessions where we

have presented the results of CerCo to the members of Eternal. The public sessions have been followed by private sessions for the discussion of the results described in the deliverables due for the 18th month of the project (D3.2, D3.3, D4.2, D4.3). Moreover, we have discussed the progress on WP5 and the problems faced in the development of the Frama-C plugin. An invited speaker from the Frama-C community has helped in understanding some of the difficulties. He has also been the target of dissemination. Eternal is an INRIA ARC project that nicely complements CerCo. In CerCo we will provide actual certified computational costs for loop bodies, to be combined by the user with bounds on loop invariants to certify overall execution costs. However, we do not provide automatic computation of the bounds. The Eternal project studies ways to bound the number of times loops are executed by means of techniques that come from the implicit computational complexity community, married with interactive theorem proving. However, they do not provide any realistic cost model for the bodies of loops. Hence each project provides tools and techniques to give the missing piece of information to the other one. A major topic of discussion in the private CerCo session has been the integration of WCET technologies. In particular, a WCET expert has been invited to give a thorough overview of the AiT tool, confirming the feasibility of a study on the integration of WCET techniques in CerCo. The study had already started in previous months and partial results have also been presented. All beneficiaries were represented.

- **Implementer's meeting, Edinburgh, Scotland, December 2011.** The one week long meeting was used to draw together implementers from each project site in order to discuss integration problems that required a tight and prompt collaboration. It was also used for a long session of brain-storming on one critical problem faced in the proof of correctness for the static prediction of costs. The brain-storming resulted in the notion of structured traces to be used to provide the operational semantics of well behaved back-end programs. The new semantics will have an impact all over the proof. Finally, the untrusted compiler was patched to integrate the feedback gained during the formalization of the compiler. All beneficiaries were represented.

Changes in the consortium

No major changes have occurred with regard to the organisation and management structure of the consortium. The legal statuses of the beneficiaries have remained unchanged.

Project planning and status

During the second period, the project has followed the project plan (both technical and management) described in the Grant Agreement.

At month 16 (+16 days) we submitted the commitment letter and two addenda for D6.2 and D2.1, in accordance with requests made by the reviewers during the first Project Review.

Hiring problems were anticipated during the first Project Review. In particular, because of changes in the Italian law and the necessity to adapt the UNIBO regulations to the new law, the University of Bologna decided not to hire the planned temporary senior researcher for the project. On the same budget, two post-docs were hired instead. The second to be hired has been put to work on the additional topics raised by the reviewers during the First Review, whilst the first to be hired

has replaced the senior researcher, obviously less efficiently because the level of maturity is not the one expected. As a consequence, we have been late with deliverables D4.2 and D4.3 and, due to interactions between tasks T3.2/T3.3 and T4.2/T4.3, the release of deliverables D3.2 and D3.3 has been delayed. The set of deliverables D3.2, D3.3, D4.2 and D4.3, expected at month 18, have been thus submitted in month 21. According to the Pert diagram, the delay of Tasks T4.2 and T4.3 should have affected T4.4 that started on time anyway, in parallel with completion of T4.2 and T4.3.

Deliverable D5.1, the last expected deliverable for the second period, has been submitted on time at month 24 (+16 days). We have also informed the Project Officer about our intent to submit in advance (at month 24) the Deliverable D5.3, expected for month 36. D5.3 is a major case study and its role is that of assessing the potential impact of the CerCo technology on some restricted scenario. An early delivery is therefore also a way to obtain a concrete running application to be shown during dissemination sooner. The early delivery is made possible because UPD, after the resignation of a PhD student funded by the project, has extended the contract of the post-doc hired during the first period to also cover the second period. Therefore more man-power has been available during the second period. A draft of the deliverable has been submitted to the Officer together with D5.1.

Deliverable D1.2 (Periodic Activity Report and Financial Statements) will be submitted within 60 days after the end of the period.

3.5 Dissemination and use of the knowledge

Use of foreground and dissemination activities during the first two periods

List of presentations given to international conferences:

- **Certified Complexity.** talk given by Claudio Sacerdoti Coen at Types 2010, Warsaw (15 October 2010).
- **Realizability Models for Cost-Preserving Compiler Correctness,** talk to be given by Marco Gaboardi at DICE 2010.
- **A canonical locally nameless formalisation of an algebraic logical framework,** talk given by Wilmer Ricciotti at Types 2010, Warsaw (13 October 2010).
- **An Elementary Affine λ -Calculus with Multithreading and Side Effects,** talk given by A. Madet at TLCA 2011 (2 June 2011)
- **A type system for positivity,** talk given by Claudio Sacerdoti Coen at Types 2011 (10 September 2011)
- **The Matita Interactive Theorem Prover,** talk given by Wilmer Ricciotti at CADE 2011 (3 August 2011)

List of posters presented at international conferences:

- **Certified Complexity.** Poster presented by Claudio Sacerdoti Coen and Dominic Mulligan at FET 2011, Budapest (4-6 May 2011). Long abstract published in the proceedings.

List of seminars given to inviting institutions:

- **Certifying cost annotations in compilers**, talk given by Nicolas Ayache at the LIP6 laboratory of the University Paris 6 (18 November 2010);
- **A canonically nameless representation of binders**, talk given by Randy Pollack at U. Penn at Philadelphia (11 June 2010);
- **A canonically nameless representations of binders**, talk given by Randy Pollack at Lab PPS (Paris) to the INRIA-Rocquencourt team [π@r2](#) (26 November 2010);
- **Certifying cost annotations in compilers**, talk given by Roberto Amadio at ENS/Lyon.
- **Certified Complexity**, talk given by Claudio Sacerdoti Coen at the University of Birmingham (20 December 2011).
- **Certifying cost annotations in compilers**, talk given by Nicolas Ayache at ENSTA (École Nationale Supérieure de Techniques Avancées) (13 December 2011);

Other seminars:

- **Operational Semantics in Specifications**, talk given by Brian Campbell at the Laboratory for Foundations of Computer Science, University of Edinburgh (16 March 2010)
- **An executable semantics for CompCert C**, talk given by Brian Campbell at the Scottish Programming Language seminar at Heriot-Watt University (11 November 2011).

List of papers published in international journals or proceedings of international conferences:

- **A Canonical Locally Named Representation of Binding**, R. Pollack, M. Sato and W. Ricciotti, Journal of Automated Reasoning, in Press, DOI 10.1007/s10817-011-9229-y.
- **Certifying and reasoning on cost annotations of functional programs**, R.M. Amadio, Y.Regis-Gianas, In proceedings of Foundations and Practical Aspects of Resource Analysis (FOPARA 2011), LNCS, in press.
- **An Elementary Affine λ -Calculus with Multithreading and Side Effects**, A. Madet, R.M. Amadio., In Proceedings Typed Lambda Calculi and Applications (TLCA 2011), Springer LNCS 6690:138-152, 2011.
- **Certified Complexity**, R. Amadio, A. Asperti, N. Ayache, B. Campbell, D. Mulligan, R. Pollack, Y. Regis-Gianas, C. Sacerdoti Coen, I. Stark, in Procedia Computer Science, Volume 7, 2011, Proceedings of the 2nd European Future Technologies Conference and Exhibition 2011 (FET 11), 175-177.
- **The Matita Interactive Theorem Prover**, A.Asperti, W.Ricciotti, C. Sacerdoti Coen, E.Tassi, In Automated Deduction – CADE-23, LECTURE NOTES IN COMPUTER SCIENCE, ISBN:978-3-642-22437-9, Pages 64-69, Volume 6803, Year 2011 64-69

List of papers currently submitted or to be submitted to international conferences or journals:

- **An executable formalisation of the MCS-51 microprocessor in Matita**, Dominic Mulligan and Claudio Sacerdoti Coen.

The paper has been previously unsuccessfully submitted to Interactive Theorem Proving 2011 and VSTTE 2012. The main motivation for rejection was that the formalization was not accompanied by further work built on top, like a certified assembler. Therefore it lacked validation and evidence of usefulness. We plan to resubmit as part of a journal paper certifying the optimizing assembler for MCS-51 developed in CerCo.

- **On the correctness of an assembler for the Intel MCS-51 microprocessor**, Dominic Mulligan and Claudio Sacerdoti Coen.
- The paper has previously been submitted to Certified Proofs and Programs (CPP 2011). At the time of submission, the paper presented work in progress and was therefore rejected. However, the feedback by the reviewers was positive. We plan to resubmit the paper, possibly combined with the one above, when the proof is completed.
- **Certifying cost annotations in compilers**, Roberto Amadio, Nicolas Ayache, Yann Régis-Gianas, Ronan Saillard.
- Submitted unsuccessfully to Formal Methods 2011. The paper describes the application of the labelling approach used in CerCo to imperative languages. The paper “**Certifying and reasoning on cost annotations of functional programs**”, already published, is based on this one and applies the same methodology to functional languages. A formal proof in Coq of the contents of the paper is in progress. A revised version that also described the formal proof will be submitted to Formal Methods for Industrial Critical Systems (FMICS 2012).
- **An executable semantics for CompCert C**, Brian Campbell. To be submitted for the first time this year.
- It contributes the executable semantics of CerCo back to CompCert, also detecting a few bugs in the non executables semantics of CompCert. One of these also hid an actual bug in the CompCert compiler itself.

3.6 Explanation of the use of the resources

Justification of major cost items and resources

Beneficiary 1 – UNIBO

In the second reporting period UNIBO was involved in WP1 and WP6 on management and dissemination activities. With regards scientific work, UNIBO carried out a different task under WP4 and WP5 and had some minor differences in WP2 and WP3.

WP2: UNIBO contributed feedback, originating with the Matita formalization (WP4), on the untrusted compiler back-end. The development of the dependent labelling approach, carried out in WP5, also contributed to several changes to the untrusted compiler, like loop optimizations and improved code generation.

WP3: UNIBO collaborated with UEDIN to provide background and support on the usage of the interactive theorem prover Matita, used for the formalization of the compiler front-end. Moreover, some parts of the formalization developed in WP3, like the executable memory model for an extension of Clight, are to be shared between the back-end (WP3) and the front-end (WP4, leaded by UNIBO) and required tight collaboration to permit reuse.

WP4: UNIBO lead WP4, whose tasks during the second period were aimed at the formalization of executable semantics for every intermediate back-end language, and of the code of the compiler back-end itself. The formalization is directly executable inside Matita, and debugging was performed by comparing execution traces between the Matita formalization, the Ocaml formalization and existing emulators. After month 18, the certification of the back-end has also started. The first theorems to be addressed have been: 1) the certification of the assembler and the branch displacement optimizations, and 2) the proof that the cost predicted by the static analysis of object code is equal to the actual cost of execution of the code.

WP5: UNIBO has collaborated with UPD in the development of the Frama-C plugin. Moreover we have extended the basic labelling approach developed in WP2 during the first period to the dependent labelling approach. The basic labelling approach has also been implemented in the untrusted compiler and a version of the plugin that handles dependent costs has been designed and implemented.

An amount of **115.825,00 Euros** was spent on personnel for conducting the above activities. Personnel involved were: 1 full professor, 1 assistant professor, 1 project manager, 2 full-time collaboration-professional contracts for research and 1 Post Doc Fellow.

Table 1.1: Personnel paid by CERCO project

NAME	TITLE	PROFESSIONAL SKILL	WORKING PERIOD	STATUS	OCCUPATION	TYPE OF ACTIVITY
Claudio Sacerdoti Coen	Prof.	Research and education	01/02/2011-31/01/2012	Permanent	Full-time	RTD-MGT
Andrea Asperti	Prof.	Research and education	01/02/2011-31/01/2012	Permanent	Full-time	RTD
Michela Cozzi	Dr	Project Manager	01/02/2011-31/01/2012	Not Permanent	Full-time	MGT
Mulligan Dominic Phillip	Dr	Research	01/02/2011-31/01/2012	Not Permanent	Full-time	RTD
Boender Jacob Pieter	Dr	Research	31/05/2011-31/01/2012	Not Permanent	Full-time	RTD
Tranquilli Paolo	Dr	Research	01/08/2011 – 31/01/2012	Not Permanent	Full-time	RTD

Table 1.2: Personnel paid using own sources

NAME	TITLE	PROFESSIONAL SKILL	WORKING PERIOD	STATUS	OCCUPATION	TYPE OF ACTIVITY
Wilmer Ricciotti		PhD student	01/02/2011-31/01/2012	Not Permanent	Full-time	RTD

An amount of **9.870 Euros** was used for travel and subsistence during the second reporting period, participating to the following events:

DATE OF THE TRAVEL	TYPE OF ACTIVITY	PURPOSE	NAME OF THE CONFERENCE	LOCATION	NAMES OF PEOPLE THAT HAVE GONE TO THE MEETING
4-7/02/2011	RTD	Project Meeting		Edinburgh - Scotland	Claudio Sacerdoti Coen, Mulligan Dominic Phillip and Wilmer Ricciotti
4-6/05/2011	RTD	Dissemination of CERCO project	FET 2011	Budapest	Claudio Sacerdoti Coen and Mulligan Dominic Phillip
1-6/08/2011	RTD	Dissemination of CERCO project	CADE – the 23 rd International Conference on Automated Deduction	Wroclaw	Ricciotti Wilmer
7-12/09/2011	RTD	Dissemination of CERCO project	Types 2011	Bergen	Claudio Sacerdoti Coen and Mulligan Dominic Phillip
27-30/09/2011	RTD	Project Meeting		Paris – France	Claudio Sacerdoti Coen, Mulligan Dominic Phillip, Boender Jacob Pieter and Tranquilli Paolo

12-16/10/2010	RTD	Dissemination of CERCO project	Types 2010	Warsaw – Poland	Claudio Sacerdoti Coen and Ricciotti Wilmer
20-26/11/2011	RTD	Technical Project Meeting		Edinburgh – Scotland	Claudio Sacerdoti Coen, Mulligan Dominic Phillip Boender Jacob Pieter and Tranquilli Paolo
18-22/12/2011	RTD	Dissemination of CERCO project	Invited talk to the University of Birmingham	Birmingham	Claudio Sacerdoti Coen

The equipment cost: **1.352 Euro** is the depreciation of the server hosted by the coordinator and fully dedicated to the CERCO project.

Finally, an amount of **1.507 Euro** was used for the organisation of the first review meeting and conference fees.

Table 3.1 Personnel, subcontracting and other major Direct cost items for Beneficiary n. 1 UNIBO for period 2 (01/02/2011-31/01/2012)			
Work Package	Item description	Amount	Explanations
WP1	Personnel costs	10.064 €	1,8 PM of Project Manager and 1,2 PM of Assistant Professor (Coordinator)
RTD WP	Personnel costs	105.761 €	3 PM of one Full Professor; 4,5 PM of one Assistant Professor; 19 PM of two Post-Docs and 6 PM of one research fellow
WP2 WP3 and WP4	Equipment	1.352 €	Costs refer to the depreciated value of the network server. The server is dedicated to the CerCo project for dissemination (hosting the project Web site) and communication between partners (hosting the mailing list server and the message archive, but also acting as the central repository for the distributed versioning system used by partners to share and maintain the history of documents and prototypes).
RTD WP	T&S	9.870 €	Costs refer to the participation to project meetings and participation to conferences for dissemination of CerCo.
RTD WP	Other costs ('the rest')	1.507 €	Costs refer to organisation of the review meeting and participation to conferences for dissemination of CerCo (conference fee).
TOTAL DIRECT COSTS		128.554 €	

Since some costs incurred during the 1st period were not corrected reported in the previous reports, UNIBO has adjusted them in this report. The table below summarizes such costs with some explanations.

Table 3.1 Personnel, subcontracting and other major Direct cost items for Beneficiary n. 1 UNIBO for period 1 ADJUSTMENT (01/02/2010-31/01/2011)			
Work Package	Item description	Amount	Explanations
WP1	Personnel costs	39 €	Adjustment is due to the recalculation of personnel costs in January 2011 (128 hours). The correct 2011 hourly cost was not available at the moment of the submission of the financial report for period 1.
WP2	Personnel costs	52 €	
WP4	Personnel costs	2.910 €	Adjustment refers to: <ul style="list-style-type: none"> • 1 PM of one PostDoc Fellow incurred during P1 but paid after the submission of the financial report for period 1; • Recalculation of personnel costs in January (32 hours). The correct 2011 hourly cost was not available at the moment of the submission of the financial report for period 1.
TOTAL DIRECT COSTS		3.002 €	

Beneficiary 2 - UPD

In the second reporting period UPD was mainly involved in WP5 with some minor role in WP1 on management activities, and also in WP2.

WP2: UPD has led the work on integration, validation and testing of the untrusted compiler developed during the first period. In particular, feedback from the formalizations going on in WP3 and WP4 has been applied to the code.

WP5: UPD has led the development of the Frama-C plugin that extends the untrusted compiler with the automatic computation of complexity assertions and the dispatching of proof obligations to theorem provers. An updated version of the plugin works in combination with the dependent untrusted compiler to allow loop optimizations. UPD has also worked on a plugin for Lustre programs that allows one to certify tight bounds for the worst case reaction time of Lustre components. Finally UPD has extended the CerCo labelling approach described in D2.1 to a standard compilation chain from a higher-order functional language of the ML family to C. This shows that the approach is sufficiently general to be applied to higher-order programs whose concrete complexity is generally regarded as difficult to estimate.

An amount of **102.676 Euros** was spent for personnel to conduct the above activities. Personnel involved are: 1 full professor, 1 assistant professor and 1 postdoctoral researcher.

Table 2.1: Personnel paid by CERCO project

NAME	TITLE	PROFESSIONAL SKILL	WORKING PERIOD	STATUS	OCCUPATION	TYPE OF ACTIVITY
Roberto Amadio	Prof.	Research and education	01/02/2011-31/01/2012	Permanent	Full-time	RTD-MGT
Yann Regis Ganas	Prof.	Research and education	01/02/2011-31/01/2012	Permanent	Full-time	RTD-MGT
Nicolas Ayache	Dr	Research	01/02/2011-31/01/2012	Not Permanent	Full-time	RTD

An amount of **4.475,7 Euros** was used for travel and subsistence during the second reporting period to participate to the following events.

DATE OF THE TRAVEL	TYPE OF ACTIVITY	PURPOSE	NAME OF THE CONFERENCE	LOCATION	NAMES OF PEOPLE THAT HAVE GONE TO THE MEETING
04-06/02/2011	RTD	Project meeting		Edinburgh, Scotland	Yann Regis Ganas and Nicolas Ayache
08-09/02/2011	RTD	Dissemination of CERCO project	CONCUR 2011	Aix la Chapelle, Germany	Roberto Amadio
10-12/03/2011	RTD	Project meeting		Bologna, Italy	Yann Regis Ganas and Roberto Amadio

16-21/01/2011	RTD	Project meeting		Bologna, Italy	Nicolas Ayache
20-26/11/2011	RTD	Project meeting		Edinburgh, Scotland	Nicolas Ayache

Table 3.2 Personnel, subcontracting and other major Direct cost items for Beneficiary n. 2 UPD for period 2 (01/02/2011-31/01/2012)

Work Package	Item description	Amount	Explanations
WP1	Personnel costs	5.314,23 €	0,47 PM for permanent personnel (1 full professor)
WP2, WP5	Personnel costs	97.361,64 €	The costs claimed under this category include: <ul style="list-style-type: none"> • 6,21 PM for permanent personnel (1 full professor and 1 assistant professor); • 11,38 PM for 1 postdoctoral researcher
RTD WPs	T&S	4.475,72 €	Participation to CerCo meetings and conference.
TOTAL DIRECT COSTS		107.152 €	

Beneficiary 3 - UEDIN

In the second reporting period UEDIN was mainly involved in WP2 and WP3 research activities with some minor role in WP1 on management activities.

WP2: UEDIN contributed feedback on the untrusted compiler front-end that originated from its formalization in Matita (WP3).

WP3: UEDIN has led the work on the formalization of the compiler front-end. During the first six months of the second period all intermediate front-end languages have been given a semantics that is directly executable in Matita. The code of the untrusted compiler has also been rewritten in Matita and execution traces inside Matita have been compared with traces of the untrusted compiler. After month 18 the certification of the compiler has started, focusing first on the technical infrastructure for the proof. In parallel, the executable semantics for C programs developed in the first project period has been ported to CompCert. Unexpectedly, bugs in the CompCert semantics have been detected.

An amount of **70.305 Euros** was spent for personnel to conduct the above activities. Personnel involved are: 2 postdoctoral researcher, 1 senior researcher (site leader) and 1 senior lecturer.

Table 3.1: Personnel paid by CERCO project

NAME	TITLE	PROFESSIONAL SKILL	WORKING PERIOD	STATUS	OCCUPATION	TYPE OF ACTIVITY
Randy Pollack	Dr	Research	01/02/2011-31/01/2012	Not Permanent	Full Time	RTD
Brian Campbell	Dr	Research	01/01/2011-31/01/2012	Not Permanent	Full Time	RTD
Ian Stark	Dr	Research	01/01/2011-31/01/2012	Permanent	Full Time	RTD, MNG
Samuel Lindley	Dr	Research	01/01/2011-31/01/2012	Not Permanent	Full Time	RTD

An amount of **1.725 Euros** was used for travel and subsistence during the second reporting period, participating to the following events:

DATE OF THE TRAVEL	TYPE OF ACTIVITY	PURPOSE	NAME OF THE CONFERENCE	LOCATION	NAMES OF PEOPLE THAT HAVE GONE TO THE MEETING
04-06/02/2011	RTD	Project meeting		Edinburgh, Scotland	Randy Pollack
10-12/03/2011	RTD	Project meeting		Bologna, Italy	Brian Campbell and Ian Stark
27-30/09/2011	RTD	Project Meeting		Paris – France	Brian Campbell

Finally, an amount of **332 Euro** was used to for the organisation of the CERCO annual meeting.

Table 3.2 Personnel, subcontracting and other major Direct cost items for Beneficiary n. 3 UEDIN for period 2 (01/02/2011-31/01/2012)

Work Package	Item description	Amount	Explanations
WP1	Personnel costs	€ 3.486,00	0,5 PM of Ian Stark
WP2	Personnel costs	€ 1.648,00	0,4 PM of Brian Campbell
WP3	Personnel costs	€ 65.171,00	14,6 PM of Ian Stark, Randy Pollack, Brian Campbell and Samuel Lindley
WP3	T&S	€ 1.725,00	Participation to project meetings
WP3	Other costs ('the rest')	€ 332,00	Organisation of the Annual CerCo meeting
TOTAL DIRECT COSTS		€ 72.362,00	

Since some travel costs incurred during the 1st period were not corrected reported in the previous reports, UEDIN has adjusted them in this report. The table below summarizes such costs with some explanations.

Table 3.2 Personnel, subcontracting and other major Direct cost items for Beneficiary n. 3 UEDIN for period 1 - ADJUSTMENT (01/02/2011-31/01/2012)			
Work Package	Item description	Amount	Explanations
WP2	T&S	€ 565,00	CerCo project meeting. The reimbursement was not available at the moment of the submission of the financial report for period 1.
TOTAL DIRECT COSTS		€ 565,00	

Budgeted versus Actual Costs

The tabular overview of budgeted costs and actual costs, by beneficiary and by major cost item including personnel, are reported in the table hereafter. The budgeted costs are taken from the Annex I of the Grant Agreement.

TABLE 4: COST/BUDGET FOLLOW-UP TABLE													
Contract N°: 243381			Acronym: CERCO					Start Date: 1/02/2010		End Date 31/01/2013			
Beneficiaries	TYPE of EXPENDITURE	BUDGET Whole project	ACTUAL COSTS (EUR)						% spent				Remaining Budget (EUR)
			Period 1	P1 Adj	Period 2	P2 Adj	Period 3	Total	Year 1	Year 2	Year 3	Total	
			e	a1	adj1	b1	adj2	c1	e1	P1/e	(P1+P2)/e	(P1+P2+P3)/e	
Benefic. 1	Person-months	79	16	1	35,5			52,50	22%	66%	0%	65%	26,5
UNIBO	Personnel costs	331.800	71.721	3.002	115.825			190.548,00	23%	57%	0%	57%	141.252
	Subcontracting							0,00	0%	0%	0%	0%	0
	Equipment/ consumables	4.000	1.014		1.352			2.365,70	25%	59%	0%	59%	1.634
	Travel	30.000	3.435		9.870			13.304,90	11%	44%	0%	44%	16.695
	Other direct costs	16.800	3.308		1.507			4.815,40	20%	29%	0%	29%	11.985
	Indirect costs	225.960	47.686	1.801	77.132			126.619,40	22%	56%	0%	55%	99.341
	Total Costs	608.560	127.164	4.803	205.686	0	0	337.653,40	22%	55%	0%	55%	270.907
Benefic 2	Person-months	66	21,6		18,06			39,66	33%	60%	0%	60%	26,34
UPD	Personnel costs	224.401	105.765		102.676			208.440,87	47%	93%	0%	93%	15.960
	Subcontracting							0,00	0%	0%	0%	0%	0
	Equipment/ consumables							0,00	0%	0%	0%	0%	0
	Travel	26.500	2.573		4.476			7.048,72	10%	27%	0%	27%	19.451
	Other direct costs	10.014	4.733					4.733,00	47%	0%	0%	47%	5.281
	Indirect costs	156.548	67.842		64.290			132.132,42	43%	84%	0%	84%	24.416
	Total Costs	417.463	180.913	0	171.442	0	0	352.355,01	43%	84%	0%	84%	65.108
Benefic 3	Person-months	69	10,1		15,54			25,64	15%	37%	0%	37%	43,36
UEDIN	Personnel costs	310.617	41.934		70.305			112.239,00	14%	36%	0%	36%	198.378
	Subcontracting							0,00	0%	0%	0%	0%	0
	Equipment/ consumables							0,00	0%	0%	0%	0%	0
	Travel	27.011	3.912	565	1.725			6.202,00	17%	23%	0%	21%	20.809
	Other direct costs	15.993	1.484		332			1.816,00	9%	11%	0%	11%	14.177
	Indirect costs	144.099	39.530		62.289			101.819,00	27%	71%	0%	71%	42.280
	Total Costs	497.720	86.860	565	134.651	0	0	222.076,00	18%	45%	0%	45%	275.644
TOTAL	TOTAL PM	214	47,7	1	69,1	0	0	117,80	23%	55%	0%	55%	96,2
	Personnel costs	866.818	219.420	3.002	288.806	0	0	511.228	26%	59%	0%	59%	355.590
	Subcontracting	0	0	0	0	0	0	0	0%	0%	0%	0%	0
	Equipment/ consumables	4.000						0,00	0%	0%	0%	0%	4.000
	Travel	83.511	9.920	565	16.071	0	0	26.556	13%	32%	0%	31%	56.955
	Other direct costs	42.807	9.525	0	1.839	0	0	11.364	22%	27%	0%	27%	31.443
	Indirect costs	526.607	155.058	1.801	203.712	0	0	360.571	30%	68%	0%	68%	166.036
	Total Costs	1.523.743	393.923	5.368	510.428	0	0	909.718,71	26%	60%	0%	59%	614.024

Planned versus Actual effort

The following table illustrates the planned person-months as indicated in Annex I of the Grant Agreement and the actual effort consumption during the first and the second reporting period.

TABLE 5: PERSON-MONTHS STATUS TABLE		TOTALS	Coord. UNIBO	Partic. 2 UPD	Partic. 3 UEDIN
Grant Agreement N°: 243381					
ACRONYM: CerCo					
Workpackage 1: Project Management	Planned WP total:	11,0	9,0	1,0	1,0
	Actual P1	2,4	2,0	0,4	0,0
	Actual P2	4,0	3,0	0,5	0,5
	Actual P3				
	<i>Remaining</i>	4,6	4,0	0,1	0,5
Workpackage 2: Compiler Prototype (untrusted)	Planned WP total:	45,0	7,0	30,0	8,0
	Actual P1	30,3	5,0	21,2	4,1
	Actual P2	3,6	2,0	1,2	0,4
	Actual P3				
	<i>Remaining</i>	11,1	0,0	7,6	3,5
Workpackage 3: Verified Compiler - front end	Planned WP total:	57,0	3,0	3,0	51,0
	Actual P1	7,0	1,0	0,0	6,0
	Actual P2	15,6	1,0	0,0	14,6
	Actual P3				
	<i>Remaining</i>				
Workpackage 4: Verified Compiler - back end	Planned WP total:	53,0	45,0	6,0	2,0
	Actual P1	7,0	7,0	0,0	0,0
	Actual P2	24,5	24,5	0,0	0,0
	Actual P3				
	<i>Remaining</i>	21,5	13,5	6,0	2,0
Workpackage 5: Interfaces and interactive components	Planned WP total:	37,0	9,0	24,0	4,0
	Actual P1	0,0	0,0	0,0	0,0
	Actual P2	20,4	4,0	16,4	0,0
	Actual P3				
	<i>Remaining</i>	16,6	5,0	7,6	4,0
Workpackage 6: Dissemination and exploitation	Planned WP total:	11,0	6,0	2,0	3,0
	Actual P1	2,0	2,0	0,0	0,0
	Actual P2	1,0	1,0	0,0	0,0
	Actual P3				
	<i>Remaining</i>	8,0	3,0	2,0	3,0
Total Project Person-month	Planned WP total:	214,0	79,0	66,0	69,0
	Actual P1	48,7	17,0	21,6	10,1
	Actual P2	69,1	35,5	18,1	15,5
	Actual P3		0,0	0,0	0,0
	<i>Remaining</i>	96,3	26,5	26,4	43,4

Actual = P+Padj

3.7 Financial statements – Form C and Summary financial report

The Financial statements for all beneficiaries (Form Cs) , together with the Summary financial report will be submitted electronically using the NEF web tool.

3.8 Certificates on the financial statements

None of the beneficiaries has reached the expenditure threshold required for a certificate in period 2 of the project, thus no certificates have been provided from the CerCo beneficiaries in this reporting period.