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Project acronym:
MIND RACES
Project title:
MIND RACES: from Reactive to Anticipatory Cognitive Embodied Systems

Instrument: STREP
Thematic Priority: Information Society Technology

PROJECT PERIODIC MANAGEMENT REPORT No. 3
Updated with justification of final costs

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Project coordinator name: Rino Falcone

Project coordinator organisation name: **CNR- ISTC**

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Project information

Project acronym:	MIND RACES
Project full title:	MIND RACES: from Reactive to Anticipatory Cognitive Embodied Systems
Proposal/Contract no.:	IST-FP6- 511931
project Manager:	ISTC-CNR

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CONTENT

JUSTIFICATION OF MAJOR COST ITEMS AND RESOURCES

This document is the updated version of the one already sent to the EC, it contains for most of partners the justifications for costs bore within 90 days from the end of the project in order to prepare the final reports and participate in the final meeting.
Furthermore it contains the correct figures eventually out-coming from the auditing process.
At its end, the document contains also the replies given form LUND and NOZE to the preliminary comments of the Project Officer.

ISTC-CNR

BRIEF DESCRIPTION OF THE WORK PERFORMED

WP1: PROJECT MANAGEMENT
The management of the consortium has, so far, received a good evaluation by the reviewers.
During the third year and beyond the end of the project, ISTC has been leading the consortium toward a successful completion of the remaining administrative and technical tasks, by providing the partners with updated information and templates for the reporting duties and final fulfilments, by collecting the documents and deliverables for the EC, and by distributing the EC contribution.
Specifically, in accordance with the reviewers' suggestions, CNR-ISTC has fostered the completion of the book as one of the most important objective for the current year.
The publications, papers, demos, scientific results and outcomes of the project have been collected in the final plan for using and disseminating the knowledge and have been the basis for the book.
The aim of the final efforts of the consortium has been to consolidate the results obtained so as to synthesize this new area of research in cognitive systems.

WP2: SCENARIOS SPECIFICATION AND EVALUATION

This WP is not active in this reporting period

WP3: ATTENTION, MONITORING AND CONTROL

How can visual selective attention guide eye movements so as to identify relevant targets? Many models have been proposed that use the statistical properties of images to create a dynamic bottom-up saliency map used to guide saccades to potentially relevant locations. This basic mechanism has been enhanced with top-

down processes in models that learn (e.g. with reinforcement learning) to move the eye in search of the target on the basis of foveated objects. The work carried out at ISTC, in collaboration with LUCS, proposes a model that improves this top-down mechanism by using an eye-centred "potential-action map" where more than one object foveated in time can "write" the potential location in space of targets or relevant cues. Results indicate that the model suitably integrates bottom-up and top-down attention mechanisms and outperforms simpler models, and that the potential-action map allows it to accumulate evidence on potential target locations in a compact format readily usable for controlling eye movements.

WP4: GOAL DIRECTED BEHAVIOUR, PRO-ACTIVITY AND ANALOGY

ISTC-CNR has been developing the controller for the robotic arm (assembled at ISTC's robotic lab) in view of the integration of it with the attention system developed together with LUCS. The overall architecture will integrates bottom-up attention processes, top-down attention processes and selection of motor primitives for the arm control. To this purpose the previously developed arm-controller needed to be improved in order to:
(a) allow it to cope with a moving eye;
(b) allow it to trigger movements after the eye finds the targets.

WP5: EMOTIONS

ISTC-CNR has investigated the relations between motivation and sensorimotor capabilities by developing an agent architecture in which anticipatory action selection is modulated by motivational states and drives. We have then studied the adaptive capabilities of such architecture in the guard-and-thieves scenario. Besides, ISTC developed a Goal directed architecture for deliberative agents, defining a richer cognitive model for BDI-like agents. The model introduces informational feedback and self-adaptation, dealing with emergent affective attitudes within reasoning. In particular Subjective expectations are used at two different levels of the cognitive architecture. On the higher level of reasoning, expectations, predictions, appraisal of relevant events and the resulting affective states are used at deliberative level to drive goal adoption and governing means end reasoning. On the lower level of situated cognition, expectations are used for enhancing agile pro-activeness to contexts and for enabling anticipation through premonitory and preparatory emotions (i.e. caution, fear, excitation). Mental states are assumed both for recruiting computational resources, when particular events and contexts require service, and for informing the higher cognitive mechanisms. Furthermore we defined and put in practice a surprise based mechanism for belief update, used for effective filtering of the relevant precepts in information-rich environments. In particular, we describe surprise-based filter mechanism that is responsible: 1) for signalling the inconsistency between beliefs and an incoming input which is relevant with respect to the current task to be solved; 2) for the revision of beliefs and expectations on the basis of the incoming relevant information. This allows intelligent strategy for resources allocation By

balancing Epistemic Vs. Pragmatic activity Exploitable for in information-rich environments (i.e. information seeking agents).

WP6:INTEGRATION

In the last year, ISTC-CNR, together with LUCS, has been developing and testing an integrated bio inspired eye-hand coordination architecture to control the real robotic arm developed at ISTC's robotic lab in the course of the project on the basis of a camera. The system uses a "moving eye" based on a real camera (the eye's motion is simulated by extracting sub-parts of the camera image). The architecture integrates bottom-up attention processes, top-down attention processes and selection of motor primitives for the arm control.
Neural networks based on population-codes, and trained with reinforcement learning, are used to control both the eye's and the arm's motion. The most interesting part of the system is the integration between the attention system and the arm control in that the first is capable of identifying potential targets for the arm movement while the second is capable of physically reaching the targets so as to collect reward signals that are used to train both the attention system and the arm controller itself.
The system uses anticipatory mechanisms at various levels: (a) anticipation of reward within the reinforcement-learning components; (b) control of arm and eye movement on the basis of desired state representations, i.e. goals (see the "sensorimotor principle"); (c) control of eye motion on the basis of a "potential action map" that collect information on the potential position of targets.

ISTC CNR fully integrated the IST's emotivector component in the goal directed architecture, introducing a suitable mechanism for both prediction and appraisal of mismatch-based surprise. The resulting model has been proposed at the ACII 07 conference

WP7: DISSEMINATION

ISTC representatives participated in important international conferences detailed in the dissemination and use plan and there presented many papers.
ISTC-CNR is also editing the final MindRACES book (tentatively titled: The Anticipatory Challenge: A Unifying Framework for the Analysis and Design of Artificial Cognitive Systems) which will include contributions provided by the project partners. The book will be presented during the last MindRACES review meeting.
ISTC-CNR is also editing a Special Issue for Topoi: an International Review of Philosophy with the title "Conventions: an Interdisciplinary Study" (Ed. by Luca Tummolini) in which the relationships between expectations and the emergence of social regularities are explored. This special issue will appear in 2008.
Luca Tummolini is organizing a conference on "Moral Emotions and Anticipation" to be held in Rome on the project themes between April and May 2008.

A list of activities performed has been provided to Noze for the updated plan for using and disseminating the knowledge.

DESCRIPTION OF THE MAJOR COSTS ITEMS

1- COSTS BORE DURING THE REPORTING PERIOD:

RESEARCHERS: 182673,89 €
COORDINATION STAFF (Susanna Tosi): 8429,71 € exclusive of the Rino Falcone costs'
JUNIOR RESEARCHERS: 21866,21 €

EQUIPMENT: 4942,67 € due for the depreciation rates of item purchased the first and second year).
Durable equipment has been accounted in accordance with the normal depreciation rules of CNR. Following CNR rules software has been considered consumable (not submitted to depreciation rules). The figures comprehend 88,15 € for consumables

TRAVELS AND INTERNAL MEETINGS:

CONFERENCES	
Cristiano Castelfranchi 15-07-06 Annecy francia	482,48
Giovanni Pezzulo, EPIROB 2006, 19/09/2006 Paris	1.047,04
Giovanni Pezzulo, Saab 06 24/09 - 01/10 2006, Roma	420,00
Giovanni Pezzulo, Genova, AISC 25-27/10/2006	131,61
Giovanni Pezzulo, Trento, ILIKS 30/11 - 02/12 2006	78,20
Cristiano Castelfranchi, RECIPROCITY Verbania (IT) 22/24-02-07	561,50
Michele Piunti, Newcastle UK, aisb07 02/05-04-2007	613,51
Giovanni Pezzulo, Rovereto (PI) CAOS 2007, 19/22-04-2007	188,55
luca Tummolini, Genova, AISC, 25-29/10/2006	162,61
TOTAL	3685,50

MEETING ORGANISATION:		
GSI fatt. 2278 del 31/10/06 e 1978 (storno)coffe break meeting 2-3 ottobre 2006		850,00
Shuttle service review meeting 12-12-06 sig. Rossetti fatt. 23 13.12.2006		440,00
fattura 210 del 12/12/06 TSUNAMI SRL closure meal review meeting 12-12-06		773,49
lunch e coffe break review meeting 11-12/12/06 "l'altro tevere" fatt. 248 del 13/12/06		1.125,89
TOTAL FOR MEETING ORGANISATION		3189,38

OTHER COSTS: 3190,67€ in the "budget follow up table" includes 2334,80 € for the second audit certificate, the cost for the third and last audit certificate: 2600.00 €. And a reduction of -1744,13€ as adjustment on previous period (see the following paragraph)

RTD ADJUSTMENT ON PREVIOUS PERIOD: **-1744,13 €** arising form the revaluation of the indirect costs resulting from an internal decree stating a rate (86,96%) to be applied from 1st January 2005 on. (CNR circolare 14/2007) on personnel costs').

OVERHEADS: € 166183,69.

2-COSTS BORE AFTER THE END OF THE CONTRACT FOR THE PREPARATION OF THE FINAL REPORTS AND MEETING, CHARGED AS ADJUSTMENT (MANAGEMENT):

As coordinator of the project most of the effort has been deployed as person months for to the preparation of the periodic and final reports and organisation of the meeting.

4,5 PERSON MONTHS: 17757,82 €
OVERHEADS: 15442,20
MEETING COSTS: 1891,71 of which 1875,21 for coffee breaks and lunches and 16,50 for badges.
(details are enclosed to the audit certificates)

The cost budget follow up "V2" annexed to this file has been updated and contains the total figures, that is, also the costs bore for the preparation of the final meeting and reports.

THIS PARTNER PROVIDES WITH ITS OWN RESOURCES TO THE CO-FINANCING OF THE MINDRACES PROJECT.

LUCS

LUCS is the work package leaders for WP3 on attention, monitoring and control. The group has been responsible for deliverable D3.1 and the final comparison between different architectures for attention, monitoring and control (D3.2) as well as robot demonstrations of some of these architectures.

BRIEF DESCRIPTION OF THE WORK PERFORMED

WP1: PROJECT MANAGEMENT

Birger Johansson participated in the project meeting in Rome on October 2006. Christian Balkenius and Birger Johansson participated in the review meeting in Rome in December 2006 and the final review in Rome in December 2007.

WP2: SCENARIOS SPECIFICATION AND EVALUATION

no activity

WP3: ATTENTION, MONITORING AND CONTROL

LUCS competed the implementations for the scenarios. This includes a demo of a fishing robot, tracking marbles and a multi robot guards and thieves demo. The theoretical work includes a novel learning method that autonomously learns an anticipatory sensory-motor mapping using a combination of a linear predictor working on coarse coded sensory coordinates and a motor coding using a homogenous coordinate coding. This leads to a very fast learning system that can pick up and gradually refine a sensory-motor mapping. LUCS has also completed the implementation of a new context sensitive multiple-model learning system that is able to track the ball in the marble run scenario

WP4: GOAL DIRECTED BEHAVIOUR, PRO-ACTIVITY AND ANALOGY

LUCS has completed one demo of a guard and thieves scenario in which a group of robots avoid a single guard. The robots use anticipatory planning methods to decide on their actions depending on the anticipated movement of the guard and the other robots. LUCS has also completed the work on the evaluation of different anticipation methods in a simple navigation task.

WP5: EMOTIONS

LUCS has completed the work on a model of emotional modulation of cortical processing and learning. The model bridges the area of motivation and emotion and biased competition in cortex, which in turn connects to the target selection problem in the attention models developed in WP3.

WP6:INTEGRATION

LUCS has further developed the Ikaros software architecture that allows a large set of interacting cognitive modules to cooperate. The system runs in real-time on multiple computers and has been used for all the models and experiments developed at LUCS and also partly by the other partners. Specifically, we have developed tools for the design of prediction systems and multi-robot control.

WP7:DISSEMINATION

LUCS most important contribution to the dissemination work package apart from our publications is the public release of Ikaros, version 1.0, which includes most of the implementations made within the MindRaces project. The release includes contribution from several of the MindRACES partners. All code written within MindRaces will be made publicly available in the forthcoming 1.1 release.

DESCRIPTION OF THE MAJOR COSTS ITEMS

RESEARCHERS: 34 113,62 €

JUNIOR RESEARCHERS: 90 957,81€

TRAVELS AND INTERNAL MEETINGS:

Conference	Location/date	participants	cost
Meeting	**Würzburg**	**Balkenius, Johansson**	**145**
EpiRob	**Paris, Sept 19**	**Balkenius, Johansson**	**1367**
SAB + Proj Meeting	**Rome, Sept 24-Oct 1**	**Balkenius, Johansson**	**2523**
Review Meeting	**Rome, Dec 11-13**	**Balkenius, Johansson**	**1505**
CogSci Summer School	**Sofia, July 6-10**	**Balkenius, Johansson**	**1027**
Metacognition Workshop	**Paris, Dec 6-10**	**Balkenius**	**170**
SAIS	**Borås, May 22-23**	**Balkenius, Johansson**	**326**
Final review meeting	**Rome, Dec 11-13**	**Balkenius, Johansson**	**1202**

OVERHEADS: 20735,29 €

OTHER COSTS: 3359 €

UW-COGSCI

This partner doesn't claim any cost for the participation in the final meeting. Furthermore, the costs described in the first version of this document have been totally certified by the auditor without further variations.

UW's main responsible person is Martin V. Butz, who has lead the project from this partner, has contributed to various interactive projects with other partners, and has also been playing an important role with the dissemination of project results due to the organization of the ABiALS workshop series, the enhanced post-workshop proceedings volume, as well as in the forthcoming MindRACES book. Moreover, Butz has been involved in the organization of the 10th International workshop on Learning Classifier Systems (IWLCS 2007).

Oliver Herbort is PhD student and has been working intensively on the MindRACES project in relation to his PhD studies. He has worked on the collaboration with ISTC-CNR on the control of a developmental cognitive robot arm yielding results comparable to human reaching performance. Additional person months support came from Prof. Joachim Hoffmann, who worked on two journal articles on the conceptualization of anticipations and evidence thereof in human experiments. Additionally, we were able to pay two students (Kevin Reif and Jun LI), who both contributed by various programming efforts to various system enhancements and evaluations.

BRIEF DESCRIPTION OF THE WORK PERFORMED

WP1: PROJECT MANAGEMENT
There was no activity directly related to project management.

WP2: SCENARIOS SPECIFICATION AND EVALUATION
Scenario specifications and evaluations were concluded last year.

WP3: ATTENTION, MONITORING AND CONTROL
Further discussions and elaborations were undertaken on how anticipatory (top-down) attention may influence sensory processing and motor control. Conceptualizations were put forward and were elaborated upon in the post-workshop proceedings volume of ABiALS 2006 (Butz et.al, 2007). Moreover, the relation to action decision making were further elaborated and contrasted in the forthcoming book chapter on action decision making in the MindRACES book.

WP4: GOAL DIRECTED BEHAVIOUR, PRO-ACTIVITY AND ANALOGY
Work on goal-directed behaviour has focussed on the further development and dissemination of the flexible robot arm architecture SURE_REACH (Butz, Herbort, Hoffmann, in press; Herbort, Butz, 2007; Herbort, Ognibene, Butz, Baldassarre, 2007). Moreover, UW concentrated on further conceptualizations on anticipatory behaviour, decision making and control, as described in two journal articles on the topic (Hoffmann, et.al., 2007) and the post-workshop proceedings volume of the Anticipatory Behavior in Adaptive Learning Systems (ABiALS) workshop. With the help of two computer science students, UW was also able to develop a novel NN-based sensorimotor control system. For this and the SURE_REACH architecture, we also researched on maximally suitable spatial representations, including the further development of the XCS architecture for this purpose. Finally, the Webots platform was adapted to show the capabilities of SURE_REACH on a real robot arm in a 3D environment.

WP5: EMOTIONS
UW did not put any effort into this workpackage but rather diverted its effort to further work on WP4, WP6, and WP7.

WP6:INTEGRATION

UW has continued its cooperation with ISTC-CNR leading to the proposed RL_SURE_REACH combination and respective publication (Herbort, Ognibene, Butz, Baldassarre, in press. Several collaborative conceptual papers emerged out of the cooperation with ISTC-CNR on Ideomotor principle and TOTE comparisons (Butz et. al., 2007, Pezzulo, et. al., 2007). The post-workshop proceedings book "Anticipatory Behavior in Adaptive Learning Systems: From Brains to Individual and Social Behavior" was produced in collaboration with ISTC-CNR and colleagues from Paris VI, France.

WP7:DISSEMINATION
UW has co-edited (with ISTC-CNR and partners in Paris) the ABiALS 2006 enhanced post-workshop proceedings book. UW has co-edited (with ISTC-CNR) a special

issue on "anticipation and anticipatory behavior" on the Cognitive Processing Journal (Springer) that appeared as issues 8(2) and 8(3), 2007 of the journal. UW has contributed in writing and editing of chapters 1,2,3, & 5 of the forthcoming MindRACES book. UW has participated in various conferences and workshops with papers and tutorial presentations. UW has published three journal articles this year and has two in press.

DESCRIPTION OF THE MAJOR COSTS ITEMS

RESEARCHERS: Dr. Martin V. Butz was payed in full for his efforts, which corresponds to an amount of 53541,93€.

JUNIOR RESEARCHERS: Oliver Herbort was payed half a position, as is common for PhD students in psychology (24403,32€ for the 12 months). Students Kevin Reif and Jun Li were payed 50 hours per month for 5 and 2 months, respectively, which corresponded to 2275€ total.

EQUIPMENT:

Equipment concentrated on books, journals, and simple EDV utilities.

Item	**cost(VAT excluded)**	**depreciation rate**
SUBITO Document Service	95	95
WEBOTS software	2362,89*20%	472,58
PC utilities	93,54*20%	18,71
Laptop and Printer	1579,21*33.3%	526,40
Shipping and mail	221,93	221,93
Custom	405,50	405,50
Books	104,58*20	20,92
Office material	203,53	203,53
Tot equipment	**5.066,18**	**1.964,57 €**

TRAVELS AND INTERNAL MEETINGS:

Conference	**Location/date**	**participants**	**cost**
GECCO 2006	**Seattle, WA**	**Martin V. Butz**	**117,93**
IST Event Helsinki	**Helsinki, Finland**	**Martin V. Butz**	**714,35**
SAB & ABiALS, Partner meeting	**Rome, Italy**	**Martin V. Butz,**	**1623,06**
Review Meeting in Rome, 12/2006	**Rome, Italy**	**Martin V. Butz & Oliver Herbort**	**1440,76**
ISTC-CNR visit	**Rome, Italy**	**Oliver Herbort**	**801,12**
TEAP	**Nürnberg, Germany**	**Oliver Herbort**	**452,55**
GECCO 2007	**London, UK**	**Martin V. Butz**	**844,72**
IJCNN 2007 (pre-financing)	**Orlando, FL**	**Martin V. Butz & Oliver Herbort**	**2870**
IDSIA visit	**Lugano, Switzerland**	**Martin V. Butz**	**990,27**
ICDL 2007	**London, UK**	**Oliver Herbort**	**1013,28**

Total Travel:			**10 868,04€**

OTHER COSTS

OVERHEADS:
The usual 20% are applied here – that is, approximately 18610,57 (to-be verified by the auditor)

NBU

BRIEF DESCRIPTION OF THE WORK PERFORMED

WP1: PROJECT MANAGEMENT
NBU participated in all of the meetings organized with presentations concerning the progress of the work on the project.

WP2: SCENARIOS SPECIFICATION AND EVALUATION

WP3: ATTENTION, MONITORING AND CONTROL
During the reported period original mechanisms of modelling top-down perception and selective attention were developed. It has been demonstrated how top-down perception and analogical transfer can both be based on one and the same anticipatory mechanism.
AMBR s mechanism for analogy making is used to generate predictions about some properties or relations related to the objects in the environment. The perception system checks whether the predictions are correct. The perception system is implemented using part of the IKAROS modules developed in collaboration with LUCS.
Extension of the above mechanisms in the direction of active vision is being implemented. The complete scene description which is provided by a camera fixed above the robot environment is now filtered and transformed to simulating vision from robot point of view but preserving the relative simplicity of the 2D environment. Thus robot will see 2D objects in its visual field. This will make the prediction of unseen objects more important and will outline the role of anticipatory capabilities.

WP4: GOAL DIRECTED BEHAVIOUR, PRO-ACTIVITY AND ANALOGY
NBU further developed the DUAL/AMBR model to handle tasks for goal-directed anticipatory behavior of robots. AMBR has been extended with new agent-types and new mechanisms that allow implementing analogy-based prediction. The new mechanisms are tested with real AIBO robots in the 'Find-an-object' scenario. The results will be reported in the project book as a separate chapter.
We started using another type of robot in the scenarios. Pioneer robot has been used in the same as the previous and more complicated scenarios. Pioneer perceives the environment with one additional to the camera sensor – sonar.
Within a parallel line of research, simulations of the influence of anticipation on cooperation and coordination in social interaction are performed. The role of anticipation has been demonstrated to be essential for the increase of cooperation and coordination. The results will be published in the project book as a separate chapter.

WP5: EMOTIONS

Efforts of including emotions in the DUAL architecture, at the theoretical level, have been made in collaboration with IST using the FearNot model for modelling emotions. Emotions will influence AMBR mechanism of analogy making basically in two ways: 1. Emotions will be attached to the description of episode thus past episodes with similar felt emotion will be more likely to be retrieved. 2. Emotions 'felt' by the model will modify some of the parameters of the architecture like for instance the spreading activation, the volume of working memory, the speed with which agents enter/leave WM etc.

WP6:INTEGRATION

We further cooperated with LUCS for improving the integrated architecture. Efforts for making the object recognition process more robust have been carried on. Also the communication between Ikaros and other modules of the architecture was enriched. This was achieved by abandoning the process of searching for colors using a template and by adding a more flexible algorithm. All seen objects independent of their color are recognized and after that the color of the object are determined via the top-down perception requests from AMBR.
Integration with IST regarding including emotions in AMBR/DUIAL was started (see WP5)

WP7:DISSEMINATION

During the present reporting period NBU have prepared the following papers:

(1) Petkov, G., Naydenov, Ch., Grinberg, M., Kokinov, B. (2006): Building Robots with Analogy-Based Anticipation. In: KI 2006: Advances in Artificial Intelligence. LNAI 4314, Springer: pp. 76-90
(2) Georgi Petkov, Kiril Kiryazov, Maurice Grinberg, Boicho Kokinov (2007): Modeling Top-Down Perception and Analogical Transfer with Single Anticipatory Mechanism. In: Proceedings of the Second European Cognitive Science Conference, Greece
(3) Kiril Kiryazov, Georgi Petkov, Maurice Grinberg, Boicho Kokinov, Christian Balkenius (2007): The Interplay of Analogy-Making with Active Vision and Motor Control in Anticipatory Robots. In: Butz, M. V., Sigaud, O., Baldassarre, G., and Pezzulo, G. (eds.): Lecture Notes in Computer Science, Anticipatory Behavior in Adaptive Learning Systems: LNAI 4520, Springer

May 2007 . Red house- Center of culture and debate. Sofia.
Maurice Grinberg hold a lecture on "Robotics: How to Tell a Robot from a Human?" in which main issues of the MindRACES project and achieved results were presented.

August 2007. National TV broadcast "Sutreshen blok" – morning information block.
Alexander Gerganov and Kiril Kriyazov gave an interview in which NBU robots and MindRaces project were presented.

DESCRIPTION OF THE MAJOR COSTS ITEMS

RESEARCHERS: Maurice Grinberg
Boicho Kokinov
Georgi Petkov

JUNIOR RESEARCHERS: Kiril Kyriazov
Ivan Vankov
Stefan Kostadinov
Emilian Lalev
Svetoslav Bliznashki
Aleksandar Gerganov

total: 21175.65 Euro

EQUIPMENT:

Computers and periphery	**Depreciation costs for technical equipment used for work related to the finalization of the project activities**	4664.47 Euro
Tot equipment		**4664.47 Euro**

TRAVELS AND INTERNAL MEETINGS:

Conference	**Location/date**	**participants**	**Cost (Euro)**
CogSci07 -	Nashville, USA, 1-4 August, 2007	**Maurice Grinberg**	**2040.54**
Project meeting (2-3 Oct. 2006) and SAB.06 Conference (30.09 - 01.10. 2006)	**Rome, 30.09 – 03.10. 2006**	**Maurice Grinberg Kiril Kiriazov Ivan Vankov Georgi Petkov**	**3999.55**
Project Review Meeting	**Rome, 9-13.12.2006**	**Maurice Grinberg Boicho Kokinov Kiril Kiriazov**	**2728.27**
Final Review Meeting	**Rome**	**Boicho Kokinov Maurice Grinberg**	**2462.26**
Total Travel			**11230.62**

MANAGEMENT: 1011.30 Euro
Of which:
606.78 Euro for salaries
204.52 Euro for Audit certificate for 2nd Reporting period
200.00 Euro for Audit certificate for 3d Reporting period

OTHER COSTS: 789.88
Of which:
Courier services – 55.62 Euro
Books – 666.67 Euro
Consumables – 67.59 Euro

OVERHEADS: 7572.12 Euro (of which 492,452 on travel costs concerning the participation in the last review meeting)

The budget follow up table has been revised as concerns the second year of activities with the figures accepted by the EC after the second review meeting.

IST

BRIEF DESCRIPTION OF THE WORK PERFORMED

In this third year, IST continued to study the relation between anticipation and emotion with a particular focus on how such relation can be applied to the generation of believable behaviour for cognitive systems aimed at interacting with the user. IST has concentrated efforts to finalize the implementation of a robotic scenario where the iCat, which architecture integrates the emotivector mechanism, acts as a companion to a game of chess. The evaluation of the scenario suggests that the emotivector mechanism is valuable in such a real world scenario, and not limited to virtual worlds. IST has also made significant efforts with ISTC in continuing the integration of their architectures, and collaborated with NBU to include emotions in the DUAL architecture at the theoretical level. IST continued to invest efforts in the dissemination of the results obtained within the MindRACES project, and had a strong presence in the international conference of affective computing and affective interaction (ACII 07) where a live demonstration of the iCat scenario was presented, and had good impact on the affective computing community.

WP1: PROJECT MANAGEMENT
The activities developed in this workpackage included the participation in project meetings, preparation of reports, and the MindRACES participation in the ACII 2007 (International Conference on Affective Computing and Intelligent Interaction), held in Lisbon, Portugal, from 12 to 14 September.

WP2: SCENARIOS SPECIFICATION AND EVALUATION

WP3: ATTENTION, MONITORING AND CONTROL

WP4: GOAL DIRECTED BEHAVIOUR, PRO-ACTIVITY AND ANALOGY

WP5: EMOTIONS
IST has finalized to integrate and evaluate the emotivector mechanism within a robotic scenario using the iCat robot platform from Philips. Because it would be impossible to finalize both implementation and evaluation of the two scenarios within the project time frame, IST concentrated efforts on the implementation of the second scenario, where the iCat robot acts as a companion to a game of chess, controlled by the emotivector mechanism. The first scenario will continue beyond the project boundaries.

WP6: INTEGRATION
IST and ISTC have made significant efforts in integrating their architectures in the "guard and thieves" scenario and also in the "building a world" scenario. In this reporting period, the efforts were mainly focused on refining the implementation of the architecture and performing more tests. The new results were published. Furthermore, IST and NBU collaborated to include emotions in the DUAL architecture, at the theoretical level.

WP7: DISSEMINATION
The following papers were prepared within the scope of the MindRACES project:
Rui Prada and Nuno Otero and Ana Paiva (2007). The user in the group: evaluating the effects of autonomous group dynamics. ACM international conference proceeding series, volume 203. Proceedings of the international conference on Advances in Computer Entertainment Technology. Salzburg, Austria. SESSION: Games evaluation. pp 25-32. ISBN: 978-1-59593-640-0.
Iolanda Leite and André Pereira (2007). *iCat, the Affective Chess Player*. In Paolo Petta and Carlos Martinho (eds) proceedings of the systems demonstrations. Second international conference on Affective Computing and Intelligent Interaction (ACII 07), ISBN: 978-989-20-0799-1, pp 29-33.
Iolanda Leite and Carlos Martinho and André Pereira and Ana Paiva (2007). *iCat: An Affective Game Buddy Based on Anticipatory Mechanisms* (submitted).
André Pereira and Carlos Martinho and Iolanda Leite and Ana Paiva (2007). *iCat the Chess Player* (submitted).

Carlos Martinho and Ana Paiva (2007): *It's All in the Anticipation*. In Catherine Pelachaud et al. (eds), Proceedings of the seventh international conference on Intelligent Virtual Agents (IVA 07), Paris France, Lecture Notes in Computer Sciences 4722 Springer 2007, pp 331-338.
Michele Piunti and João Gonçalves and Carlos Martinho (2007): *Modeling Expectations for Affective Agents*. In Roddy Cowie and Fiorella de Rossis (eds) proceedings of the doctoral consortium. Second international conference on Affective Computing and Intelligent Interaction (ACII 07), ISBN: 978-989-20-0798-4, pp. 86-93.

DESCRIPTION OF THE MAJOR COSTS ITEMS
RESEARCHERS: 37,031.58€
JUNIOR RESEARCHERS: 8,940.00€
EQUIPMENT:

iCat Robot	2,666.67€	
PC	360.54€	
Laptop Computer	325.28€	
Tot equipment	3,352.48€	

TRAVELS AND INTERNAL MEETINGS:

Conference	Location/date	participants	cost
Project Meeting	**Rome, Italy / 25 Sept to 3 October 2006**	João Gonçalves; Prof. Carlos Martinho; César Pimentel	**3,488.61€**
Project Meeting	**Rome, Italy / 10 to 13 December 2006**	**Prof. Ana Paiva; Prof. Carlos Martinho; João Gonçalves**	**2,808.92€**
ACE 2007	**Salzburg, Austria / 12 to 17 June 2007**	**Prof. Rui Prada**	**1,644.15€**
14thInternational Summer School in Cognitive Science	**Sofia, Bulgary / 15 to 20 July 2007**	**Prof. Rui Prada**	**396.84€**
ACII 2007	**Lisbon, Portugal / 12 to 14 September 2007**	**César Pimentel; Prof. Carlos Martinho; João Gonçalves**	**700.00€**
IVA 2007	**Paris, France / 16 to 20 September 2007**	**Prof. Carlos Martinho; Prof. Ana Paiva**	**2,349.54€**

OTHER COSTS:
148.32€ (bibliography)
2,128.10€ (adjustments)
640.00€ (Audit Certificate - Year 2)
520.00€ (Audit Certificate - Year 3).

OVERHEADS:
Year 3: 84.628,44€
Travel costs that were made in the previous reporting period and were not claimed were added to this reporting period in adjustments (in the amount of **4,727.03€**). We have made adjustments to the 1st and 2nd year Cost Statements in the amount of **-2,598.93€**. This adjustment corresponds to an Update of IST's Indirect Costs. The values that were being used were values of 2004. In July 2007, our indirect costs were audited and updated until the year of 2006. Consequently we have adjusted all indirect costs from that date onwards.

THIS PARTNER PROVIDES WITH ITS OWN RESOURCES TO THE CO-FINANCING OF THE MINDRACES PROJECT.

OFAI

BRIEF DESCRIPTION OF THE WORK PERFORMED

WP1
Project communication, partner interaction and co-ordination of co-operation.

WP2
In work package 2 the work on the scenarios was mainly completed and therefore there were no significant activities in this reporting period.

WP3
OFAI developed an algorithm based on Markov models to code an observed sequence of images as a sequence of discrete states related to the location of a moving object which may be temporarily hidden. In our scenario a ball rolls behind a wall and, in a small percentage of all runs, the ball is reflected at a second wall. VLMM (Variable Length Markov Models) and PFM (Prediction Fractal Machines) are applied to generate forecasts, which themselves can be used to implement anticipatory behaviour. The robot does not move in this scenario. Simulations and also real world experiments with a stationary camera were performed to show the applicability of the algorithm.

OFAI also applied a reinforcement learning approach to another scenario by trying to fit neural networks (MLPs and RBFs) to value functions to allow AIBO finding short cuts to catch a moving or reflected object. This worked sometimes, but fitting a net to the function was not reliable therefore this branch of research was abandoned.

- Lewandowski A., Poelz P., Dorffner G.: Anticipatory Behaviour based on Prediction of Image Sequences. Technical Report, Austrian Research Institute for Artificial Intelligence, Wien, TR-2007-07, 2007

WP4
As one main effort in work package 4 OFAI implemented and evaluated an Artificial Immune System Architecture for Anticipation (AISA) using an artificial immune network as a basis. AISA controls OFAI's primary robotic platform AIBO which plays the role of the hunter in the hunter-prey-scenario. Experimentation was done in the Webots 5 simulation environment and with the real AIBO robot in OFAI's test bed. As a hardware abstraction layer the universal real-time behaviour interface (URBI) is used.

Further OFAI developed a particle filter approach to implement anticipation when observing a moving object in a world with obstacles. The particles were used to model the possible trajectories of a temporarily hidden object. The robot can use the forecasted trajectories to develop a strategy to catch the object. In simulated environments the approach has proven to work fine and also simple real world experiments with a single visible wall and another hidden obstacle where a ball could be reflected were successfully performed using the particle filter approach. In these experiments AIBO knew its own position and the location of the second robot was assumed to be known (except for noise). However transferring

the particle filter approach to the WEBOTS simulation environment raised the problems of self localization and localization of the other robot and therefore we used coloured spheres as markers there. The motion models for AIBO and the other robot were approximated. Once the localization phase was over (and was successful), the approach usually worked well. Analogous experiments with the Particle filter approach in a real world environment brought up difficulties in transferring the colour segmentation algorithm.

We developed other approaches based on image sequences, in which the AIBO is now allowed to move and is goal directed. These approaches can be seen as competitors to the particle filter approach and as extension of the ideas presented in WP 3. Within Matlab we applied algorithms from reinforcement learning, namely Q-learning, including eligibility traces, on the sequence of sector views. In one specialisation of the scenario without inner walls and a moving prey (on a circular trajectory) AIBO learned to find short cuts, at least for one direction (the prey was allowed to randomly change the orientation on its trajectory between consecutive runs). Another second scenario showed a bouncing ball within a square surrounded by walls, which was quite reasonably solved. But the algorithms showed (even with augmented memories) to have difficulties in scenarios for which the second robot moved behind a wall. Therefore a new algorithm to analyse transitions between sector views incorporating AIBO's actions was developed. It is based on a backward induction algorithm to maximize expected reward within a finite horizon. Goal states are dynamically generated (but must have been experienced earlier). The algorithm works very well in a scenario without a wall and is able to solve the one wall scenario problem quite often, if time is not a constraining factor.

This promising approach was also transferred to the WEBOTS environment with using Matlab as robot controller. Further as a refinement of the scenario the roles of AIBO and the prey were switched and the task of AIBO was to avoid the running robot without losing intervisibility. Here in a scenario with surrounding walls AIBO had difficulties to escape from corners.

Finally, using the same approach, two AIBOs were independently controlled by MATLAB. One of them acted as hunter, the other one as prey. In all experiments the hunter usually caught the prey, probably as the hunting strategy is easier to learn than the escaping strategy.

- Lewandowski A., Poelz P., Dorffner G.: Using Particle Filters to Anticipate the Location of Reappearance of a Temporarily Hidden Target. Technical Report, Austrian Research Institute for Artificial Intelligence, Wien, TR-2007-06, 2007

- Lewandowski A.: Learning to anticipate a temporarily hidden moving object. Technical Report, Austrian Research Institute for Artificial Intelligence, Wien, TR-2007-08, 2007

WP5

The main efforts in this work package were aligned on a continued evaluation of and experiments on the integration of the Endocrine and the Artificial Immune Systems.

WP6

OFAI continued in comparing the XCS with the AIS architecture and in cooperation with IDSIA performed Matlab simulations with the immobile AIBO observing a ball rolling behind a wall, which is sometimes reflected. Experiments with the LSTM algorithm were very promising and simulations with a running AIBO were performed thereafter: here AIBO runs from randomly generated starting points to the centre of a wall, behind which a ball had disappeared.

Although now actions were also incorporated, LSTM is still able to forecast the reappearance of the ball behind the wall. Alternatively, a Markov model with simplified sector views was developed for the same experiments and also delivered reasonable results.

WP7

In their dissemination activities OFAI submitted a paper with the results from the activities in WP3 to the KI 2007 (30th Annual German Conference on Artificial Intelligence) and another paper summarising the particle approach mentioned in WP4 to the Epigenetics Robotics Conference in Rutgers, New Jersey. Unfortunately the first submission was not accepted as a paper – sharing this experience with 68% of all submissions, although 45% of the rejected submissions were later accepted as a poster. The program chair of the EpiRob conference informed us 8 weeks after the original deadline that our paper would not fit exactly to "the very specific scope" of the conference and suggested to "submit your paper to a venue where it will receive due consideration". Another submission about learning to anticipate a temporarily hidden moving object was prepared but not submitted to a conference, as any conference will take place after the end of the project.

DESCRIPTION OF THE MAJOR COSTS ITEMS

RESEARCHERS: **personnel costs 60.511,91 Euro**

JUNIOR RESEARCHERS:

EQUIPMENT:

1 PC + accessories (invoice net value Euro 1.764,32) depreciation value for reporting period =	**588,11**
1 Roboter Sony/AIBO (invoice net value Euro 1.855,83) Depreciation value for reporting period =	**674,85**
1 Simulation-Software for AIBO Roboter (invoice net value Euro 1.850,12) , depreciation value for reporting period =	**1.480,10**
(all depreciation values were calculated according to OFAI's normal accounting rules)	
Total equipment costs Euro	**2.743,06**

TRAVELS AND INTERNAL MEETINGS:

Conference/Meetings	Location/date	participants	cost
Project Meeting	**Rome, Oct. 1-3, 06**	**P.Pölz, J.Rattenberger, A.Lewandowski**	**1.628,78**
2nd Review Meeting	**Rome, Dec. 11-12,06**	**P.Pölz, A.Lewandowski, G.Dorffner**	**2.149,85**
Final Review Meeting	**Rome, Dec. 12-13,07**	**A. Lewandowski**	**670,54**
		Total travel costs Euro	**4.449,17**

OTHER COSTS: Euro 1.438,25

OVERHEADS: Euro 13.548,48

Total costs declared for 3rd reporting period: 82.690,87

COSTS BORE WITHIN 90 DAYS AFTER THE END OF THE PROJECT:

670,54 € AS TRAVEL COSTS
134,11 € AS RESPECTIVE OVEHEADS

IDSIA-SUPSI

BRIEF DESCRIPTION OF THE WORK PERFORMED

WP1: PROJECT MANAGEMENT

Project meeting preparation, participation, project report preparations and project communication.

WP2: SCENARIOS SPECIFICATION AND EVALUATION

The work on the scenarios is basically completed. Therefore, there were no significant activities in this reporting period.

WP3: ATTENTION, MONITORING AND CONTROL

We have finished our work with the marble run game simulation (proposed by LUCS) and applied different network structures to improve the control of the fovea trained with supervised learning methods. The experiments show that the recurrent neural network has learned to follow the ball given the visual input and additionally has an internal representation of the ball behavior allowing it to predict the location of the ball without external visual feedback. Part of the results will be published in the Mind Races book. A detailed article is in preparation.

We continued our attention based experiments with memory requirements in the fovea framework with different tasks. We used policy gradient reinforcement learning methods and supervised learning methods with recurrent networks.

We applied our gradient ascent reinforcement learning method on a control task to drive a car in a physically realistic 3D racing car simulation.

We have also further developed our state of the art evolutionary reinforcement learning methods yielding the Cooperative Synapse NeuroEvolution (CoSyNE) algorithm for automatically designing controllers by cooperatively coevolving neural networks at the level of individual synaptic weights. Our previous work in neuroevolution has also laid the foundation for a hybrid evolutionary/supervised class of methods, Evolino, which can be used for modeling complex, non-linear systems.

WP4: GOAL DIRECTED BEHAVIOUR, PRO-ACTIVITY AND ANALOGY

We have continued our work with the localization and mapping problem in an in-house environment. After literature study of other localization methods based on biologically inspired neural network structures, we have moved our experiments to a real robot in a real office environment. Additionally, we have implemented a standard simultaneous localization and mapping algorithm (DP-SLAM) to compare our neural based method with classical particle filter techniques. The experiments are not finished, but the main characteristics of the different methods are observable: E.g. the DP-SLAM algorithm is very sensitive to the accuracy of the odometry data, while the recurrent network method does not need odometric information. The drawback of the neural network approach is that the number of episodes required to learn the environment is much higher than for the classical mapping method.

WP5: EMOTIONS

No significant activities in this reporting period.

WP6: INTEGRATION

We shared our universal network library (UNL) with UW-COGSCI and OFAI for further development of flexible and configurable hierarchical recurrent networks with advanced properties.

We have continued our cooperation with OFAI in the "AIBO observing a ball rolling behind a wall" task. We developed some tools in Matlab to visualize and analyze the simulated tasks as well as control and supervise the learning effort and results. We have also discussed objective benchmarking and measurement techniques to make the learning achievement of the different methods comparable.

WP7: DISSEMINATION

The universal network library (UNL) we have previously shared with UW-COGSCI and OFAI is further under development. We renamed the library to PyBrain (**P**ython-**B**ased **R**einforcement Learning, **A**rtificial Intelligence and **N**eural Network Library). The library is made public (see www.pybrain.org) and many developers, e.g. from the TUM, are contributing modules to the framework. It contains algorithms for neural networks, reinforcement learning (and the combination of the two), unsupervised learning, and evolution. The library is built around neural networks in the kernel and all of the training methods accept a neural network as the to-be-trained instances. A suite of (ODE-based) environments is available for algorithm testing.

Additionally, we submitted and published several papers related to MindRaces research and gave several talks at conferences and universities about our results.

DESCRIPTION OF THE MAJOR COSTS ITEMS

RESEARCHERS: 86'714.60
JUNIOR RESEARCHERS: 0.00

EQUIPMENT:

Pan-tilt unit with accessories	Directed Perception	2'446.78
Laser range	Sentek	1'870.31
Laser range	Sentek	1'997.26
Small equipment	-	71.10
Tot equipment		**6'385.45**

TRAVELS AND INTERNAL MEETINGS:

Conference	Location/date	participants	cost
MiRa	Rome/2.10.06	Förster Wierstra	626.14
MiRa	Rome/10.12.06	Schmidhuber Förster	992.40
EUPF7 Project	Marl (D)/25.03.07	Förster	536.92

ESANN'07	Bruges (B)/25.04.07	Förster	1329.08
NanoTera	Pf˙åffikon (CH)/24.05.07	Gomez	192.96
SF AIS Grant Panel	Arlington, 27.05.07	Gomez	315.85
Tot Travels			**3993.35**

OTHER COSTS: Audit 596.00
Final meeting in Rome (Dec. 2007; Schm idhuber and Förster) 1'237.10

1'833.10
OVERHEADS: 19'418.68

2-COSTS BORE AFTER THE END OF THE CONTRACT FOR THE PREPARATION OF THE FINAL REPORTS AND MEETING, CHARGED AS ADJUSTMENT (MANAGEMENT):
Costs bore for the participation in the final meeting concern the travel expenses of Alexander Forster and Juergen Schmidhuber: 1237,10 € and
Cost concerning the last audit certificate: 596,00 €
Total final costs: 1833,10 €

NOZE

BRIEF DESCRIPTION OF THE WORK PERFORMED

WP1: PROJECT MANAGEMENT
NOZE had to deal with the management of meeting participation (MindRACES Second Review Meeting - Roma - December 12, 2006).

WP2: SCENARIOS SPECIFICATION AND EVALUATION
No activity performed in the reporting period

WP3: ATTENTION, MONITORING AND CONTROL
NOZE settled up a new research thesis with Dr Daniela Lalia in collaboration with Professor Cecilia Laschi at the Arts-Lab (Scuola Superiore S'Anna) and Professor Franca Tecchio at the ISTC. The work is focused on the development of an anticipatory schema based controller for robotic fingers. Robotic fingers behaviour will be compared with humans one using a specific testbed in order to appreciate strength and limitations of anticipatory capabilities.

WP4: GOAL DIRECTED BEHAVIOUR, PRO-ACTIVITY AND ANALOGY
NOZE developed in collaboration with the ISTC various papers (5) about schema based models and about their anticipatory nature and impact in the design of complex architectures. Issues about modulatory influence of motivations on behaviour and relationships between emergent behaviours in schema models and limited resources competition were also faced. NOZE also developed the first release of the AKSL library (AKIRA Schema Language), an integrated module of AKIRA architecture to develop anticipatory schema models in an easier and faster way.

WP5: EMOTIONS

NOZE contributed in the analysis of emotions in anticipatory systems studying effects of emotional and motivational states in emergent behaviours produced by schema based models. These results are discussed at session "Computational Models of Emotion and Theoretical Foundations" during the Affective Computing & Intelligent Interaction Conference (ACII 07-Lisbon, September 2007) and published in:

Giovanni Pezzulo and Gianguglielmo Calvi. *Modulatory influence of motivations on a schema-based architecture: a simulative study*. In Ana Paiva and Rosalind Picard, editors, Proceedings of Affective Computing & Intelligent Interaction (ACII 07), pages 374–385, 2007.

WP6:INTEGRATION

NOZE addressed integration issues in the paper:

- Giovanni Pezzulo and Gianguglielmo Calvi. *Designing modular architectures in the framework AKIRA*. Multiagent and Grid Systems, 3(1):65–86, 2007.

It also complete the integration of anticipatory components in the first beta release of the ICC s.a.s. Planning software. Collaboration with ISTC mainly in the sophistication of the Guard and Thief Scenario and in the development of the new AKSL (AKIRA Schema Library)

WP7:DISSEMINATION

NOZE produced and customize project outputs such as video and documents and distributed them into the web (i.e Youtube and Wikipedia). NOZE powered the web portal with a custom system to manage documents and publications upload and categorization. NOZE restyles the portal to be more user friendly and with more content provided (i.e scientific and cognitive science automatic rss feed in home, google coop custom searcher, ...). NOZE integrated AKIRA Fuzzy Cognitive Maps anticipatory tool with University of Palermo – DREAM Laboratory and developed a customized version of AKIRA able to deal with socio-economics domains for the DREAM Laboratory. NOZE started to establish contact with organizations and specific internet resources that can spread MindRACES results faster, in particular NOZE became partner of the ZEA – Zope European Network publishing MindRACES Portal as a concrete and successful Plone application in the domain of research management. NOZE took part into different international meetings and conferences (Creativity Festival – Florence; Miopen – Milan) where MindRACES project was published. NOZE also released a new full of features AKIRA update (0.92 version). NOZE is also going to finalize the first official release of the ICC software. NOZE started an internal research branch with the ESA (Employer Satisfaction Analyzer) project. ESA is a small software module integrated with the NOZE ERP (Enterprise Resource Manager) system that supports the monitoring process of employees' wellness and permits to predict possible conflicts and motivational problems. It is based on a cognitive model of employees' expectations about their job (considering factors such as salary, achievements, free time, etc.). NOZE also developed SAM (Salary Allocation Manager) in collaboration with the PROMETEIA risk analysis group (http://www.prometeia.it/). SAM was designed to manage allocation of roles and resources in business areas. SAM extends standard constraint satisfaction algorithms with a cognitive model of employees and a set of predictive mechanisms that permit to anticipate future salary claims of employees for the sake of considering future and not only present needs/requests in the roles allocation process.

DESCRIPTION OF THE MAJOR COSTS ITEMS

The whole NOZE investment for research activities done so far (during the third project year) is equal to **43,8** person months for a total of € **100621,67**

EQUIPMENT:

	sum of the depreciation rates
PENTIUM4 XEON 2.66Ghz, 4Gb DDR PC2100, HDD SEAG.74Gb 10000RPM	**€ 2.758,84**
PENTIUM4 XEON 2.66Ghz, 4Gb DDR PC2100, HDD SEAG.74Gb 10000RPM	
ALTOS Server G320, P4 630, 2Gb Ram, Fdd, Dvd, Mouse, 2x LAN	**€ 1164,15**
ALTOS Server G320, P4 630, 4 Gb Ram, Fdd, Dvd, Mouse, 2x LAN Gigabit, , 2x 300Gb	
Tot equipment	**€ 3922,99**

TRAVELS AND INTERNAL MEETINGS:

Conference	**Location/date**	**participants**	**cost**
ISTC-Roma Interaction, Coordination and Development	Roma, 13/11/2006 17/11/2006	Gianguglielmo Calvi	€ **51,54**
ISTC-Roma Interaction, Coordination and Development	Roma 02/01/2007 04/01/2007	Gianguglielmo Calvi	€ **102,99**
ISTC-Roma Interaction, Coordination and Development	Roma 19/02/2007 23/02/2007	Gianguglielmo Calvi	€ **102,99**
ISTC-Roma Interaction, Coordination and	Roma 04/05/2007 10/05/2007	Gianguglielmo Calvi	€ **102,99**

Development			
Total travels			€ **360,51**

OTHER COSTS:

Detail	**Location/date**	**participants**	**cost**
SECOND AUDIT			€ **1.000,00**
Total others			€ **1.000,00**

TENTATIVE EXTIMATES:

OVERHEADS: 20981,03

COSTS BORE WITHIN 90 DAYS AFTER THE END OF THE PROJECT:

€ 2.459,49 Gianguglielmo Calvi November 2007 salary concerning the time for preparation of the final report

€ 102.99 fuel refund for car travel from 27/11/2007 to 1/12/2007;

€ 80,00 train ticket(s)

€ 68,35 lunch tickets

€ 2,00 metro ticket

€ 33,00 train ticket
€ 2.000,00 audit certificate

€ 4.745,83 total

NOZE co-finances this project with its own resources.

1.9 TABULAR OVERVIEW OF BUDGETED AND ACTUAL PERSON MONTHS

As regards the electronic version, please see the excel file enclosed.

1.10 TABULAR OVERVIEW OF BUDGETED AND ACTUAL COSTS

As regards, the electronic version, please see the excel file enclosed.
AC contractors give a tabular overview of all resources employed on the project and a global estimate of all direct costs in accordance with the financial guidelines.

1.11 MAJOR DEVIATIONS FROM COST AND PERSON-MONTHS BUDGET

NOZE:
In the cost statement from 1/10/2005 to 30/09/2006 the EC found in NOZE's documents some kind of imprecise information about NOZE's claimed person months/workpackage. In particular they found that the **3,3 p/m** claimed in the WP3 were not supported by a description in the NOZE Management Report. The part that EC considered wrong was the following:
"**WP 3 Attention, Monitoring and Control** : **Nothing** "
Here there was an error from NOZE in the use of term "Nothing". Noze used "Nothing" instead of the common form "no specific output, only standard annex activities carried on**".** In particular we clearly misunderstood the meaning of the word. In the previous context "Nothing" was meant for "Nothing to explain further" or "Nothing to specify". NOZE hopes to have been able to clarify its position about that mistake. NOZE would like to claim here **3,3 p/m** that in fact it concretely used to cover activities in the WP3.

TASK WORKED BY NOZE IN WP3 IN THE SECOND REPORTING PERIOD:
During the second period NOZE WP3 efforts were focused into four general categories :

1. Analysis of Consortium available tools and of their limitation and features
2. Proposals of customizations and enhancement of available software tools
3. Simulations
4. Publications

In particular NOZE worked on new software modules integrated into AKIRA to deal with attention shifting and process activity monitoring in order to use these for future important simulations (i.e. for example those in the guard and thief scenario). Moreover, NOZE worked on the infrastructure and on the conceptual models (with ISTC) of future publications (i.e. Schema-based design and the AKIRA Schema Language - Springer LNAI 4520, 2007, Modulatory influence of motivations on a schema-based architecture: a simulative study. In Ana Paiva and Rosalind Picard, editors, Proceedings of Affective Computing & Intelligent Interaction (ACII 07), pages 374-385, 2007.) Time was spent also analyzing other Consortium tools

(such as IKAROS and LSTM network) in order to understand how their particular characteristics and features could have been integrated into the AKSL (AKIRA Schema Language).

MAJOR DEVIATIONS FROM PERSON-MONTH BUDGET

LUCS

The number of person months was increased for the third reporting period to allow the project to complete the work on the scenarios as proposed at the second review meeting. The cost for this was covered by the fact that personnel costs as well as equipment costs were lower than expected during the initial period of the project.

NOZE

COMMENTS ALREADY RECEIVED FROM THE CPO:
"NOZE used its own resource and its business relationships to cover the augmented effort of 50,2 p/m." Therefore I assume that not all the 50.2 PM are claimed to the EC. May I please ask them to specify which part of these 50.2PM are claimed as costs for this project and which part are covered by these extra funds."
REPLY:

Noze, as many other partners did, realised that the efforts needed to achieve the tasks assigned to them by the work programme, had been under-estimated in terms of manpower and time. They so tried to fix the problem by recruiting young experts with a lower salary in order to complete their work while avoiding an extra-charge to the EC. Furthermore, the business relationships gathered during the normal activities were exploited also for the benefit of the project without any extra-charge.
As conclusion all the person months claimed by Noze should be co-funded by the EC within the threshold foreseen in the contract.