D10.3 Project Periodic Report

Period covered: Sep 2010 - Aug 2011

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Periodic report	1st **X** 2nd □ 3rd □ 4th □
Period covered	From 01/09/2010 to 31/08/2011
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Declaration by the scientific representative of the project coordinator

I, as scientific representative of the coordinator of this project and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

- The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;
- The project (tick as appropriate):

  X has fully achieved its objectives and technical goals for the period;

  ☐ has achieved most of its objectives and technical goals for the period with relatively minor deviations.

  ☐ has failed to achieve critical objectives and/or is not at all on schedule.
- The public website, if applicable

  X is up to date;

  ☐ is not up to date
- To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 6) and if applicable with the certificate on financial statement.
- All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 3 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of scientific representative of the Coordinator: Jonathan Freeman

Date: 31/ October/ 2011

Signature of scientific representative of the Coordinator:

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Consisting of:

No	PARTICIPANT NAME	S.N.	COUNTRY
1	Goldsmiths, University of London	GOLD	UK
2	Universitat Pompeu Fabra	UPF	ES
3	University of Sussex	UOS	UK
4	Informatics and Telematics Institute	ITI	GR
5	Eberhard Karls Universitaet Tuebingen	EKUT	DE
6	Universität Augsburg	UAU	DE
7	University of Teesside	TEESSIDE	UK
8	Università degli Studi di Padova	UNIPD	IT
9	Max Planck Gesellschaft zur Foerderung der Wissenschaften E.V.	MPG	DE
10	Ecole Normale Superieure	ENS Paris	FR
11	Budapesti Muszaki Es Gazdasagtudomanyi Egyetem	BME	HU
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Publishable Summary

PROJECT AT A GLANCE:

Project acronym: CEEDS

Project title: The Collective Experience of Empathic Data Systems

Project logo:

Project number: 258749

Call (part) identifier: FP7-ICT-2009-5

Project Start Date: 1st September 2010

Project Duration: 48 month

Project Coordinator: Dr. Jonathan Freeman, Goldsmiths, University of London, UK

Project website: ceeds-project.eu

Project consisting of:

No	*PARTICIPANT NAME*	*S.N.*	*COUNTRY*
1	Goldsmiths, University of London	GOLD	UK
2	Universitat Pompeu Fabra	UPF	ES
3	University of Sussex	UOS	UK
4	Informatics and Telematics Institute	ITI	GR
5	Eberhard Karls Universitaet Tuebingen	EKUT	DE
6	Universität Augsburg	UAU	DE
7	University of Teesside	TEESSIDE	UK
8	Università degli Studi di Padova	UNIPD	IT
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PROJECT SUMMARY

The Collective Experience of Empathic Data Systems (CEEDs) project is developing novel, integrated technologies to support human experience, analysis and understanding of very large datasets.

- **Making use of humans' implicit processing abilities.** CEEDs will develop innovative tools to exploit theories showing that discovery is the identification of patterns in complex data sets by the implicit information processing capabilities of the human brain. Implicit human responses will be identified by the CEEDs system's analysis of its sensing systems, tuned to users' bio-signals and non-verbal behaviours. By associating these implicit responses with different features of massive datasets, the CEEDs system will guide users' discovery of patterns and meaning within the datasets.
- **Immersion in synthetic reality spaces.** To achieve this goal, users will be immersed in synthetic reality spaces (SRS), allowing them to explore complex data whilst following narrative structures of varying spatio-temporal complexity. Unobtrusive multi-modal wearable technologies will be developed in the project for users to wear whilst experiencing the SRS. These will provide an assessment of the behavioural, physiological and mental states of the user.
- **Two brains are better than one – collective experience.** Individuals' pattern detection abilities will be augmented by linking multiple users together, creating a collective discovery system. Components of the CEEDs system will be integrated using generalized architectures from network robotics, creating a genuinely novel approach to massive distributed synthetic reality applications.
- **Making a practical difference.** CEEDs' effectiveness will be validated through studies involving stakeholders from science, history and design. The consortium envisages genuine benefits from the CEEDs system. Think, for example, of a young pupil using CEEDs being able to see complex patterns in an astronomy data set, patterns which without CEEDs would only be perceptible to an experienced professor. By unleashing the power of the subconscious, CEEDs will make fundamental contributions to human experience. When we look back to life before CEEDs, we may liken our experience to living with our eyes closed.
- **Enriching theory across disciplines.** On the theoretical level, CEEDs targets a novel integrated computational and empirical framework, merging the delivery of presence with the study of consciousness, its underlying sub-conscious factors and creativity. To do this, CEEDS will follow a multi-disciplinary approach that will significantly further the state of the art across science, engineering and the humanities. By bringing together a team of leading experts in psychology, computer science, engineering, mathematics, and other key disciplines, CEEDs will build the foundations for key developments in future confluent technologies.

EXPECTED IMPACTS

- CEEDs aims at creating **a novel mixed reality system**, merging real and virtual, with two unique features: unifying implicit and explicit experience according to a narrative, and supporting novel forms of perception and action. Differently from purely aesthetic multimedia installations, here the psychological experience of the user/visitor is investigated. The result will be a set of tested, effective scenarios where the user can exploit novel affordances to act, accompanied by a scientific description of the way in which people make sense of these unusual affordances configuration.
- CEEDS explores **a novel solution to present massive volumes of data**, not only by merging physical and virtual sources of stimulation, but also implicit and explicit information. Augmented reality systems already try to make visible information and cues that are consequential but would remain non accessible to one or more of the interactants; here the "invisible" phenomena are of a special kind, namely implicit information of which user are not aware, but which users will be able to benefit from in exploring complex data sets. The nature of this information and the way to present it for

an effective exploitation on the users' part will be one result of the project, moving a step forward the current solutions to collect and manage "invisible" data.

- The study of presence in mediated environments is currently breaking old frontiers by considering not only systems that saturate the users' experience and seclude it from the surrounding environment, but also other more pervasive cases in which the mediated environment is permeated by other environments or stimuli. As such, our studies will be is able to test presence models and explanations on environments that are closer to the mediated environments that are present in everyday life, regardless of the novelty of the specific interface. CEEDs investigates the presence experience in this spirit, and - besides measuring presence– it will put great **emphasis on the way in which the specific nature of the environment shapes the way in which presence is manifested and enacted**.
- The last expected important impact is **to contribute to the better understanding of how sensory information is delivered to, and interpreted by the brain**. Discovery depends on the identification by the brain of patterns in complex data sets. These patterns can be derived from our sensation of the physical world we are embedded in or through augmented realities where human sensation is expanded through the use of novel sensing technologies and action augmented through novel effector systems. CEEDS seeks to exploit the implicit information processing capabilities of the human brain. These implicit cues, as measured through novel sensing and effector systems including biosignals and non-verbal behaviour form the core information based on which the CEEDS system will process data and present it to the user(s). Hence, CEEDS places the investigation and delivery of presence in the scientific context of consciousness research and expands its horizons to include implicit and sub- pre-conscious forms of perception, cognition and action.

HIGHLIGHTS FOR PERIOD 1 (01/09/2010 – 31/08/2011)

The CEEDs project started on September, 1st 2010. The Kick-off meeting, the first Project Coordination Committee (PCC) and Project Management Board (PMB) were held in Barcelona (ES) on October 4th-5th, 2010. The 2nd Consortium meeting took place in London (UK) on April 6th-7th, 2011 and was devoted to presentation of the work carried out in the first six months of the project by each partner and to preparation for the 6 months ahead. Overall, about 20 official meetings (e.g., PCC, PMB, integration meeting) were held with CEEDs partners, either in person or via conference call.

With regards to the primary scientific workpackage of the project (**WP1 - Theory of human unified experience**), the 1st year of the project was devoted to preliminary literature review and research, which led to the creation of an abstract theoretical model of the dataflows, i.e., their functional and mechanistic basis, that underpin transparency and presence in conscious experience. An additional highlight is WP1's research on visual anticipation and its effects on conscious processing.

CEEDs sensing platform (**WP2** - **CEEDS sensing system**) was conceived, designed and partly developed within the first project year. The platform was conceived to transmit high level information data to the CEEDs engine starting from the pre-elaboration and fusion of single sensor parameters. Both platform architecture and single building blocks descriptions have been developed and are described in WP2's year 1 deliverable. Additionally, the set of sensing parameters that will be made available for the CEEDs application and the preliminary activity on the platform development is also described.

During this period, the conceptual architecture of the CEEDS engine (**WP3 - CEEDS engine: perception, cognition and action**), the narrative generator and data discovery components were defined. The conceptualization work of other components like the CEEDS Sentient Agent and the Composite Engine also started. The CEEDS engine has been developed working closely with other work packages in order to create a common framework that is a reference for the applications. Through the progress of the project this architecture can be revised and adapted. The data discovery component and the narrative generator have been developed closely with applications to develop the required algorithms and has already been started to integrate it into prototypes. As part of the cooperation with other work

packages an integration week was organized to gather together all technological partners to discuss the architecture of the engine and the applications and also to start practical work on the development and integration of technologies.

In this period in WP4 (**WP4 - CEEDS effectors systems & environments**), first steps were also taken in the design and implementation of the CXIM 2.0 environment, with changes made to the hardware and software of the previous XIM.

With regards to **integration** (**WP5**) of the CEEDS system architecture, YARP was presented as the software integration tool for the CEEDs project and verification of how YARP can work with different OS was initiated. The specifications of the computer system in charge of running CEEDs applications were also presented.

As planned, initial CEEDs use cases and usage scenarios for CEEDs were generated (**WP8 - Use cases and scenarios**) in year 1. With a range of diverse applications planned for the project (from neuroscience and astrophysics, history and archaeology, through to retail/commerce based applications), it was essential to ensure congruence in the underlying potential user experiences. To maintain consistency across Applications, a unified high level conceptualisation of CEEDs uses was required and to this end, commonalities across Application scenarios were sought. The process involved a consultation with stakeholders (and the set up of a Stakeholder Advisory Group) and critical and creative thinking. These methods informed the development of a user interface taxonomy and culminated in a set of 'Core Features' (CFs), i.e. application-independent components of CEEDs experiences.

The creation of CFs has been closely aligned with **WP6** (**Application Development**) which has further elaborated the scenarios to provide concrete, functional application visions, and to develop initial application prototypes.

CEEDs usability guidelines were also drafted (**WP7 - Experience assessment and human factors**) and an accuracy test of wireless sensorized vests used by CEEDs was conducted. Other studies were conducted in WP7. A first investigated which brain areas are activated when healthy adults perform perceptual/attentional tasks in their peripersonal space (the space within their arms' reach) and extrapersonal space (the space beyond their arms' reach). A series of studies was also carried out that use the line bisection paradigm to investigate spatial cognition, and in particular its visual-attentional features, in 3D spaces where object manipulation can be supported by different tools.

In the first year of the project, several tools were used and several activities were carried out by the CEEDs Consortium to ensure that the dissemination of project results took place on a broad platform (**WP9 - Dissemination, exploitation planning, training and networking**): CEEDS results were disseminated primarily through presentations and invited lectures at relevant scientific conferences and meetings; the publication of papers in leading peer-reviewed journals; through a dedicated public website (ceeds-project.eu); press releases; interviews and videos; and other public events (e.g. FET2011). Collectively, thse aimed to raise the CEEDs profile and get expressions of interest and comments on CEEDs. Collaboration with similar Future and Emerging Technologies (FET) projects (e.g., the VERE project) was also achieved through constructive meetings between project coordinators.

A review of the key trends and of the existing tools for the exploration and analysis of large datasets in application domains of scientific research relevant to the project outlined how the CEEDs system has some strong and innovative characteristics compared to its "competitors". A preliminary template distributed to all partners to capture their initial ideas and individual plans for the exploitation of the potential foreground also indicated great potential in terms of both commercial exploitation of R&D results and general advancement of knowledge.

Finally, with regards to the management of the project (**WP10 - Management, Coordination and Ethics**), several activities were carried out to ensure that the project achieved the planned results at the end of the reporting period, such as:

- Establishment of the decision-making structure for the project;
- organization, chairing, and follow-up of two consortium and Project Management Board (PMB) meetings, and five Project Coordination Committee (PCC) meetings;

- set-up and management of project communication (i.e., mailing lists, Google Groups, MeetingZone) and collaboration systems (i.e., Box.net);
- management of partner contributions and inter-partner relations within the consortium;
- supporting consortium members in achieving the timely completion of project deliverables and milestones; and maintenance of document archive of results and project deliverables;
- monitoring of partners' budgets and supporting consortium members in all aspects related to financial reporting;
- definition of an ethical code of conduct (policy) to be adopted by the whole consortium.

Table of Contents

List of Figures

List of Tables

1 Project Objectives and Major Achievements during the Reporting Period

1.1 Project objectives for the period

According to the Description of Work, the tasks listed in Table 1 were scheduled to start and/or be carried out during reporting period 1 (M1 – M12).

Tab. 1 - *List of tasks started in Year 1 by workpackage and their duration.*

Task	DESCRIPTION	MONTHS	RESP PARTNER
WP1 Theory of human unified experience			
T1.1	Theoretical and computational modelling	M6 – M48	UPF
T1.2	Testing transparency and presence in dataworlds	M6 – M43	UOS
T1.3	VR technology for creating "virtual synaesthesia"	M6 – M43	UPF
T1.4	Autonomic responses underlying emotional salience	M6 – M48	UPF
T1.5	Decoding of neural activity predicting intention and discovery	M6 – M31	ENS Paris
T1.6	Subliminal stimulation	M6 – M31	ENS Paris
T1.7	Functional brain mapping during mixed reality experience	M6 – M24	EKUT
WP2 CEEDS sensing system			
T2.1	Unobtrusive Physiological signal wearable acquisition system	M1 – M36	UDP
T2.2	Movement and gesture wearable acquisition system	M1 – M36	UDP
T2.4	Eye gaze acquisition system (HATCAM)	M1 – M36	UDP
T2.5	Speech acquisition system and processing	M1 – M36	UAU
T2.6	Brain signals recording and analysis	M1 – M36	EKUT
T2.7	Higher level processing of user responses and interfacing to CEEDS engine	M1 – M48	UAU
WP3 CEEDS engine: perception, cognition and action			
T3.1	Architecture of the CEEDS engine	M1 – M48	UPF
T3.2	Composition engine	M1 – M48	UPF
T3.3	Data Discovery	M1 – M48	MPG
T3.4	Narrative Generator	M1 – M48	TEESSIDE
T3.5	CEEDS Sentient Agent (CSA)	M1 – M48	UPF
WP4 CEEDS effectors systems & environments			
T4.1	Upgrade of eXperience Induction Machine - CXIM 2.0	M1 – M12	BME
T4.2	Portable version of the eXperience Induction Machine	M1 – M12	BME

WP5 Integration			
T5.1	System technical specification	M1 – M6	UPC
T5.2	Viewpoints, views and models	M7 – M15	UPC
WP6 Application development			
T6.1	Conceptualization and Design of CEEDS system architecture for Applications UPF	M1 – M18	UPF
T6.2	Applications Development	M1 – M48	UPF
T6.3	CEEDS Interface Design	M1 – M18	UH
WP7 Experience assessment and human factors			
T7.1	Cognition and Psychophysiology of user experience	M6 – M36	UNIPD
T7.2	Spatial cognition and actions in technologically enhanced spaces	M1 – M30	UNIPD
T7.3	Credibility and user acceptance of confluent systems	M12 – M48	UNIPD
T7.4	Social and communication ergonomics	M12 – M40	UNIPD
T7.5	Relevant feedback	M12 – M40	ITI
WP8 Use cases and scenarios			
T8.1	Scenario development and use cases	M1 – M15	GOLD
WP9 Application development			
T9.1	Dissemination Planning and Monitoring	M1 – M48	GOLD
WP10 Dissemination, exploitation planning, training and networking			
T10.1	Consortium Management	M1 – M48	GOLD
T10.2	Financial Management	M1 – M48	GOLD
T10.3	Activity Planning and reporting to the Commission	M1 – M48	GOLD
T10.4	Scientific Co-ordination and WP Interfacing	M1 – M48	UPF
T10.5	Ethical considerations in confluent systems	M1 – M48	UNIPD

2 Work Progress and Achievements During the Period

2.1 WP1 - Theory of Human Unified Experience

2.1.1 Work Package Objectives

The principal objective of WP1 is the development of a unified theoretical framework and its empirical validation connecting two key dimensions in consciousness research: transparency/presence of human experience and the role of unconscious factors in perception, experience and cognition. WP1 will show how the delivery of synthetic reality (SR) can be structured along these two dimensions using a novel integrated approach towards the qualia problem (the GEPE model defined below) and discovery. This model will be implemented as a computational model of consciousness.

WP1 comprises the following tasks:

- **Task 1.1: Theoretical and computational modelling** (Task Leader: UPF. Other partners involved: UOS, ENS, MPI)
    - Objective: To develop a theoretical/computational model formulating a set of constraints governing the emergence of transparency and presence.
- **Task 1.2: Testing transparency and presence in dataworlds** (Task Leader: UOS, Other partners involved: UPF, ENS)
    - Objective: To perform experiments monitoring autonomic and neural signals to test the model developed in task 1.1.
- **Task 1.3: VR technology for creating 'virtual synaesthesia'** (Task Leader: UPF. Other partners involved: UOS, BME)
    - Objective: To develop VS technology by inserting cross-modal correlations into data-worlds in order to facilitate exploration and discovery.
- **Task 1.4: Autonomic responses underlying emotional salience** (Task Leader: UPF. Other partners involved: UOS, ENS)
    - Objective: To measure and characterize autonomic responses to salient features in VR situations involving concrete and abstract environment.
- **Task 1.5: Decoding of neural activity predicting intentions and discovery** (Task Leader: ENS. Other partners involved: UOS, UPF)
    - Objective: Use EEG to investigate neural markers of awareness of intentions using readiness potentials and support vector machines.
- **Task 1.6: Subliminal stimulation** (Task Leader: ENS. Other partners involved: UPF, UOS)
    - Objective: Investigate how subliminal stimuli can guide navigation and decision making in virtual environments
- **Task 1.7 Functional brain mapping during mixed reality experience** (Task Leader: EKU. Other partners involved: UPF)

- Objective: use real-time fMRI (rtFMRI) to control activity in anterior insula and/or superior temporal sulcus and assess effects on subjective sense of presence.

- **Task 1.8 fMRI-BCI to navigate in CeXperience Induction Machine space** (Task Leader: EKU. Other partners involved: UPF)
  - Objective: To combine BCI technology with the XIM technology in an fMRI context, to allow navigation through the XIM environment.
- **Task 1.9: Interfacing of WP1 to CEEDS system** (Task Leader: UPF. Other partners involved: UOS, ENS, EKU)
  - Objective: Ensure integration.

2.1.2 Progress towards Objectives

These are presented below as they were reported by partners at the request of the Coordination Office (at each quarter).

2.1.2.1 Q1

- **T1.1**

  UOS identified via a preliminary literature review important factors to include in a theoretical model of presence and transparency. In particular, UoS identified important questions as to whether (i) sensorimotor prediction, coherence, and expectation matching, and/or (ii) elicitation of appropriate emotional responses are necessary and/or sufficient for generating presence. An initial theoretical framework will be developed around hierarchical Bayesian networks implementing 'free energy minimization', a process whereby network plasticity acts to ensure that top-down predictions are matched by bottom-up sensory input (predictive coding). UOS will examine how this framework can incorporate emotional responses in an integrated model of presence. Further development of the model will require dedicated CEEDS effort: UOS is currently advertising for a CEEDS-funded PDRA (closing date Feb 24, expected start May 2011).

- **T1.3**

  This task is scheduled to start in month 6. However, in Q1 UOS and BME have been in contact regarding a possible implementation of virtual synaesthesia VS using letters of different spatial frequencies.

- **T1.6**

  This task is scheduled to start in month 6. However, in Q1 ENS has commenced an initial literature review surveying the scope of the problem.

- **T1.7**

  This task was scheduled to start in month 6. Although there is no progress to report, UOS and EKUT have discussed modifying the objectives of this task to better address central CEEDS objectives.

2.1.2.2 Q2

- **T1.1**

  UOS continued background work on identifying basic components of a theoretical model of presence. Two PDRA outstanding candidates were identified. The most outstanding may not be able to start until Sep 2011, in which case progress on WP1.1 will likely be delayed by a few months. Final decisions on the appointment will be made within 1 month.

- **T1.3**

  The task is scheduled to start in month 6. Discussions between UOS and UPF have identified this task as a possible high priority target for generating rapid experimental results.

- **T1.5**

  This task started in month 6. ENS focused on the recruitment of an engineer specialized in EEG measurements. Leonardo Barossa will join our team in April 2011 and will focus on sources localisation and multivariate analysis methods (e.g., support vector machine) as described in the Down. ENS also started to review the different toolboxes available for performing this kind of analyses.

- **T1.6**

  This task started in month 6. ENS acquired the Poser© software for 3D figure design and animation, and started the construction of avatar faces with different emotional expressions, in order to present pleasant vs. unpleasant stimuli (e.g., happy vs. fearful face) as described in the Down. [UOS note: need to ensure effective cooperation with UPF on stimuli generation]

- **T1.7**

  This task is scheduled to start in month 6. However, UOS and EKUT proposed modification of the objectives of this task to better address central CEEDS objectives. The new title replaces the previous title 'Functional brain mapping during mixed reality experience'. The main objective of this task, exploring the link between multisensory integration and sense of presence, was not changed. Exploratory fMRI studies will be devoted to assess how spatio-temporal properties of visual stimuli and their predictability generate and modulate presence (specific protocols will be presented in the next report) and thus to reveal specific patterns of brain activity underlying such mechanisms. Level of immersion can be modulated using parametric paradigms where spatio-temporal properties (e.g. temporal delay, synchronization etc.) are varied in a linear/non linear fashion and by gradually increase the participant's stimulation (i.e. from unimodal to multimodal). Furthermore real-time fMRI studies will directly test the impact of brain regions supposedly critical for the feeling of presence such as the anterior insula (AI) and the superior temporal sulcus (STS). Learned modulation of AI is hypothesized to impact presence through changes in emotional appraisal of homeostatic information whereas the acquired control of the activity in the superior temporal sulcus is hypothesized to modify the ability to integrate multimodal sensory information. This work will directly assess the relative contributions of emotional responsivity (insula) and multisensory integration (STS) to presence, which represents a milestone of CEEDS engine.

- **T1.8**

  This task is to start in month 6. UOS and EKUT proposed modification of the objectives of this task to better address central CEEDS objectives. The title has been changed from 'fMRI-BCI to navigate in CeXperience Induction Machine space' and will now focus on the subliminal perception of emotional stimuli. Subliminal perception of emotional stimuli is thought to reflect the activation of automatic affective processes however we still lack a clear understanding of the neural mechanisms and the environmental factors influencing the extent of unconscious emotion processing. Recent research has shown that non-conscious responses to masked stimuli can be observed in sensory cortices throughout the first 300 ms following stimulus presentation, but do not induce neural activity over longer periods or large distances in the brain. This suggests a quickly dissipating feed-forward wave that is insufficient to elicit conscious experience. In contrast, conscious processing of unmasked stimuli is accompanied with sustained prefrontal activity, increases in phase synchrony between distant brain regions, and enhanced causal interactions between sensory and prefrontal cortices. In light of these findings, we aim to investigate whether the threshold for conscious perception of emotional stimuli can be lowered by instrumental learning of relevant brain responses. Specifically, we want to test if real-time contingent feedback of neural activity in regions relevant to the processing of emotional stimuli can lead to reward-based enhancement of this activity, and whether this in turn can influence access to conscious awareness. To this aim, we

propose experiments in which healthy individuals will undergo instrumental conditioning of BOLD activations measured by fMRI in emotional and attentional brain networks. Participants will be trained to selectively amplify activity in these regions in the presence of certain classes of subliminal emotional stimuli with contingent monetary reward based on real-time fMRI measurements. The threshold of conscious access to emotional stimuli will be tested with both objective and subjective tests, before and after instrumental conditioning, to evaluate the effect of learned changes in neural responses on the conscious perception of emotional stimuli. [UOS comment: need to ensure effective integration with ENS here]

- **Contact with ARS Electronica, Linz, Austria**. UOS has established contact with ARS Electronica at Linz (AEL), an organization specializing in public-facing and research-oriented new media and science/art interaction. Of particular interest is their '**Deep Space'** project (WWW), which is currently among (if not the) world leading projection environment. Deep Space has 8 1080p HD active stereo Barco Galaxy NH12 projectors, 4 directed at a large 16x9m wall, and 4 at the floor (also 16x9m). The wall resolution is 2160x3840px. Image blending is seamless and 3D is exceptionally sharp and deep. (Viewers must wear active LCD goggles). Laser rangefinders locate subjects within the space and the entire system is interactively controlled via an iPhone.
    - Deep Space may provide a useful template for driving technology development in WP4 in particular in moving beyond CAVE environments.
    - Deep Space itself could be used to test data projection prototypes, in collaboration with AEL.
    - AEL are generally open to interaction and may be very interested in interacting specifically with CEEDS. UOS (Seth) has met with the museum director (Christian Kerman) and established further contacts with the overall AEL director, and the leader of the associated 'FutureLab' research group.
    - CEEDS consortium should consider the potential of inviting AEL to join the consortium, and whether any budget could be redirected to support joint work there. Of note, AEL have a festival in the first week of September every year, which could furnish an excellent venue for dissemination.

2.1.2.3 Q3

- **T1.1**

  UPF have carried out validation and modelling of the 'validation gate' hypothesis that distinguishes between relevant and irrelevant regions in task space that trigger resource allocation combined with a three tiered processing system expressed in fast and slow saccades and conscious decisions. This study provides a basis for experiments as described in Task 1.8. UOS have developed a preliminary model of conscious presence, illustrated in the figure below. This model proposes a possible mechanism, based on hierarchical Bayes, by which agency and interoception (emotion) combine to generate presence. This model will be developed over the next months. UOS have also hired a PDRA, Keisuke Suzuki, who will start work on the CEEDS project on Sep 01 2011.

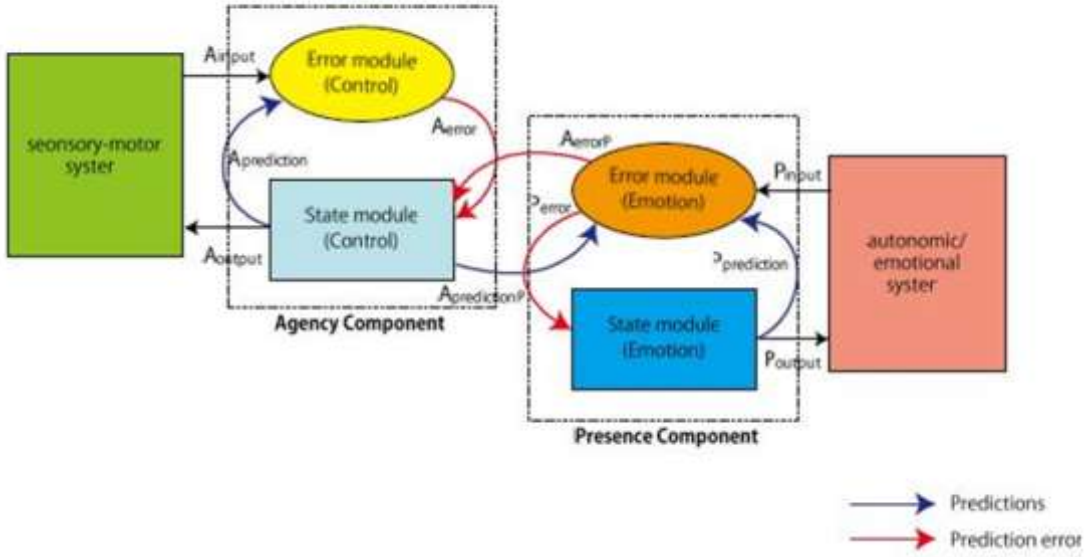

Fig. 1 - *Computational model of presence*

- **T1.2**

  UOS have identified a new technology, **substitutional reality** (SR), which can be used to test transparency and presence. SR involves a combination of head-mounted VR goggles (e.g., the Vuzix VR920) with a forward facing camera, head-motion tracking, and a spherically panoramic video camera (e.g., the LadyBug 3, as used by Google street-view). The key to SR is that a subject can look freely around an environment while the experimenter toggles between live feed from the forward-facing camera and a prerecorded feed using the LadyBug 3 camera. By manipulating the prerecording we can experimentally test presence in a variety of environments and with a variety of manipulations. The new hire Suzuki is experienced in SR.

- **T1.3**

  UPF have continued development of an integrated audio-visual stimulus generation and interaction system using Unity and SMuSE.

- **T1.4**

  UPF have conducted evaluation of physiological responses (GSR, breathing, ECG) to a standardized library of emotional images and a standardized facial expression dataset. Thie evaluation has including the use of the BCI2000 analysis tools. UPF have also carried out a comparison of wearable physiological sensing systems with standardized methods. These steps constitute a necessary prerequisite to the experimental phase of Task 1.4.

- **T1.5**

  ENS has been focusing on reviewing the methodological literature on EEG measurements focusing on sources localisation and multivariate analysis methods (e.g., support vector machine) as described in the DoW. ENS has been in particular studying how the upcoming protocols will be constrained by what can and what cannot be done with this kind of methods.

- **T1.6**

  ENS has been working on the construction of a 3D labyrinth using the Blender© software. ENS is now preparing the experiment to test whether navigation in a virtual maze can be biased through subliminal stimulation, using both behavioural (direction) and electrophysiological (EEG) indices.

- **T1.7**

  This task started in month 6. A review of the literature as well as discussions between EKUT, UOS, and UPF indicated that empirical assessment of the influence of predictive coding and free-energy minimization on the experience of presence would yield important insights for CEEDS in general and Task 1.1 in particular. UPF has provided a previously tested psychophysical protocol which EKUT and UPF are currently adapting for fMRI experiments (the validation gate experiment describned in Task 1.1). The experiment will require high-quality recordings of eye-movements; efforts so far have shown that such recordings are possible (although not trivial) at EKUT. Pilot measurements at EKUT will start in Q4. Zenon Mathews from UPF will visit EKUT to facilitate development of this study.

- **T1.8**

  This task started in month 6. Discussions between EKUT and UOS indicated an important gap in the literature on subliminal perception: While it is generally assumed that posterior parietal and lateral prefrontal cortices play a crucial role in conscious perception, empirical evidence for this assumption is largely correlational. Recent efforts using transcranial magnetic stimulation have begun to shed light on the causal involvement of these areas in (non-)conscious perception. However, it remains to be shown that similar effects can be obtained using voluntary regulation of activity in prefrontal and posterior parietal regions. UOS has provided an experimental protocol which EKUT is currently adapting for a neurofeedback study using real-time fMRI. Pilot experiments will start in Q4. Adoption of this study as the key element of Task 1.8 requires the approval of the PCC; it represents an evolution in design and specific objectives from Task 1.8 as described in Q2.

2.1.2.4 Q4

- **T1.1**

  UOS has further developed the computational model described in Q3 (task 1.1) to the state of a submittable research paper, comprising deliverable D1.1: abstract model of the dataflows underlying telepresence. The paper title is 'An interoceptive predictive coding model of conscious presence' and the abstract is given below:

  We describe a theoretical model of the neurocognitive mechanisms underlying conscious presence. The model is based on interoceptive prediction error and is informed by predictive models of agency, general models of hierarchical predictive coding in cortex, the role of the anterior insular cortex in interoception and emotion, and cognitive neuroscience evidence from studies of virtual reality and of psychiatric disorders of presence, specifically depersonalization/derealization disorder. The model associates presence with successful 'explaining away' by top-down predictions of interoceptive signals evoked by afferent sensory signals and by autonomic regulatory signals. The model connects presence to agency by allowing that predicted interoceptive signals will depend on whether afferent sensory signals are determined, by a parallel predictive-coding mechanism, to be self-generated or externally caused. Anatomically, we identify the (right) anterior insular cortex as the likely locus of the relevant neural mechanisms. Our model integrates a broad range of previously disparate evidence, makes specific predictions for conjoint manipulations of agency and presence, and represents a step towards a mechanistic account of a fundamental phenomenological property of consciousness.

- **T1.2**

  Keisuke Suzuki, the new PDRA familiar with the **substitutional reality** (SR) technology, will start work on the project on Sep 12 2011.

- **T1.5**

  ENS has been working on the design of an EEG protocol relying on support-vector machine and navigation in a virtual maze (common to task 1.6). In this protocol, participants are required to decide which direction to take (left or right) at the end of

alleys in the virtual maze and scalp EEG are used to infer, at this stage, which direction will be taken before a button press by subjects. Neural markers of upcoming motor intentions will consist of lateralised readiness potentials. ENS has started to build the computational tools to analyze support-vector machine algorithms for the classification of this type of neural events.

- **T1.6**

  ENS has continued working on the construction of a 3D labyrinth using the Blender© software, improving it, now connecting it with the gaze-contingent eye-tracking system and working on the parameters for an efficient gaze-contingent substitution of crowded navigational cues. ENS has been also working on setting up a partially immersive environment by acquiring a very large 3D screen in a fully obscure room, rather than a head-mounted system in order to run the upcoming experiments. This was mostly related to the difficulty of directly obtaining a head-mounted system combining also a high-resolution eye-tracker for gaze-contingent substitution. These types of systems are not conventional but a prototype can be constructed for the purpose of this project. ENS is in relation with several companies in order to find out what would be the best solution. Until then, the experimental tests for task 1.5 and 1.6 will be done with this partially immersive environment. ENS estimates that this setup, although partially immersive from a technical point of view, actually allows a strong feeling of presence and psychological immersion in the virtual maze.

- **T1.7**

  EKUT conducted preliminary tests of the eye-tracker system in the MR settings to assess high sampling frequency capability. Results indicated that eye-tracking is feasible at 120 Hz, but requires individual fine-tuning. EKUT then performed preliminary combined eye-movements and fMRI recordings during a psychophysical experiment using a displacement detection task that was previously tested at UPF. This fMRI study investigates the neural correlates of bottom-up and top-down processes of human conscious perception. Behavioral and fMRI data are currently being explored.

- **T1.8**

  EKUT performed a real-time fMRI based neurofeedback pilot experiment to assess voluntary regulation of PFC. Participants underwent a first functional localizer session to delineate the target regions in the prefrontal cortex followed by three rtfMRI regulation sessions where they were required to learn to increase and decrease BOLD activity in the left and right PFC. One participant was tested to learn regulation of correlational activity of PFC and PPC. Preliminary results indicate that self-regulation of PFC only is achievable through the combination of mental strategies (e.g. participants focused on their own thoughts) and contingent feedback in few training sessions. Regulation of correlational activity of PFC and PPC might require additional effort and further training sessions. EKUT is currently integrating the protocol provided by UOS (visual discrimination task as in Rounis et al. 2010) with the rtfMRI neurofeedback protocol. Such integration would allow EKUT to directly assess the effect of self-regulation of PFC on (non-)conscious perception.

2.1.3 Deviations from the Project Work Programme

2.1.3.1 Q1

- As discussed at the kick-off meeting and the previous PCC meeting, tasks 1.7 and 1.8 as written seem slightly off target (1.7) and/or infeasible (1.8). UOS have discussed modifications of these tasks to better pursue central CEEDS objectives. These proposals were broadly approved by the PCC but await confirmation from the scientific director. In short, it was suggested that EKUT replan their fMRI studies to more directly test the impact of rtFMRI on anterior insula cortex and superior temporal sulcus with respect to influences on subjective sense of presence. This work would directly assess the relative

contributions of emotional responsivity (insula) and multisensory integration (STS) to presence.

2.1.3.2 Q2

- T1.7 and 1.8 have been revised as described in 2.1.2.2 above.
- Suggest swapping responsible partners for tasks 1.1 and 1.2; UOS to report on 1.1, UPF to report on 1.2. Needs to be confirmed by PCC.

2.1.3.3 Q3

- T1.7 and T1.8 have been further revised. Task 1.7 has been extended to include the 'validation gate' experiment developed by UPF. Task 1.8 now focuses on a neurofeedback study using real-time fMRI to allow subjects to control activity in the prefrontal cortices. The objective is to complement existing research showing the PFC is selectively involved in subjective not objective judgements about stimulus identity and presence, i.e., it is a key node in a network underpinning conscious presence. Previous interventional studies have been limited to TMS; NF will provide a very valuable complement because one can both downregulate and *upregulate* activity. Moreover, NF on PFC is itself an underexplored area of considerable basic interest.

2.1.3.4 Q4

No deviations to report.

2.2 WP2 - CEEDs Sensing System

2.2.1 Work Package Objectives

The work package is responsible for the development of the core body machine interface (BMI) which includes the remote sensing platform and instrumented patches, the sensor modules, the real-time algorithms and the portable devices to gather parameters correlated to general cognitive user states and activity (e.g. speech processing, eye gaze and EEG). The core BMI will include textile and non-textile sensors, and wearable electronics with the aim of acquiring physiological as well as gestural and physical activity measurements, without interfering with the individual both in terms of comfort and motivation. One major step in this WP will be to integrate into a unique sensing system physiological, behavioural and brain signals.

WP2 comprises the following tasks:

- **Task 2.1: Unobtrusive Physiological signal wearable acquisition system** (Task Leader: UDP. Other partners involved: UPF)
    - Objective: To develop a wearable unobtrusive system able to acquire physiological parameters: Hearth Rate (HR), Heart Rate Variability (HRV), Breathing Rate (BR), Electro Dermal Response (EDR).
- **Task 2.2: Movement and gesture wearable acquisition system** (Task Leader: UDP. Other partners involved: UPF)
    - Objective: To design and develop the gestural Body Movement Interface. In particular, it will be conceived of: (1) upper limb interface for 3D gestural navigation; (2) hand interaction interface.
- **Task 2.3 Integration, pre-processing and transmission of physiological and movement parameters** (Task Leader: UDP. Other partners involved: UPF)
    - Objective: To design and develop a unique integrated interface that will include physiological (Task 2.1) and motion (Task 2.1) interfaces.

- **Task 2.4: Eye gaze acquisition system (HATCAM)** (Task Leader: UDP. Other partners involved: UPF, UAU)
    - Objective: To design and develop a wearable interface able to detect subject eye gaze (in terms of Subject point of view image and gaze X, Y points referred to the given image).
- **Task 2.5: Speech acquisition system and processing** (Task Leader: UAU. Other partners involved: UDP)
    - Objectives: To combine speech recognition with vocal emotion recognition.
- **Task 2.6: Brain signal recording and analysis** (Task Leader: EKU. Other partners involved: UPF, UDP)
    - Objectives: To assess whether EEG and/or NIRS techniques are appropriate as portable/wearable brain signal recordings instruments to be integrated in the CEEDs engine.
- **Task 2.7: Higher level processing of user responses to the interfacing to CEEDS engine** (Task Leader: UAU. Other partners involved: UPF, EKU, UDP).
    - Objectives: To perform an overall high level processing of user responses in order to extract relevant information for the CEEDs engine.

2.2.2 Progress towards Objectives

These are presented below as they were reported by partners at the request of the Coordination Office (at each quarter).

2.2.2.1 Q1

- **T2.1**

  As decided during the kick-off meeting, UDP has purchased from Smartex the current version of the physiological sign garment. The garment has one ECG lead (two electrodes) that is used for HR and HRV extraction and a piezoresistive textile sensor that relieves BR by measuring chest deformations due to respiration activity. A dedicated wireless (Bluetooth) electronics performs analogue pre-elaboration and on line signal processing for parameter extraction. An on board tri-axial accelerometer is used to obtain subject inclination (with respect to the absolute vertical) and a rough activity classification (subject not moving, walking or running). Elaborated data (HR, HRV, BR, activity) or raw signals (ECG, accelerometer, breathing sensor) are sent to a remote PC. Four electronic systems and different garment kinds have been purchased (short sleeve shirts, chest bands and bras). Each kit comprehends monitoring software for visualization and data storage, and a software library. One physiological garment has been delivered to UNIPD for preliminary testing and personnel training. In the second PCC meeting, it has been decided to deliver the other systems to UPF, Goldsmith and BME.

  Concerning the ElectroDermal Response (EDR) system, this first quarter was focused on a preliminary system design. Indeed, a study of the state of the art of the EDR systems currently present in literature was carried out as well as the first concepts of the design were fixed. In particular, as result of the study a non-standard methodology as well as a non-fixed biological site (hands and feet), for EDR acquisition, were found. In addition EDR could be detected in several modalities such as Skin Conductance Response (SCR), Skin Admittance Response (SAR), Skin Resistance Response (SRR), and Skin Impedance Response (SIR). Currently, main design concepts are:

    - use of non-dominant hand as physiological site;
    - implementation of a glove with integrated textile electrodes;
    - low power consuming
    - wireless communication

- **T2.2**

  The activity of the current quarter was focussed on the preliminary design of the gestural body motion sensor system that will include both an upper limb and a hand interfaces.

  The upper limb interface will be able to create a correspondence between a local frame fixed to the end-effector (the human hand) and a virtual frame in the imagine space. This system has been conceived as a minimal set of IMUs[1] (2 units) and a CE[2] based smart shirt. The combined use of IMUs and textile deformation sensors will be exploited, in a sensory fusion approach, in order to perform a real time extraction of gestural data. In a first internal prototype, the shirt CE sensor topology is very close to the one described in[3]. For a more advanced prototype release the shirt will be redesigned according to the project requirements and the testing results. The IMU positions on the garment have been identified: one IMU will be positioned on the posterior side of the wrist (proximal with respect of carpal bones) in order to maximize information on forearm movements and hand orientation. The other one will be positioned on the medial surface of the arm, proximal and close to the medial epicondylus of the humerus.

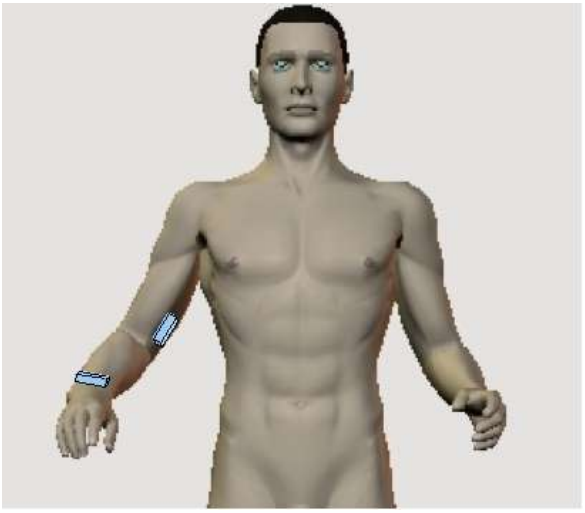

Fig. 2 - *Possible inertial sensor positioning*

The IMU hardware has been designed and it is composed of: a 3-axis magneto-resistive sensor and 3-axis MEMS accelerometers (Honeywell HMC6343[4]), the digital support circuits and a wireless (ZibBee) interface.

The hand interface will consist of a CE sensing glove[5], the glove maps local fabric deformation due to user hand movements into hand posture/gestures. Within CEEDs, the sensing glove will be devoted to recognize finger positions and/or gestures in order to detect significant grasp and pinch for the project aims. Previous studies demonstrated the

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1 Inertial Measurement Unit

2 Conductive elastomer

3 Giorgino et al.:"Sensor evaluation for wearable strain gauges in neurological rehabilitation". IEEE transactions on neural systems and rehabilitation engineering 2009; 17(4):409-15.

4 http://www.magneticsensors.com/products.html

5 Tognetti et al: Body segment position reconstruction and posture classification by smart textiles; Transactions of the Institute of Measurement and Control , 29 (3-4), 215-253, 2007

possibility of using the sensing glove to reconstruct static postures and measure joint angles by using algorithms based on multivariate interpolation or neural networks. The drawback of these techniques was the consistent calibration effort which may bind the use of such devices in practical situations. The activity in the current quarter has been focussed on the development of dedicated algorithms for the extraction of hand gestural information with minimal (only two positions) or no calibration efforts.

- **T2.3**

  According to the DOW this task will start at month 13.

- **T2.4**

  The activity of the current quarter was focussed on the preliminary design of the Wearable Eye Gaze Tracking system (WEGT), which will permit free user movements. In addition, a feasibility study was carried out, which has highlighted the major restriction points to have a system able to satisfy the objectives of the project. As result of the study three issues are detected: the "absolute head position" problem, which represents the greatest limitation for most of the eye gaze trackers; environment illumination; and real-time elaboration.

  Concerning the preliminary design, Video OculoGraphy (VOG) tracking technique has been chosen being minimally invasive, in fact the eye movements are achieved by processing the image of the eyes. Moreover, a deep study of the environment of application was done to evaluate the pupil tracking method, which could be dark or bright pupil. In our case, being the environment equipped by IR illuminator a dark pupil method has been chosen taking advantage of the natural illumination provided by the environment.

  Principles of the design can be summarized as follows:

  - wearability;
  - minimal obtrusiveness;
  - eye and head tracking capabilities;
  - wireless communication;
  - Video OculoGraphy (VOG) technique;
  - real-time elaboration;

  Following these principles the first prototype will be equipped with a wireless CMOS camera (CP294) characterized by lightweight (20g), minimal volumes (2x2x2 cm), and a wireless Inertial Motion Unit that provides three rotation euler-angles of the head.

- **T2.5**

  As a first step, UAU has been in search for speech recognition software to combine with EmoVoice system. EmoVoice is a tool developed by UAU for real-time recognition of emotions from acoustic properties of speech. Features based on pitch, energy, MFCCs, duration, voice quality and spectral information are extracted and classified with help of a previously trained classifier. However, so far EmoVoice is not using any word information. By including linguistic features as a second channel recognition accuracy may improve.

  Some requirements of the speech recognition software are speaker/gender/age independence and availability of pre-trained models in different languages. Since the main focus of CEEDS is on the affective content (as opposed to a comprehensive analysis of the spoken content), a garbage model to capture words that are not of relevance to the domains under consideration would be of great benefit. To increase robustness, there should be the possibility to switch the list with key-words on-the-fly depending on the current system context. Finally, an API is highly appreciated to allow a smooth integration with EmoVoice and other recognition components.

  After intensive tests with different systems, UAU decided in favour of the VoCon 3200 Embedded Development System (v3.4) from Nuance (http://www.nuance.com/). VoCon EDS is a SDK that contains the VoCon state of the art embedded speech recognition

system. It also offers a number of useful development tools, such as a user dictionary editor or audio data collector.

VoCon supports BNF+ (Backus-Naur Form) grammars, which have been developed to formally define the grammar of a language without ambiguity and hence is well suited for our demands as it gives us the possibility to exactly define which words are allowed, i.e. can be recognized, and which not, i.e. will be ignored. The following is an example of a BNF+ grammar to recognize keywords with positive affect:

!grammar Positive;

!language "American English";

!start <start>;

<start>: <...> <keywords> <...> <keywords> <...>;

<keywords>: happy | good | lucky | great | fine | well | awesome | cool | amazing | positive | best | delightful | exciting | <NULL>;

The definition of richer grammars will be among UAU's next tasks. This will also include the incorporation of so called anti-keywords. Anti-keywords are words with a pronunciation similar to one of the keywords. Including these words to the grammar, i.e. allow the recognizer to match them, decreases the risk of false-recognitions. Nuance offers tools to automatically determine possible candidates.

- **T2.6**

  During the kick-off meeting, EKUT highlighted the difficulty to measure EEG and NIRS signals in a subject experiencing CXIM environment during walking as this situation would generate strong movement artefacts not easy to be corrected and rejected. EKUT is therefore considering as ideal scenario a human participant in a sitting position centred in the CXIM environment. Moreover the current technology of both EEG and NIRS wearable systems is limited in terms of spatial resolution and consequently of potential brain information to be derived. In this first quarter EKUT started defining potential protocols for EEG and NIRS acquisition to be used for integration of brain signal recording and analysis tools in the CEEDs engine. The protocols under consideration allow participants to perform upper limbs movement while experiencing virtual reality environment. Before assessing capabilities of EEG/NIRS to capture CEEDs relevant information EKUT intend to test our EEG/NIRS setup using a lower level VR environment using VR goggles.

- **T2.7**

  For this task UAU start from our Social Signal Interpretation (SSI) framework. SSI offers tools to record and analyse multimodal signals in real-time. Following a patch-based design pipelines are set up from autonomic components and allow the parallel and synchronized processing of sensor data from multiple input devices. In the course of the project SSI will serve as development platform to integrate low-level signal aggregation and high-level information extraction. This involves also the integration of newly developed sensor devices by UDP and EKU.

  During the kick-off meeting, an initial discussion on the high level processing of physiological, motion and behavioural data was performed (UDP, UAU, EKU). In order to better define the process an internal document describing wp2 data exchange and protocols has been produced by UDP and sent to the other partners. In the next quarters the high level processing strategy will be defined.

  First analyses have been performed by UAU to recognize user interest from eye gaze and linguistic information focusing on grounding mechanisms as an important indicator of user attention.

2.2.2.2 Q2

- **T2.1**

  Concerning the ElectroDermal Response (EDR) system, this second quarter was focused on the research of the best method to detect the EDR. Since no standard modality is actually present in literature we aimed at comparing commercial laboratory systems, which are commonly designed in continuous wave stimulation, with safer systems in alternating voltages/current stimulus. In fact it is well-know from the literature, that alternating modality take into account many advantages in terms of reduced electrode polarization, reduced electrolyse of the skin, reduced disturbs of the measurement by possible varying electromotive forces (EMFs), and avoiding the registration of the skin endosomatic DC potential. More in detail, we aimed at developing the preliminary system prototype for EDR acquisition through an alternating tension stimulation. Hence, the system is able to provide Skin Admittance Response (SAR) as result.

  Following a simulation phase, a printed circuit board (PCB) has been made. The circuit power is supplied by batteries that allow developing the characteristic of portability. The PCB can be considered constituted of three parts:

  - the first part generates the stimulation through a function generator, which provides AC voltages of different amplitudes and wide frequency range;
  - the second part acquires and conditions the EDR information;
  - the third part converts the output into digital information and sent it to a remote station by wireless modality.

  Concerning the wearable physiological signal acquisition systems, UDP sent 4 packages (containing 3 different type of garments, 1 electronic unit, 1 Bluetooth dongle, user guide and connection cable) to selected CEEDS partners (Goldsmiths, UNIPD, UPF, BME). These partners are testing the wearable systems using a preliminary version of the acquisition software (compiled binary code) included in the installation CD that allows visualization and off-line elaboration of acquired data. Moreover, UDP developed a minimal acquisition software release (c# VS2010 project) for BME allowing them real time access to acquired physiological signals. UNIPD was trained in December 2010 on the use of the wearable physiological acquisition system by UDP staff.

- **T2.2**

  Starting from the preliminary design of last quarter, the IMU hardware PCB has been realized and preliminary tested. The device correct functionality (power supply, interconnections, wireless transmission) has been assessed. The device firmware is under development: in particular the routines for the management of the I2C communication between the MEMS devices and the microprocessor are under development. In its final version the wireless sensor will be able to transmit the complete orientation matrix (or the three Euler's angles) as well as the three accelerometer components. The main sensor specifications are: heading accuracy 2°, pitch/roll accuracy (1°), 100 m transmission range. The sensor benchmark with respect to a reference device will be performed in the coming quarter. Regarding textile interfaces based on piezoresistive CE sensors, UDP is up-dating the models that describe the variation of sensor resistance with respect of the applied deformation. Regarding the upper limb interface of Fig. 2 - , the strategy for enhancing the overall recognition performance through sensory fusion between inertial and CE based sensors is under development. In particular, we are focussing our work on an elbow flexion detection experiment that use two CE sensors the elbow region (i.e. resistance variation in correspondence of elbow flexion-extension) and two accelerometers disposed as the IMU.

- **T2.4**

  Q2 was focused on the first eye-tracker-prototype development. This prototype was realized trying to follow the issues highlighted in the last report. The preliminary prototype is equipped with a wireless CMOS camera (CP294) characterized by lightweight

(20g), minimal volumes (2x2x2 cm). In particular, in this system version, the inertial platform was not included, due to the fact that we were mainly interested in trying to characterize the prototype in terms of both system capabilities in eyes recognition in different light conditions, and fixing of system weakness (such as power consumption, wearability, wireless communication etc.). In this phase, we tried to replicate the same environment conditions of the final usage. At the end of this phase, this preliminary prototype has shown some lack of eye identification into dark condition, and the same was occurred during high-sunlight condition. Good results were achieved during controlled illumination conditions. Future works will aim at integrating inertial platform for free head movements.

- **T2.5**

  To prepare the combination of paralinguistic and linguistic analysis, UAU has implemented a first prototype of the speech-analysis pipeline, where EmoVoice and VoCon receive audio input from the same microphone. The definition of a fusion model that combines the decisions from both components will be one of UAU's future targets.

  In order to test and evaluate the prototype, an appropriate corpus was recorded and is being annotated (see Task 2.7 for details).

- **T2.6**

  EKUT started to develop a real-time functional NIRS-BCI system based on the Hitachi ETG-4000 device. This system would enable online analysis and feedback of hemodynamic signals from pre-selected optodes The fNIRS-BCI would be based on three separate components: signal acquisition, signal processing and feedback. The fNIRS-BCI would be used to online monitor brain activity during XIM exploration and to potentially provide feedback to enhance VR experience and/or to drive participants' attention to specific scenarios depending on the type of application.

- **T2.7**

  UDP

  UDP is developing a modular multisensory platform for HRI (Human Robot Interaction) and HMI (Human Machine Interaction) studies which allows acquiring the subject's physiological state and behaviour in real-time. The modular structure enables choosing which modules will be included to easily configure a specific set-up based on requirements of the study to be performed.

  The software framework is based on Robotics4.NET which supports the development of software aimed at controlling robots of different nature and provides a communication infrastructure based on XML messages. Robustness is guaranteed by UDP communication protocol which enables easily restoring from failures. The underline structure of Robotics4.NET is inspired from a biological model in which the "body" defines the sensory system acquiring data from the environment and the "brain" is responsible for the behaviour of the platform. The "body" is formed by a set of modules, each of them is dedicated to the acquisition of data coming from a different hardware or apparatus.

  This modular platform is used by UDP as preliminary data integration system for the acquisition of subject's physiological signals, gesture, eye gaze and video using sensing garments and wearable devices.

  UAU

  UAU's former experiments have shown that humans express their emotions rarely exclusively, but through various channels such as speech and mimics. A correct interpretation is only possible if information of all sources is combined. In the optimal case, modalities will carry complementary information and improve the robustness of the recognition. However, situations may occur where a channel takes up a contrary position or fails completely. Dealing with conflicting results and handling of missing data are problems, which have been widely neglected in previous studies in the field of multi-modal emotion recognition. This is mainly because multi-modal emotion databases are usually recorded under too optimistic assumptions, which do not necessarily meet the challenges under realistic conditions. Often professional actors are asked to express

emotions in a prototypical manner, which leads to exaggerated expressions. Such clear emotions do hardly occur in human interaction, which is dominated by subtle and non-prototypical emotions. In order to collect more realistic data subjects must not know about the actual objective of the study. Instead, a setup is required, which tries to elicit the desired emotions, e.g. a Wizard-of-Oz scenario. Such a procedure is more time-consuming, not only in planning and conduction, but also since afterwards thorough annotation by experts is required. Nevertheless, this constitutes a reliable way to obtain data that is similar to what can be expected under realistic conditions.

The lack of multimodal databases with spontaneous emotions has encouraged UAU to conduct an appropriate experiment. UAU decided to rely on a quiz scenario similar to the quiz shows in television, where subjects answer a series of multiple choice questions. In order to engage subjects emotionally they were offered the possibility to win cash. However, for an incorrect answer the value of the question is subtracted from the balance. To distract participants from the actual objectives they were told that this was a general knowledge test. In order to invoke a broad range of positive and negative reactions the quiz was divided in three periods: during the first period questions were asked, which are very likely known by most people. Here, subjects were able to accumulate a high profit. In the second period we increased the difficulty of the questions and introduced a tic-tac-counter to induce stress (the value of the question decreases with time). Finally, during the third period, the system intentionally misunderstood correct answers. Towards the end of the game only a small balance remained if it was not even negative. The experience from a previous similar experiment (three participants only) had shown that subjects indeed follow the intended emotional flow, which leads from a positive, pleased mood to a negative, annoying attitude. This time, 21 subjects in total (around 25 minutes of interaction from each) were recorded and to additional sensor devices were used. Beside high-quality audio and video recordings, three physiological sensors (SC, RSP and BVP) and eye gaze were captured. Annotation process is now underway. The first pass includes a transcription of the spoken utterances and identification of emotional cues in voice and mimics.

Meanwhile, UAU has implemented and tested a wide variety of possible fusion techniques into the SSI framework, such as feature fusion, elaborated decision level combination rules, meta-classification or hybrid-fusion. So far, two corpora have been used for evaluation - the DaFEx and CALLAS corpus. Both include audio-visual recordings of different emotional states. The DaFEx corpus is a purely acted corpus including recordings of 8 professional Italian actors expressing 6 basic emotions and neutral. In contrast participants in the CALLAS corpus have no special acting abilities and were asked to perform expressions in the three broad categories positive, neutral and negative. None of the two corpora includes real spontaneous emotions, but allow for a systematic comparison of the proposed fusion methods. Main objective of this study was to investigate the general potential of multi-modal fusion compared to single channel emotion recognition and to get hints on benefits of certain fusion schemes or even their interchangeability for future studies. In case of the CALLAS corpus we observed the case that sometimes subjects were not looking to the camera. Instead of eliminating such samples beforehand we equipped all fusion techniques with the strategies to handle missing information in some of the channels. In order to compare results obtained by single channel with the multimodal approach UAU came up with a novel visualization technique (see Figure 1). So far, the obtained results show that after all sophisticated ensemble strategies bare the potential to outperform more simple ones, but success is not guaranteed. Differences in accuracy tend to be rather small among all considered fusion techniques.

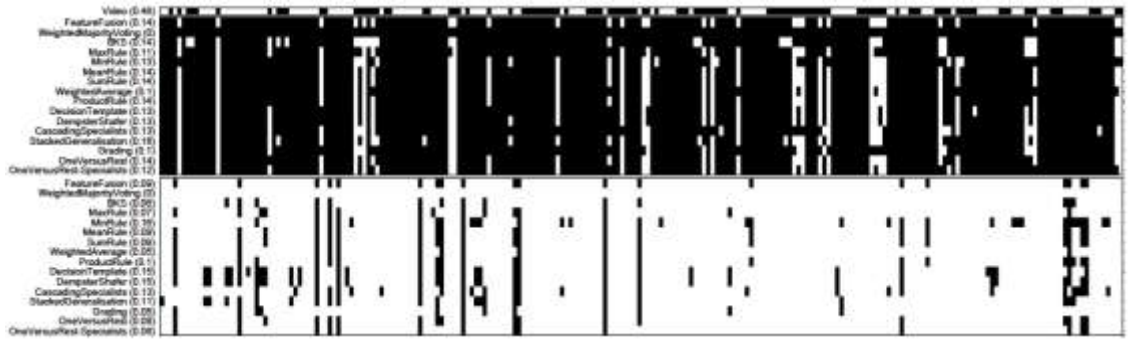


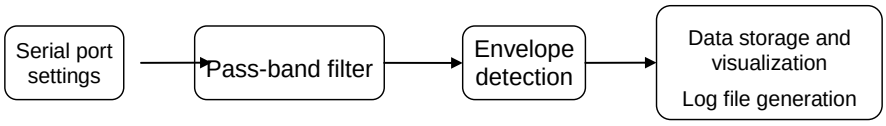
Fig. 3 - *Visualization of recognition improvements and impairs for the first third of the DaFEx samples.*

2.2.2.3 Q3

- **T2.1**

  Regarding the electrodermal response, the third quarter concerns the development of the software interface. The goal is to develop a software library to be integrated in a multi-programming interface and/or in changeable hardware architecture.

  The functions performed by the interface can be summarized with the following flow chart.



  The first software version has been developed with the software LabVIEW (in object oriented Graphic Language) and it can allows to choice a Com Port, which is connected to an Xbee receiver, and its configuration.

  The data is filtered in the range 0.01-2 Hz with a Butterworth bandpass filter. Filtered data are available in both format modulated by the AC signal of stimulation and demodulated by the envelope detector. Modulated and demodulated data are saved in two files, which are readable by Matlab for the subsequent post-processing phase. In the next phase a comparison and checking of correctness of the data will be made to detect the quality of the demodulation, as it is known that a demodulation error could give erroneous data changes that can be misinterpreted as physiological information.

- **T2.2**

  UDP finalized the IMU device designed and realized within the last quarters. The device firmware was implemented on the microprocessor with particular care on the I2c routines for the management of the I2C protocol between the MEMS device and the microprocessor. Moreover, the wireless communication protocol has been defined and implemented. The module has been bench tested and the declared measurement accuracy has been confirmed. Regarding textile interfaces based on piezoresistive CE sensors, UDP has carried out activity on updating the models that describe the variation of sensor resistance with respect of the applied deformation (this information will be used to improve sensor signal processing). In particular, a model that takes into account sensor non linearity and non negligible relaxation time was developed. For the activity on the upper limb interface, first experiment on sensory fusion between CE sensors and inertial devices have been carried out, focussing on the estimation of the elbow flexion by means of two CE sensors and two inertial devices (placed as described in Fig. 2 -). The data fusion strategy was based on the following assumptions:

- Inertial devices perturbations are due to external (environmental) forces and they generate signal spikes (high frequency content with respect to the movement to be detected);
- CE sensor behaviour is complex (above described model), but is not affected by force perturbation; the frequency content is highly correlated with the movement to be detected.

Starting from these assumptions, inertial sensors have been treated by means of adaptive filtering technique. The filter bandwidth was set by means of the CE signal frequency content. As first stage, the fusion strategy was tested on estimation of elbow flexion. The results were encouraging: maximum error of 5 and RMS of 1 degrees (computed with respect to standard electro-goniometers). Further work will be aimed on extending this strategy to other upper limb segments and to use filtered inertial sensor signal to identify the parameter of the CE sensor.

- **T2.4**

  In this quarter, the activity was concerned on the first attempt of inertial platform integration. A first wireless inertial platform with a sampling frequency about of 10 Hz was used. Two main issues are raised. The first was about the sampling frequency of the inertial platform, in fact even though the head movements can be considered slow in the range of the 1-2 Hz, in free condition of movements the inertial platform was not able to follow those movements with a consequent lack of information and erroneous head correction. The second issue to be solved was referred to an interference on the video acquisition, in our hypothesis it was due to the same frequency of communication of the cam and the inertial platform with the remote consol. In the next phase we will try to solve these problems, first a camera with different frequency communication will be acquired, and second an innovative and personalized ad-hoc algorithm of head movement correction will be implemented.

- **T2.5**

  To allow non-experts and application developers to write and edit SSI pipelines with a simple text editor, an XML based language has been developed by UAU, in which each component of a pipeline is represented by a XML element. This will allow the developers of the showcases to adjust and configure pipelines outside of the development environment as re-compilation is no longer required.

  The components of an element are identified through unique class names and option files can be used to adjust their parameters, e.g. the device id of a sensor or the cut-off frequency of a low-pass filter. Elements are connected via pin names that tell the interpreter from which source(s) a component receives input. The following figure gives an example of a pipeline for an affective speech recognizer:

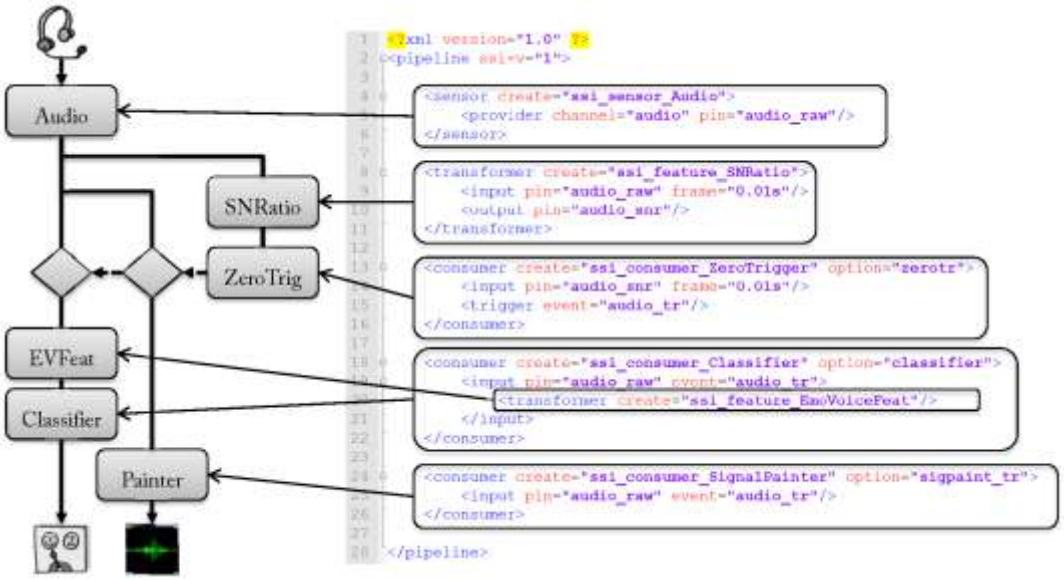


Fig. 4 - *Example of a pipeline for an affective speech recognizer*

The graphic visualizes the association between a flow chart of the pipeline and according XML code. Head of the pipeline is an audio sensor (Audio), which opens an audio input device for recording. The audio stream is published through a pin named audio_raw. Components that need to process the audio stream can connect through this pin. Here, we add a voice trigger, a painter for visualization, and a classifier. To trigger voice activity, we first calculate the signal-to-noise ratio (SNR) from the audio signal (SNRatio). SNR is a measure to quantify how much a signal has been corrupted by noise, where a value greater 0 indicates more signal than noise. Based on this measurement we use a trigger (ZeroTrigger) to find voiced parts in the signal. If voice activity is detected registered components are notified. In our case, the detected speech segments are forwarded to a painter class (Painter) and the classifier (Classifier). While the painter directly displays the raw waveform in a graph, the classifier first extracts a set of affective feature (EVFeat). Based on these features the classifier assigns the input to one of several affective categories. The actual classification model that is used for this task is defined by its option file (here classifier.option). In this way the pipeline definition is separated from details of its components. If at some point the developers of a showcase decide to store the audio stream that is processed by the recognizer they achieve this by adding another Consumer element:

<consumer create=”ssi_consumer_WavWriter” path=”audio.wav”>

<input pin=”audio_raw” frame=”0.2s”/>

</consumer>

- **T2.6**

  EKUT is currently being testing the real-time functional NIRS-BCI system using a block designed motor paradigm. During this test participants are required to perform active hand motor task and hand movements imagery. Optodes are applied sagittally covering the frontal regions, supplementary motor area, and primary and secondary motor and somatosensory areas; all the main areas relevant to upper limbs cortical representation. Based on the international 10-20 system for EEG electrode placement, the vertex (electrode position Cz) was used as a reference point for the positioning of the optodes. Oxyhemoglobin and dehoxyhemoglobin changes are calculated online with a maximum delay of about 6 s.

  A new 4 channels wireless EEG system (ENOBIO, STARLAB) became available at EKUT. A clear definition of specific protocols for XIM environment exploration would allow us to assess the potentiality of this instrument.

- **T2.7**

  According to the development of the previous quarter, UDP finalized and released a preliminary C# version of the physio-shirt acquisition unit. UAU is currently testing this library in their high level processing SSI framework. The following graphic illustrates how signals sent via Bluetooth by the t-shirt (through the SMARTEX sensor) are captured and visualized by SSI.

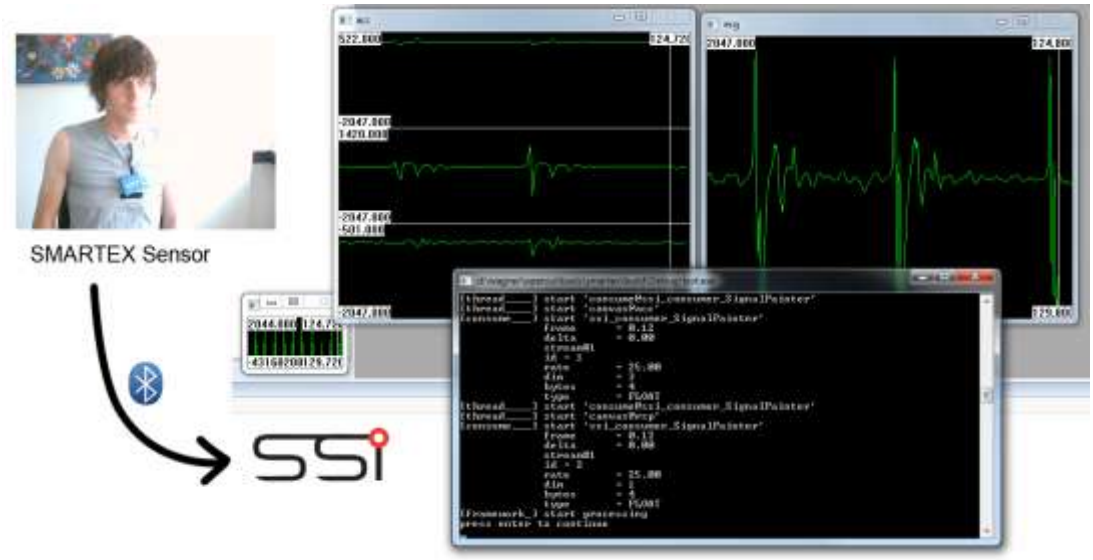


Fig. 5 - *Signals captured and visualized by SSI*

In order to forward the output of a pipeline to the CEEDS engine partners have agreed to use YARP (http://eris.liralab.it/yarp/) as a free and platform independent middleware for data exchange. YARP allows communicating in a peer-to-peer way, with a family of connection types (tcp, udp, multicast, ...). Therefore it has been integrated to the SSI framework and can now be used as any other output component.

2.2.2.4 Q4

- **T2.1**

  Regarding the electrodermal response, the first prototype of the device has been tested in terms of both electrical specification and quality of the signal. The testing part is split into two phases. In the first phase, we tested voltage levels and synchronization of the clock sources, which were essential for the proper electrical functioning, and the induced current value into the body for the stimulation of the subject. Afterwards we tested the power consumption over time and the signal quality. In this latter test, we have also evaluated the quality of data transmitted. In the second phase, we carried put some preliminary testes to compare our device with a gold standard represented by a commercial device. Results are very promising in terms of higher signal amplitude, which means that higher quality information for EDR can be achievable. Future works will be dedicated to the development of a second prototype in which some corrections will be performed in agreement with the results of the tests.

- **T2.2**

  Regarding the upper limb interface, the current period was focussed on the improvement of the algorithms for data fusion between CE inertial sensors. In particular UDP is extending the algorithms tested in the previous quarter to the whole upper limb segments. A test campaign with a CE based upper limb shirt and two inertial devices was performed. Data collected are under elaboration.

  Regarding the hand interface, the activity was focused on the development of dedicated algorithms for the extraction of hand gestural information with minimal calibration efforts (two positions). Linear regression model having hand aperture as dependent variable and

the output of the sensor elements as independent variables.
The calibration effort was extremely reduced: only the sensor status corresponding to the positions of open and closed hand need to be stored.
Good results on flexion-extension of the four long fingers.

Moreover, the first experiments of integration of the CE glove with the wearable haptic display of task 4.6 were performed. Glove signals, treated with the above described algorithm, were used to drive a custom developed 3D hand model used in virtual manipulation experiments as described in "Task 4.6: Wearable Haptic Displays" (Q4).

- **T2.4**

In these months, UDP tested the first system prototype in terms of errors between the points of gaze provided from our system and their real position, in three different condition of illumination (i.e laboratory, sunlight and darkness). The errors were calculated, as eucledian distance, in the plane of the camera. In this plane, a system of coordinates (ÔXY) was fixed at the left top corner. The errors were calculated after the calibration phase, for ten volunteers during which each subject was asked to look at fixed point (see fig.1) whose, xy, coordinates were known. The distribution of the distances was non Gaussian, hence median and dispersion were extracted as parameters of the distribution. In addition, the execution time of the algorithm was calculated to test the real-time condition. It resulted of 0.0224±0.0019 second. Whole experiments were conducted with a normalization of illumination performed by the Discrete Cosine Transform. The table below shows the obtained results.

Illumination condition	Errors in eye gaze point detection
Laboratory	16.214 ± 7.016
Sunlight	16.522 ± 6.641
darkness	16.501 ± 6.595

Future works will be oriented to the head rotation angles integration to get information about the VestibuloOcular Refelex (VOR), which is involved in modifying eye rotation during head movement. This information will be used for correcting eye coordinates inside the camera image plane.

- **T2.5**

Currently, UAU is enriching the available feature-set for real-time audio feature extraction, generated by the EmoVoice SSI component with features inspired by the OpenSmile module, developed at TUM. Integration into the SSI framework is about halfway done.

According to the development of an XML pipeline generator for fast application development for non-experts (see Q3 Task 2.5), a new version of the SSI framework has been tested and released. Ready-for-Use pipelines for recording, pre-training and on-line recognition of emotional audio data have been distributed among partners.

- **T2.6**

EKUT concluded the implementation of a real-time fNIRS system. This system is currently based on the Hitachi ETG-4000 device (but will be also available for the Shimadzu FOIRE-3000 in the near future). It enables online analysis and feedback of hemodynamic signals from selected optodes with a maximum delay of about 6s (see Deliverable 2.1 for further details). An online fNIRS system able to classify ongoing brain signals by a spatio-temporal support vector machine (SVM) is currently been developed. Moreover, a portable fNIRS system (NIRScout, NIRx) will become soon available. This system would allow us to directly test the functionality of fNIRS for XIM integration

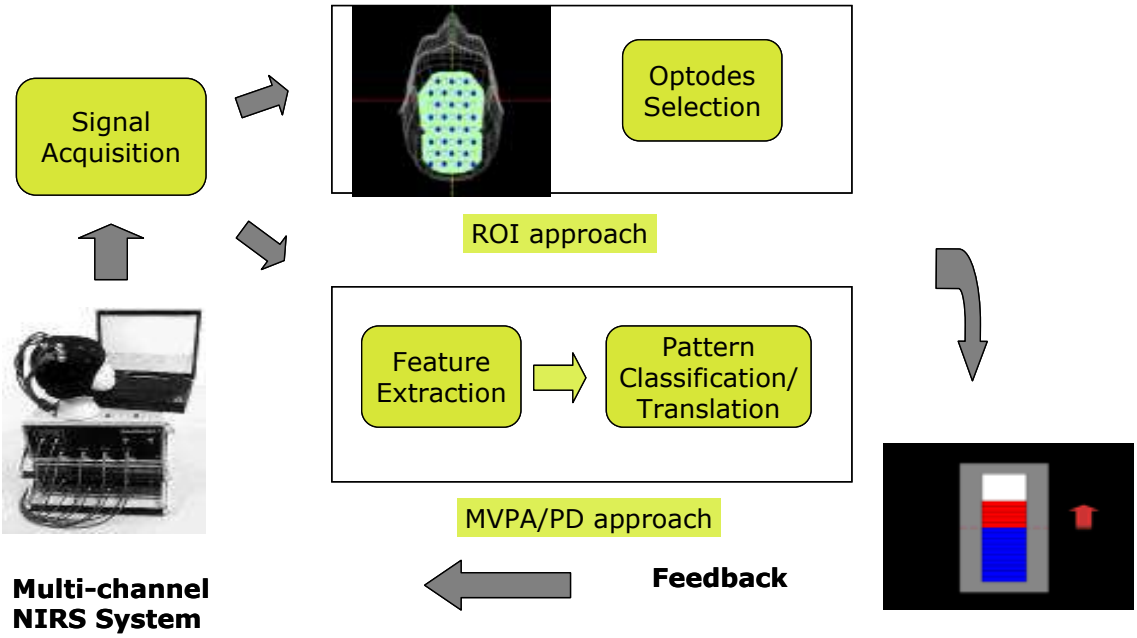
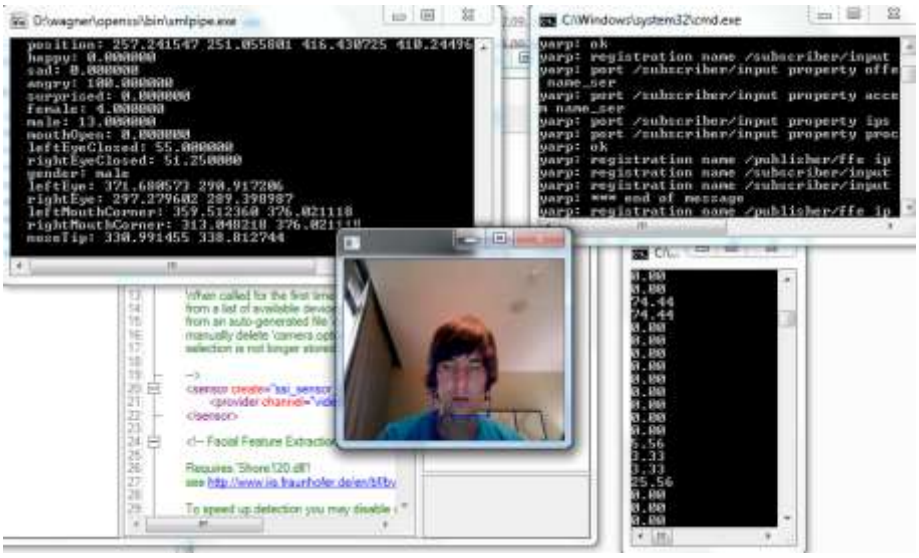


Fig. 6 - *fNIRS-BCI system implemented at EKUT*

- **T2.7**

  UAU has made fusion methods tested in Q2 Task 2.7 available for on-line recognition within the SSI framework. Furthermore, by requests of partners from application development, UAU has included a module for face detection and emotional user state recognition from video data, obtainable from simple devices like e.g. webcams. The component is based on the open source SHORE™ engine (Sophisticated High-speed Object Recognition Engine). Respective pipelines for simple integration have been made accessible.



  In addition to the video component, a temporary solution for analyzing biometric data has been included into the framework. It requires IOM Feedback Hardware and Finger Sensors shipped with Wild Divine Software (the software is actually NOT required).

  Both components are explicitly not meant to replace any technologies currently developed by partners, but to enable fast prototyping of applications

2.2.3 Deviations from the Project Work Programme

As mentioned in Q4 Task 2.7, UAU has included components for facial and biometric data acquisition and evaluation. These were added for fast prototyping of applications and will be replaced in the course of the project by more elaborate technologies being currently developed by respective partners.

2.3 WP3 – CEEDS Engine: Perception, Cognition and Action

2.3.1 Work Package Objectives

The objective of this work package is to build and test the CEEDS core engine. This engine orchestrates the interaction between the users of CEEDS and the data space that will be explored. Key elements of the engine are, generic data mining, discovery and analysis tool, narrative structure generators, and the CEEDS Sentient Agent (CSA), an intentional, sentient autonomous agent.

WP3 comprises the following tasks:

- **Task 3.1: Architecture of the CEEDS engine** (Task Leader: UPF. Other partners involved: UPC)
- **Task 3.2: Composition engine** (Task Leader: UPF. Other partners involved: Teeside)
- **Task 3.3: Data Discovery** (Task Leader: MPI. Other partners involved: UPC, ITI, GOLD)
- **Task 3.4: Narrative generator** (Task Leader: Teesside. Other partners involved: UPF)#
- **Task 3.5: CEEDS Sentient Agent** (Task Leader: UPF. Other partners involved: MPI, UNIPD)
- **Task 3.6: Interfacing of WP3 to CEEDS system** (Task Leader: UPF. Other partners involved: Teeside)

2.3.2 Progress towards Objectives

These are presented below as they were reported by partners at the request of the Coordination Office (at each quarter).

2.3.2.1 Q1

- **T3.1**

  First steps for the design of the CEEDS engine. Definition of its architecture and components: Sentient Agent, Narrative Generator, Composition Engine, User model and Data Discovery.

- **T3.2**

  Conceptualization of a middle layer between the outputs of the narrative generator and the effectors. The main idea consists in transforming very abstract commands into concrete, concerted actions.

- **Task 3.3**

  As a starting point UPF worked on a general framework for the Data discovery part using a Bayesian approach that will provide a structure and a language to describe and discuss the possible tasks (e.g. pattern detection, model inference, prediction) for the CEEDS system and the possible interactions (e.g. navigating, annotating, or rearranging the data) of the user with data representations. UPF's planned next step consists in establishing contact with University of Leiden (UL), asking for archaeological data and establishing a concrete data discovery framework, both applicable to CEEDs and envisioned by UL.

  UPC have been working in learning probabilistic finite state autoamta for opponent modelling for discovering the strategy followed by a player in the Prisoner's dilemma. UPC have being developing a tool to learn the opponent transducer using GIATI algorithm framework and extended its usage beyond the N-gram techniques where it was initially tested. With this algorithm UPC can perform translations forward and backward between an extended language and the pairs of input-output symbols characteristic of the transducers.

- **Task 3.4**

  UPF have completed the development of a first basic version of the narrative experience engine. The engine is intended to drive various display operations according to contextual objectives, which can correspond to hypotheses to be tested. It is also designed to respond to real-time user interactions to adjust the information presented.

  This is designed to operate as an event-based system where each display event has a specific trigger although this would not constraint its duration (note that there is no temporal planning at this stage). The system is based on a Heuristic Search Planner (HSP) which can control a sequence of "next display actions" in real time based on interaction cycles to be defined as part of the application.

  Teesside's work has been mostly dedicated to the specifications of the narrative engine component of WP3. A first set of candidate techniques have been identified considering the constraints on real-time interaction and information display control. In the absence of fully specified scenarios, it is currently impossible to define more precisely some interaction aspects (e.g. sampling rate) and this should be a major objective for the next reporting period. Teesside has however started prototyping some of the software technologies, on a standalone basis, taking into account some software integration requirements.

- **T3.5**

  Schematic conceptualization of the CEEDS Sentient Agent and design of a behaviour regulation model.

- **T3.6**

  This task is connected to task 6.1. At the moment we studied different way of interaction between the CEEDS engine and the technologies that will be developed in WP2 and WP4.

2.3.2.2 Q2

- **T3.1**

  UPF has defined the principles of human data exploration and discovery, where the consciousness model (WP1) assumes a key role in the presentation of the data to the user and in the prediction of his/her responses. According to a bottom-up approach, we started designing a data visualization system that will be applied first to neuronal data and subsequently generalized to other types of data in different areas through a data mining operation.

- **T3.3**

  MPI developed, implemented and tested tests for independence for potential application to the archaeological data as soon as they are available. In particular we compared the

chi-square test, a test based on mutual information and a Bayesian test using the logarithm of the evidence ratio [1] with simulated data. I started to work also on methods for the identification of specific patterns but further work is needed. UPC has been working in the development of "learning probabilistic finite state automata for opponent modelling". This model will be used in the Hide and Seek experiment.

UPC have been continuing working in learning probabilistic finite state automata for opponent modelling for discovering the strategy followed by a player in the Prisoner's dilemma. We have used the GIATTI algorithm framework and make different experiments to find the appropriate opponent modelling. We are now preparing a document describing the algorithm and the experiments performed.

- **T3.4**

  In this task work concentrated on the definition and implementation of a real-time mechanism for the real-time generation of event sequences, based on heuristic search planning and/or local search. Basic algorithms have been defined to adapt real-time heuristic search planning to the CEEDS context in a user-centred, interactive context. The associated representational aspects require further input from user scenarios to determine which type of event/stimuli should be generated in response to local goals, context and user input (physiological data). However some basic hypotheses on user exploration and perception have been incorporated into the design of the search component.

2.3.2.3 Q3

- **T3.1**

  UPF has worked on the requirements of the CEEDS Engine, evaluating technologies to base the engine components and the specification of the Sentient Agent (CSA), the Narrative Generator and the Composition Engine. UPF worked on a first descriptions of the engine and the components to discuss with users of the engine (application developers in WP6) and component developers in WP3 to align the architectural design of the applications with the engine design. During this period the document was evaluated technologies for the integration of CEEDS components, specifically the YARP framework to facilitate the communication between the different components of the engine.

- **T3.3**

  CERTH: In Task 3.3, CERTH obtained a synthetic 3D model database with ancient potteries. Based on these data, CERTH started working on developing a shape similarity search and retrieval method. A first study was conducted on 2D to 3D matching and partial matching algorithms. Moreover, CERTH contributed to the description of the "Archaeology" and "Commercial" use cases. Based on this document CERTH will implement a shape similarity search engine that takes also into account the user's implicit responses so as to improve (re-rank) the retrieved results. A testbed web site was implemented for testing the algorithms on the available database. CERTH participated to the 2nd plenary meeting (London, UK)

  MPI: MPI started the statistical analysis of the archaeological data. In a first step contingency tables were created using a subset of the of the variables and explored some simple analysis methods, such visual representations, biclustering and testing for statistical dependencies between two variables. To get meaningful results, a pre-processing of the data is necessary that has to be discussed with the archaeologists. Moreover, we discussed already some possibilities how adaptive sampling and adaptive feature selection could be useful in the CEEDS context.

  GOLD: At Goldsmiths we have narrowed down the analysis part to the use of 2D images of profiles of ceramics and pottery sherds in the Archaeology application. This will be done by matching approximate profiles derived from snapshots (taken by the archaeologist) with profile information available in reference book. The relevant book has now been provided by the Archaeology team of Leiden. We had many discussion via

email in May in preparation of the Barcelona meeting in early June and the Leipzig meeting later in June both meant to refine our ideas and ensure all sides can work coherently on the archaeology application.

UPC: UPC has been working in new techniques for inferring the probabilistic automata of the opponent in a game play using the GIATI algorithm and derive a counter -strategy that exploit any weakness that this strategy could have. In this last step we have been working using a Markov Decision Process and we have derived the governing rules for it. Moreover we have been working in new algorithms detecting people using telemeter lasers installed in a robot in order to detect people in outdoor environments. This detection will be used for game play hide and seek. Finally we have been working in the definition of all the steps for the hide and seek experiment.

- **T3.4**

  TEESSIDE: Encapsulation of the Narrative Engine. Development of an authoring interface (continued). The next step for integration requires the specification of an event sampling mechanism in either middleware (YARP, Portable XIM).

2.3.2.4 Q4

- **T3.1**

  UPF organized a integration week (08-10/06/2011) to discuss the engine design with developers of the main components in WP3 and application developers of WP6. The meeting was used to validate and create a first version of the architecture to use as reference. During this period UPF worked on the documentation of the engine architecture to be included on the WP3 report (D3.1)

- **T3.2**

  UPF worked on the analysis on how to apply principles of music composition to the construction of visual content and how to place the composition engine inside the CEEDS architecture. Based on the development of the Bergen-Belsen memorial prototype we are getting requirements on for the design of the composition engine

- **T3.3**

  UPC has been working in the POMDPs (Partial Observable Markov Decision Processes) for modelling and inferring the motion of the opponent in the game hide and seek. These techniques can be used in different CEEDs applications although we are using them for the hide and seek game. Moreover we have been working in predicting the motion of humans, and we have developed a new Bayesian method for obtaining the human motion prediction, which can be used in different applications where the human motion intentionality is required (we have submitted a paper in a top congress in robotics). We have also continued working in the detection and tracking of people using telemeter lasers. The last two mentioned techniques are required in the data discovery process (to detect people and their intentionality) for the hide and seek game

  ITI: In this period ITI worked on developing a method for automatic Archaeological sherd classification for the archaeology use case and a method for 3D partial matching for the commercial use case.

  Automatic sherd classification:

  Currently, conservators classify archaeological sherds found in the field manually based mostly on chrominance features. This process is both effort and time consuming for archaeologists. Automatic classification aims to speed up this procedure. The method can be summarized in the following steps:

  - Capturing of front and back side images of sherds
  - Extraction of region or Interest (ROI) for each image (remove parts of the sherds that have shadows and other non uniform colouring etc.)

- Extract features for the ROI
- Classify the sherds based on the extracted features a KNN classifier

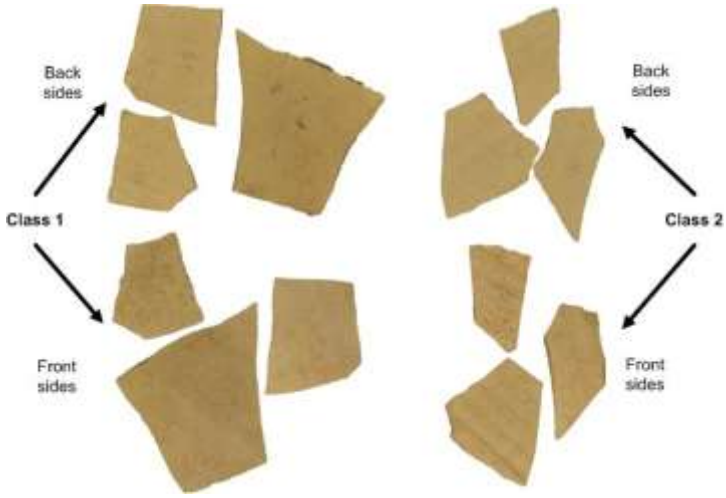


Fig. 7 - *Two classes of sherd images. For each sherd, front and back sides have been captured.*

3D partial matching for commercial use case:

With this work CERTH aims to develop a novel 3D partial matching technique based salient areas extraction and local descriptors. For each 3D model salient areas are extracted based on how smooth or not the surrounding surface area is. The salient areas are formed in clusters and for each cluster a local descriptor is computed. The local descriptor used is the "projection Images" descriptor.

MPG: First results of the statistical analysis of the archaeological data were discussed between UL, MPG and GOLD at the meeting in Leipzig. As a result MPG decided to use topic models as a first step and Markov random fields as model class for the statistical description of the shard distribution on the archaeological site. In the following MPG has carried out first estimations of topic models using an expectation maximization algorithm on test data from the Tanagra data base.

On a meeting at July 14th and 15th in Barcelona the MPG and UPF group discussed the data analysis for the potential neuroscience applications. There one has to distinguish between experimental data and data from simulations. As the result of the discussion it was decided to proceed in the following directions:

1) For the connectome data (provided by O.Sporns) MPG and UPF will collaborate in implementing simulations in iqr using the information of the structural connectivity matrix and producing a functional connectivity matrix. This can be used to test hypothesis about the direction of the coupling which cannot be measured directly and is therefore not contained in the structural connectome data.

2) For the exploratory analysis of neural time series data such as Electroencephalogram (EEG) or Magnetoencephalogram (MEG) data, local field potentials (LFP) or spike train data from multi electrode arrays (MEA) heither the raw data or certain features of the data have to be either visualized and/or certain features will be transformed into sound patterns (sonification). Features that will be used include the spectral power in different frequency bands, amplitudes, phase and mean frequency in certain frequency bands. Parameters from time frequency analyses (linear models with time dependent parameters e.g. adaptive autoregressive models, short term Fourier transform, wavelet analysis, matching pursuit algorithm) will be used both for the definition of features and pattern detection. Available data sets include EEG data from coma patients (UPF) and sleep EEG data (Universität Zürich/MPG). Further discussions are necessary in order to decide which of the available data sets will be best suited to develop a CEEDs application.

3) For the analysis of data from simulations MPG wants to implement real time calculation of information theoretic quantities such as mutual information, multi-information, conditional mutual information to enhance the understanding of simulations in neural models of cognitive processes

- **T3.4**

  TEESSIDE: Encapsulation of the Narrative Engine: Development/Deployment of the Narrative Engine within the Unity 3D game engine, which makes use of a Dynamic Link Library (DLL) that encodes the planning syntax (previously implemented). Creation of Unity assets that are used to encode planning engine component, narrative actions and object controllers. This will increase the re-usability within future Unity scenes and allow possible applications for other use case scenarios.

- **T3.5**

  Based on the engine architecture UPF started to work towards implementing basic ideas of the CSA on the applications prototypes. CSA is based on the DAC architecture and it was implemented the first layer of the architecture, the reactive layer that does not involve any intelligence yet but reacts to explicit reaction of the user. With this approach the idea is to understand how the CSA is placed on the engine architecture and how to continue the implementation. Also contributed to the discussion with application developers with the role that the CSA will have on each application

2.3.3 Deviations from the Project Work Programme

No deviation to be reported.

2.4 WP4 - CEEDS Effectors Systems & Environments

2.4.1 Work Package Objectives

Main objective of this WP is to create a common synthetic reality platform. This objective includes the further enhance the XIM architecture (CXIM 2.0), which includes the development of a portable infrastructure, and the development of novel visualization technologies and algorithms suited for terra- or even petabyte sized data sets.

WP4 comprises the following tasks:

- **Task 4.1: Upgrade of eXperience Induction Machine – CXIM 2.0** (Task Leader: BME. Other partners involved: UPF, UH).
  - Objective: Design and implement a unified HW and SW framework for the CEEDS platform based on the XIM and VHI systems.
- **Task 4.2: Portable version of the eXperience Induction Machine** (Task Leader: BME. Other partners involved: UPF, UAU).
  - Objective: Develop a portable version of the CXIM 2.0 system for shared research and dissemination purposes.
- **Task 4.3: Visualization technologies** (Task Leader: BME. Other partners involved: UPF)
  - Objective: Develop a novel algorithms and rendering methods for visualising large datasets in real-time and the support of interactive applications development based on these results

- **Task 4.4: Sonification technologies** (Task Leader: UPF. Other partners involved: BME, UAU).
- **Task 4.5: Real-Time 3D Reconstruction & Representation of Objects Including Haptics** (Task Leader: GOLD. Other partners involved: UPF).
- **Task 4.6: Wearable Haptic Displays** (Task Leader: UDP. Other partners involved: BME, UPF)
    - Objective: To develop innovative wearable haptic/tactile displays, based on electroactive polymer actuators. The devices should be arranged in contact with fingers, either via a glove or other means of support.
- **Task 4.7: Specification and implementation of the interfaces to the CEEDS system** (Task Leader: BME. Other partners involved: UAU, GOLD, UPF, UDP).

2.4.2 Progress towards Objectives

These are presented below as they were reported by partners at the request of the Coordination Office (at each quarter).

2.4.2.1 Q1

- **T4.1**

  BME started with analysing the existing XIM architecture including the most critical hardware and software elements. The HW consists of a cluster of computers each responsible for driving different aspects of the projection system, the applications themselves and the interaction processes, such as managing devices, tracking people, etc. During the reporting period BME studied the main control interface SW, called IQR, specific to the design of XIM and have developed a shared understanding of what the main components of the upgraded system will be. Based on these findings, BME created an initial design of the software architecture. On the hardware side, the most difficult task currently is to find a generic replacement of the floor tiles and the tracking system. Based on the requirements BME found that only a handful of companies build elements we could use especially at the price/performance point the project is budgeted for. BME has also looked at new types of projectors and evaluated a number of technologies to be included in the final design.

- **T4.2**

  Based on the experience gained from working on Task 4.1 BME has started an early experimental design of the multi-rendering capabilities BME will need to support the large number of projectors from a single system. BME has researched the architectural constraints including graphic cards options, internal bus speeds, etc. that can support up 4 to 8 projectors at a time from a single computer. To drive these projectors BME needed to plan a new rendering architecture that renders virtual camera images into high fidelity buffers on the graphics card without storing them in central computer memory and combines them in a flexible manner using shaders before outputting them to the projectors in a highly flexible manner. Having designed a few technical alternative solutions, BME implemented small scale test programs to measure the performance aspects and eventually selected the design best suited for implementation.

- **T4.6**

  Aimed at providing the user with vibro-tactile feedback controlled by a variety of inputs from the CEEDs system, innovative wearable haptic/tactile displays, compact and comfortable for the user, are being developed. The devices are based on smart materials for actuation made of electromechanically active (or electroactive - EAP) polymers. They are highly promising to develop lightweight, deformable, efficient, silent and cost-effective electromechanical transducers. In particular, the devices under development are based on the following EAP technology: so-called hydrostatically coupled dielectric elastomer actuators (HCDEAs), recently conceived at the University of Pisa. They rely on

an incompressible fluid that hydrostatically couples a DEA-based active part to a passive part interfaced to the user.

In the last period, the activities of this task have been focused on the design of the first version of a finger-tip tactile display based on a bubble-like HCDEA integrated within a plastic case arranged at the finger tip. The following figure shows a CAD drawing of the performed design.

Experimental activities to manufacture the first prototype based on this design will start in the next period.

2.4.2.2 Q2

- **T4.2**

  During Feb 22-26, 2011 Barnabas Takacs from BME has visited UPF in Barcelona to review in detail the current hardware (HW) and software (SW) infrastructure of the existing XIM. Throughout the week the team had detailed discussions on current and future requirements, control infrastructures, legacy devices, rendering architecture and visualization methodologies, including the use of avatars and high fidelity virtual humans.

- **T4.6**

  In this period, activities aimed at developing wearable vibro-tactile feedback devices were focused on the design, manufacturing and testing of bubble-like hydrostatically coupled dielectric elastomer actuators (HCDEAs), which had been selected in the previous period as the most promising technology for this application.

2.4.2.3 Q3

- **T4.1**
  During the discussions in our consortium meeting in London on April 6-7, 2011 with Dr. Paul Verschure BME was asked to compile *High-End alternative designs* for the XIM upgrade. This configuration would allow high-end users to create their own XIM2 walls when more resources are available.

  If there is a budget for a large number of HD projectors, BME has made a list of recommendations to UPF and is in a position to help design the configuration and drive the entire system with a small set of computers as part of the project. Final decision on what type of system XIM2 will purchase or use will be made by UPF within the following months.

- **T4.2**

  BME has continued to design the portable XIM2 focusing on projection design, software and hardware integration, and software development.

  BME has compiled a list of requirements for the portable XIM environment, which vary greatly according to the budget and space constraints of individual project partners.

  To support various othe types lab configurations and placements (like ceiling mount) BME has evaluated a number of specific projectors that we can recommend to our partners. All these were tested and measured in our laboratory. Based on these test results we concluded that for BME's purposes and the wide range of possible configurations the best model available on the market (and within the university's proposed budget) is the NEC PA500U. Four of these units have been ordered and are expected to be delivered in ealry July, 2011.

  To support new interaction modalities as well as to capture subliminal user responses based on biofeedback devices BME has integrated into its software suite the *SmarTex* sensor provided by the University of Pisa. The second device BME has incorporated was the 3D sensor family based on PrimeSense's technology (http://www.primesense.com/) BME also integrated Microsoft Kinect (http://www.xbox.com/en-US/kinect) and the Asus

Xtion (http://event.asus.com/wavi/product/WAVI_Pro.aspx) cameras into the XIM2 architecture to provide 3D sensing capabilities that will be used for *user tracking*, as well *hand and body-based gesture contro*l. BME has also developed a multi-3D camera sensing interface to that supports e.g. multiple Kinect's plugged into the same computer to create a large and seamless 3D sensory surface. The final piece of hardware we integrated on the software level is a virtual reality motion platform that was designed to create the feeling of walking while staying in the same physical position.

BME has implemented a prototype 3D scene browser to demonstrate the key features of the XIM2 design.

UDP:

- **Task 4.6: Wearable Haptic Displays**
  In this period, activities aimed at developing wearable vibro-tactile feedback devices were focused on the prosecution of the electromechanical characterization and testing of bubble-like hydrostatically coupled dielectric elastomer actuators (HCDEAs), which had been developed in the preceding period, following their selection as the most promising technology for this application.
  During the second period, the dynamic performance of such actuators was specifically investigated in order to assess their frequency response and study their applicability as vibrating units.
  During the last period, activities oriented at designing integrations of these actuators within a textile elastic glove have also started. The design phase is currently in progress at the time of writing this report and will be reported at the end of the next period.

2.4.2.4 Q4

- **T4.1**

  (A) Projection designs for XIM2 and the portable XIM

  During the current reporting period BME has finalized the design and software architecture of the CXIM2 and worked with UPF in further details of the projection systems's choice and design criteria. As a result of those efforts both have purchased the final projectors for their respective environments.

  To test the rendering characteristics and speed performance of the new portable XIM platform, BME conducted a multi-monitor test to find out how to best connect 12 units and create a seamless rendering surface with it.

  UPF worked on the upgrade of XIM to CXIM 2.0. In the first stage it was upgraded the servers machines to handle the network connectivity and improve the processing capacity to handle the CEEDS application requirements. A virtualization server was acquired to reduce the number of physical machines and provide a scalable solution for future needs. It was also acquired a KVM system to support the administration of the machines from a remote console.

  In a second stage based on BME reports it was evaluated the equipments for the visualization system. Different projectors models were evaluated in CXIM based on image quality and the possibility to reduce the display configuration from 8 to 4 projectors. After performing the evaluation the conclusion was that a configuration of 8 projections was necessary to reduce the shadows projections to provide a better user experience. For the image quality aspect we found that the model G5750WU from Epson offers the best compromise in terms of quality and price, so it was decided to upgrade the system with this model.

  For the display systems it was evaluated the requirements of the applications and the visualization engine (Unity). It also was take it into account the final configuration of the projectors (8 projectors). It was decided to upgrade the system with two displays machines with high end graphics cards with 4 display outputs each. With this configuration the visualization systems can handle the output of 8 projectors and it can be extended in the future to handle more projectors (to handle projections in the floor or the ceiling).

At the end of this period the new server machines and display machines are installed and running in the CXIM space. All services from the old machines were transferred to new machines or converted into virtual machines

- **T4.2**

  (A) Quick-Setup portable screen

  To further support ease of transport and portability we wanted to come up with yet another compact and low-cost design for our partners in the project. As a result BME designed simple corner units with aluminum frames and a special projection surface. Our next plan is to continue towards self-supporting projection structures. In previous reports we have concluded that such inflatable structures could not deliver the visual performance we needed. Thus, we took a step back and turned towards geodesic dome designs often used in public installations. We have obtained this particular dome in the picture as a special "gift" and at no cost to the project as it was used in the World Expo in Shanghai. It is 7m in diameter and could not be set up in our small laboratory, but we managed to get another space from the University supposed to be finished by August but at the time of this report still under construction. While this causes no delay in the project since this is only a variation of the XIM portable design, we are planning to set this up and fully test it before the end of the year, construction permitting.

  (B) Compact Ruggedized Projector Design

  To further support the need for XIM2 to travel and to complement the high-end projectors with a low-cost alternative BME has created a final design for short-throw projectors.

- **T4.6**

  In this period, activities aimed at developing wearable vibro-tactile feedback devices were focused on the design and implementation of a customized software interface. The interface was specifically conceived to simulate interactions of a human hand with a virtual object and generate an output signal as soon as a contact between them is established. The signal is used to control the wearable vibro-tactile feedback device, so as to provide the user with a tactile feeback upon detection of the virtual contact. For this purpose, the considered strategy foresees that the user wears a smart glove equipped with sensors able to monitor the movements of the fingers, as developed in this project (Fig. 1).

Fig. 8 - *The sensorized glove considered to monitor the movements of the user's fingers.*

The output of the glove sensors is processed such that the software interface reconstructs on a computer screen a virtual hand, whose fingers movements reproduce in real time those of the user's hand. The software also shows a virtual object, e.g. a ball, close to the virtual hand (Fig. 2a).

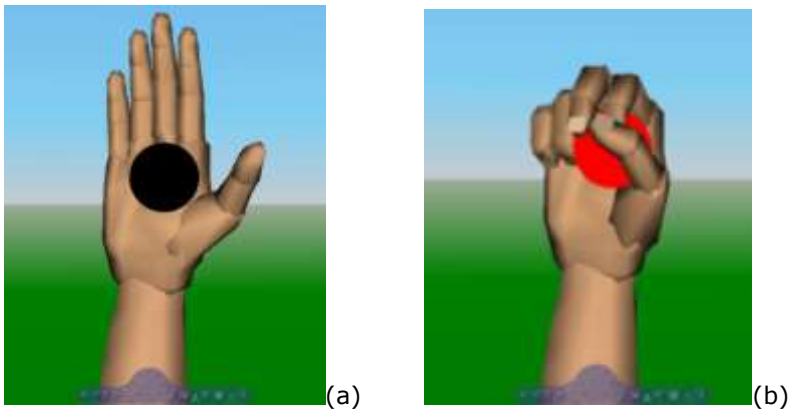

(a) (b)

Fig. 9 - *Virtual hand and object shown on screen by the developed software interface: (a) the user's hand is open and there's no contact with a virtual ball; (b) the user's hand is closed, so that more than one finger is in contact with the virtual ball; the contact is visualized by changing the colour of the ball.*

While wearing the sensorized glove, the user is asked to watch at the computer screen and move his/her fingers, until a contact of the virtual hand with the virtual object is established. The software visualizes the contact by changing the colour of the object (Fig. 2b). The whole strategy foresees that as soon as the contact is established, the software interface activates a wearable vibro-tactile device integrated within the same smart glove, so as to provide the user with a coherent feedback.

During the next period, activities will be oriented at improving the software interface, on one hand, and at integrating a prototype vibro-tactile device into a sensorized glove, on the other hand.

2.4.3 Deviations from the Project Work Programme

No deviation to be reported.

2.5 WP5 - Integration

2.5.1 Work Package Objectives

The integration process in CEEDS requires a large number of distributed processes that come from different heterogeneous input resources (data bases, effectors, human data, etc.) and that have to deal with heterogeneous output resources (sensors, displays, etc.). Additionally, it is required to manage processes (in our case specific modules) in a distributed way that cannot be controlled from a centralized system. The objective of the Integration WP is twofold: firstly, to generalize the existing distributed architecture (URUS) to include a layer to deal with the mixed/virtual/augment reality systems; and secondly, to integrate the CEEDS processes for the project.

WP5 comprises the following tasks:

- **Task 5.1: System technical specifications** (Task Leader: UPC. Other partners involved: All)
- **Task 5.2: Viewpoints, views and models** (Task Leader: UPC. Other partners involved: All)

- **Task 5.3: Integration of the CEEDS system architecture and software backbones** (Task Leader: UPC. Other partners involved: All)
- **Task 5.4: Technical components testing** (Task Leader: UPC. Other partners involved: All)

2.5.2 Progress Towards Objectives

These are presented below as they were reported by partners at the request of the Coordination Office (at each quarter).

2.5.2.1 Q1

UPC has been working in the system technical specifications. The first action has been to send a questioner to the partners for knowing the level of knowledge of the tools that are required for doing the system integration that means the knowledge in software tools, middleware, operation system etc. With this questioner UPC want to know what will be the best middleware that will be used and up to what level the partners will require special help for doing the integration. The second action is preparing a tutorial that will be sent to all the partners to help them in the integration process. This tutorial will explain the middleware that will be used and how a partner has to prepare its software to be integrated with the software of the other partners for each one of the experiments. This tutorial will have several levels. UPC are preparing now the first one, where it is explained the basic tools and some simple examples.

Although UPC first considered as a first option the MeRMaID middleware based on YARP, UPC is now analyzing again the middleware due to the characteristics of the partners profile and the complexity of the experiments. The MeRMaID middleware based on YARP is an excellent tool for integrating complex systems, but it requires medium / high level software knowledge. UPC realized that in CEEDs Consortium this software level is not so high for several of the partners and moreover that several of the experiments will probably not require too complex middleware tool. For these reasons UPC is studying another middleware tool, denominated ROS which share some of the characteristics of the MeRMaID and it is simpler. However this decision will be taken later on, once UPC know in more detail the elements and the relation between them required in the experiments.

2.5.2.2 Q2

UPC has been working in the preparation of the tutorial for the CEEDs project and in developing facilities for the middleware. We have made a first tutorial document that will be released in few weeks. From the information of the questioner sent to the partners in Q1, we have realized of three important issues:

- The operating systems that the partners use are: Microsoft Windows and Linux
- 7 of 16 partners have software knowledge
- There are five experiments in the project

The operating system is an important issue due that the middleware that is going to be used works mainly in Linux. The best operating system to be used is Linux, however also it can be used Microsoft Windows. Because we have not experience with the middleware for this second operating system, we have made the tests with this operating system and we have now the procedure to connect software that runs in Microsoft Windows with the middleware. We have also included the documentation to use Microsoft Windows. With respect to the second and third issue, UPC has realized that we have to group the partners in experiments in order to join together people that have software knowledge with people that do not have, because for the integration it is required some software knowledge. UPC will explain the fundamentals of the middleware in the second general meeting, and then UPC will propose a technical meeting for July 2011 to explain in detail the way how this middleware works.

UPC has been developing facilities for the middleware in order that the partners can use simplified structures to use the middleware for the integration process.

Moreover UPC has been working in the architecture and in the specifications. We will explain this architecture in the technical meeting.

2.5.2.3 Q3

UPC presented the distributed communication system using YARP and the YARP as a software integration tool for the CEEDs project. Moreover UPC prepared a document for the use of YARP in Linux and Microsoft Windows platform. Furthermore, UPC worked with UAU people to install YARP in their machines and adapt their software to the YARP framework. Successful result, UAU data is now available as YARP publishers, and with UPF people to install YARP in their machines and integrate two simple modules, one from UPC and the other from UPF. The resulting application was a visualisation at the XIM of a 3D model of an urban area from the viewpoint of a robot position. This simple application wanted to demonstrate the use of YARP in the CEEDs context and its potential.

With respect to the tele-robotics experiment, UPC has been working in how to make this experiment "CEEDs compliant". The main ideas that arise from the discussion were:

- Add implicit cues and define when and how they will be used
- Data from robot sensor feeds directly the raw data base
- User detected state modifies robot behaviour
- Simplify the app to match better the CEEDs.
- First version of the game: just look for people in the environment
- Allocate computer resources following user reactions. I.e: If an artefact is seen in laser data, stop robot and put efforts on people detection.
- Match to CEEDs diagram and analyse how we deal with Core CEEDs features

2.5.2.4 Q4

UPC have been continued working in the integration process. UPC has been verifying the installation of YARP in different OS and analyzed the measures that have to be taken into account. Moreover UPC has tested some of the modules (human motion detection and tracking, autonomous navigation and teleoperated operations) of hide and seek game that will be integrated in the robots and in the XIM machine, although all this process has been done in the IRI laboratories. UPC has also been working in the architecture of the hide and seek game to be CEEDs compliant, and it adapted the system to the Core Features of any CEEDs application. This information is in the Deliverable 5.1

TEESSIDE: Development of a Dynamic Link Library (DLL) in order to be used as a wrapper for the Narrative Engine and directly be integrated within the Portable XIM

2.5.3 Deviations from the Project Work Programme

No deviation to be reported.

2.6 WP6 - Application Development

2.6.1 Work Package Objectives

This WP objective is to develop concrete, functional astronomy, neuroscience, history applications in the diverse scientific and commercial fields selected by the project for their complex datasets (e.g. retail data or archaeology), based on the components developed in the CEEDS project. This work comprises two main tasks: the design of the applications, and conceptualizing and implementing the required user frontends. The work will be done based on and in close collaboration with other technical WPs: 2, 3, 4, and 5, and will be connected to WP8 and WP9 to provide links to potential end-users, both professionals and laypeople.

WP6 comprises the following tasks:

- **Task 6.1: Conceptualization and Design of CEEDS system architecture for Applications** (Task Leader: UPF. Other partners involved: UPC, GOLD,UAU, MPI, Teeside, BME, UPC, UH, ELECTROLUX, LU)
- **Task 6.2: Application developments** (Task Leader: UPF. GOLD,UAU, MPI, Teeside, BME, UPC, UH, ELECTROLUX, LU)
- **Task 6.3: CEEDS interface design** (Task Leader: UH. Other partners involved: UPF)
- **Task 6.4: Installations, performances and exhibitions** (Task Leader: UPF. Other partners involved: GOLD, UAU, MPI, Teeside, BME, UPC, UH, ELECTROLUX, LU)
- **Task 6.5: Interfacing of WP6 to CEEDS system** (Task Leader: UPF. Other partners involved: GOLD, UAU, MPI, Teeside, BME, UPC, UH, ELECTROLUX, LU)

2.6.2 Progress towards Objectives

These are presented below as they were reported by partners at the request of the Coordination Office (at each quarter).

2.6.2.1 Q1

- **T6.1**

  With "Bergen-Belsen memorial site" as the first use case, UPF started the development of the detailed systems architecture that will eventually be generalized to other use cases and application.

  UPC proposed a new experiment where CEEDs partners will be able to test some of the CEEDs modules and analyze how to do the integration among modules. The aim of the proposed experiment is to enable a human to learn and discover human-robot interaction strategies through his/her embodiment into a robot using the CXIM machine. The human will perceive and react to real-time stimuli present at the robot site. The robot will be commanded at a high level from human reactions and at low level from its own autonomous behaviours in order to guarantee safety and systems integrity. A two-way learning and discovery process is engaged. On the one hand, robot motion behaviors are learned and refined to adapt to human activity; on the other hand, the human will discover rules of engagement for an optimal completion of a task from its immersion into a multisensorial experience that otherwise would not be possible.

  As a sample application, a hide-and-seek situation will be solved, in which other humans hide from the robot at the experimental site, and the user in the CXIM must find them. The game poses relevant challenges from the perspective of human-robot interaction such as people detection, recognition and tracking of human activity, prediction and anticipation to human behaviour. With respect to the CEEDs paradigm, the experiment poses relevant challenges for real-time data representation through a limited

communications channel, and for learning and categorization of human behaviour from multi-sensory data patterns.

- **T6.2**

  Following the scenarios "Wiki walk Barcelona" and "Bergen-Belsen memorial site", UPF have set up a sandbox environment for the CEEDS engine. UPF developed paradigms for delivering 3D content to the rendering engine Unity, link spatial information to front end systems. Moreover, UPF looked at the conceptualization of timeline as a dimension. In order to develop specific prototypes UPF invested in new hardware and software.

- **T6.3**

  Two reviews were accomplished in Q1. One review on Astrophysics visualisation and interaction techniques. The other one on Neuroscience visualisation systems. This served as an input to organise design proof of concepts in Q2.

  Abstract1 Interactive Neuroscience Visualization: The development of observing and education tools in neuroscience has reached a state of art where our senses and interactive collaboration are involved. New systems encourage us to build bridges between learning centers, medical companies and even individuals to achieve better understanding of brain anatomy, nervous systems and neurological health conditions. Visualization technologies allow us to gather scientists, students from crossed disciplines to collaborate in interactive environments to share complex data in more understandable form. Also haptic interfaces can be applied to increase the value of touching devices for enforced learning.

  Abstract2 Advanced interaction and visualisation tools and techniques for simulating Astrophysics on large scale multi touch virtual environment: Visualization and interaction, mostly navigation on large scale multi touch virtual environment to simulate the astrophysical Universe is really challenging and still a hot research issue. The huge range of astronomical models, large spatial scaled empty spaces, way finding requires users knowledge of astronomical context infer the difficulty to design and choose the techniques and tools to simulate astrophysics in large scale multi touch virtual environment. This paper review several published papers and figure out usability, pros and cons of tools and techniques with respect to problem and/or design domain.

2.6.2.2 Q2

- **T6.1**

  Further progress was made by UPF on the detailed conceptualization of the CEEDS system architecture.

  UPC has been working in the design of the CEEDS system architecture for the applications, preparing some examples for the use of the middleware and organizing some of the modules.

- **T6.2**

  UPF developed a prototype web-framework which deals with the large amount of data produced by online web services such as Wikipedia (wikipedia.org) and Flickr (flickr.com). Our framework makes use of Wikipedia and Flickr APIs to extract in real time geo-tagged articles and pictures from their databases according to the current user position on an interactive 2D map. This prototype will be used as a proof of concept and employed in the development of real case scenarios such as the Bergen Belsen concentration camp application for mobile devices.

  UPC has been starting to work in the new experiment which aim is to enable a human to learn and discover human-robot interaction strategies through his/her embodiment into a robot using the CXIM machine. UPC has been preparing the scenario and some tools for the experiment.

- **T6.3**

  Design research: Definition of a prototype to explore interaction design approaches for an adaptive navigation system. Set up of a prototype system with implicit and explicit interaction including widgets for adaptive navigations on a multitouch display. Implicit signals include heart rate and respiration and other corporal movements. The work is being carried out by two master thesis students.

2.6.2.3 Q3

- **T6.1**

  UH: Planning and designing the Commercial scenario. UH has lead activities and organized meeting to prepare to develop for the Commercial scenario. The scenario provides an immersive and empathic environment for experiencing and manipulating 3D objects of appliances. This is aimed at a variety of actors in the product design lifecycle: designers, engineers, prospective users and consumers.

  UPF: UPF has worked on a detailed description of the concepts and designs of the CEEDS applications, focusing on the Bergen-Belsen and neuroscience domain. This description is tightly coupled to the conceptualization of the CEEDS engine developed in WP3.

- T6.2

  GOLD: Main efforts were spent at the 3 day meeting in Barcelona at the beginning of June. In late May preparation for this meeting was done with email exchange between partners involved in the Archaeology application. Our main questions are with regards to the type of analysis that will be fed back to us once user responses are made available in CEEDs (which will happen later in the project).

  UPF: UPF has further developed the software infrastructure for the neuroscience and Bergen-Belsen applications. The prior is based on the software infrastructure of CXIM, the latter on a customized Linux-Apache-MySQL-Python framework. Both applications use the Unity game engine for rendering of graphical content.

  UH: Integration of user location tracking. UH has been working in exploring ways to track user location and orientation on the IPad. The problem consisted in finding the user's real-world location and place him in the corresponding location in a virtual 3d-model. High update rate preferred. The iPad provides GPS positioning service and compass heading. This data can be read into Unity3D and used to update the user's location and orientation. Two demo applications where developed on iPad to demonstrate compass integration with Unity3D for compass and GPS.

2.6.2.4 Q4

UPC has been working in the architecture design of the hide and seek application and in the sensor data that will be used. Moreover it has be designing the raw data base and the user response database

TEESSIDE: Formalisation of the planning domain supporting user experiences through CF configurations as defined by the scenario

UPF hosted the event "Integration Week" on 8-10 June 2011, in Barcelona. This event allowed defining the main Core Features of the different applications. A technical presentation about the hardware, the software and the network infrastructure of the XIM has been shown to the partners. Partners agreed to the use of the communication protocol YARP as a standard for all the application.

UPF has developed a prototype for the Bergen-Belsen application working on-site with the GPS sensor of the iPad. Part of the camp (Star Camp) was reconstructed in 3D and mapped to the physical world, while the application included historical data displayed for the users, serving both for usability testing and for experimentation on navigation in the virtual space.

UPF made further progress in the conceptualization of the architecture of the Neuroscience application. CF1 and CF2 have been already implemented. The next step consists in

representing real connectome data. For this reason UPF met MPG in Barcelona on July 14-15 2011: MPG proposed to implement simulations of the connectome data in iqr using the information of the structural connectivity matrix and producing a functional connectivity matrix. This can be used to test hypothesis about the direction of the coupling which cannot be measured directly (and is not contained in the structural connectome data).

2.6.3 Deviations from the Project Work Programme

No deviation to be reported.

2.7 WP7 - Experience Assessment and Human Factors

2.7.1 Work Package Objectives

The main objective of this WP is to provide the guidelines for CEEDS system developers based on the users' experience evaluation, and advance knowledge on the social and cognitive processes involved in the use of the interface. In both cases, the contribution will be ongoing and iterative, starting in the early phases of the project to input the design process, and covering the entire length of the project

WP7 comprises the following tasks:

- **Task 7.1: Cognition of psychophysiology of user experience** (Task Leader: UNIPD. Other partners involved: UH, GOLD, ENS)
- **Task 7.2: Spatial cognition and actions in technologically enhanced spaces** (Task Leader: UNIPD. Other partners involved: UPF, UOS, EKU)
- **Task 7.3: Credibility and user acceptance of confluent system** (Task Leader: UNIPD. Other partners involved: GOLD, UH)
- **Task 7.4: Social and communication ergonomics** (Task Leader: UNIPD. Other partners involved: UH)
- **Task 7.5: Relevance feedback** (Task Leader: ITI. Other partners involved: UNIPD)
- **Task 7.6: Confluent Application in real Scenario: CEEDS trial** (Task Leader: UH. Other partners involved: UNIPD, ELECTROLUX, UAU)

2.7.2 Progress towards Objectives

These are presented below as they were reported by partners at the request of the Coordination Office (at each quarter).

2.7.2.1 Q1

- T7.2

  The methodology of three experiments has been outlined during this quarter. A first study will investigate which brain areas are activated when healthy adults perform perceptual/attentional tasks in their peripersonal space (the space within their arms' reach) and extrapersonal space (the space beyond their arms reach). Functional Near Infrared Spectroscopy (fNIRS) will be used during a line bisection task carried out in an immersive virtual environment. The second study will deal with a methodological issue in these kinds of experiments, i.e. the implications of using or not a chinrest. The third experiment will study what are the implications of stretching vs bending the arm while

using a tool for the bisection task performed in peripersonal space and extrapersonal space.

Pilots of the first study have also been carried out with 18 healthy adults without fNIRS monitoring, in order to test the validity of the behavioural response selected. Validity was confirmed.

2.7.2.2 Q2

- **T7.1**

  "SMARTEX" wireless sensorized vests (a male vest, a bra, and a band) was delivered from UNIPI. Such vest contains three types of sensors: electrodes for heart monitoring, piezo for respiration monitoring and a 3-axis accelerometer for detecting type and amplitude of the wearer's movement. After a few tests of the functionality of the equipment, the technical specifications of this new system were matched with the ones of standard systems, by looking at the features of similar devices available on the market and usually employed for medical/clinical routines. The environment in which these devices can work was also considered (e.g. use in mobility, robustness to muscular artefact, types of electrodes). Then an experiment was defined, to test the accuracy of the sensors as well as the accuracy of the algorithms implemented in the Bluetooth device with which the vest transmits data to the PC. In particular, we aim to test (a) the detection of Heart Rate, by confronting data collected by the SMARTEX device with a "medical class" device, and (b) the number of steps detected by SMARTEX, comparing its output with the output obtained from a Nintendo Wii Balance Board. The procedure was refined after some pilots.

- **T7.2**

  The data collection of the first study among those planned in Q1 was completed. The study requires to bisect lines with a simulated laser pointer within two different virtual spaces: peripersonal space (near space) and extrapersonal space (far space). The participants wear an HMD (head mounted display) and are monitored via fNIRS. We hypothesized that bisecting lines in peripersonal space would activate parieto-occipital brain areas while bisecting lines in extrapersonal space would activate occipital brain areas.

2.7.2.3 Q3

- **T7.1**

  During Q3, UNIPD completed the accuracy test of the "SMARTEX" wireless sensorized vests by collecting and analyzing the data. The performance of SMARTEX electrocardiogram (ECG) and heart rate sensors was compared with a "medical class" pulse oximeter in situations varying in the level of stress (i.e., lying, standing, walking, or running). The accuracy of SMARTEX in conditions with low movements was also compared to the performance of a device manufactured by Beddit, which uses a ballistocardiography to measure heart rate during situations that do not involve large movements on the users' part (e.g., sleeping, sitting on a chair watching the TV). Acceptance of the SMARTEX device was also investigated through an ad-hoc questionnaire. Finally, UNIPD started a literature analysis to identify the usability guidelines to be first drafted in D7.1.

- **T7.2**

  During this quarter UNIPD progressed in a series of studies that use the line bisection paradigm to investigate spatial cognition, and in particular its visual-attentional features, in 3D spaces where objects manipulation can be supported by different tools.

  First, the 'fNIRS study' data (Fig. 1), which were collected in the previous quarter, were analyzed and the results discussed. VR-fNIRS HMD appears a technically suitable tool for scientific research on neural correlates involved in 3D environment navigation

Fig. 10 - *An image from the VR-fNIRS study*

In addition, two planned experiments were started (Exp.2 and Exp.3), testing the effects of possible methodological artifacts in line bisection tasks. Exp.2 considers the role of the chinrest (Fig. 2, left), which is sometimes adopted in previous literature; it investigates its effect on the pseudo-neglect effect in healthy subjects. Participants, with or without a chinrest, were asked to bisect lines with a real laser pointer or a set of wood sticks, along four different distances. The Exp.3 investigates the role of the arm position in producing the bisection error: we hypothesize that, in the bended arm condition, the bisection error (pseudoneglect) in the transition from peripersonal to extrapersonal space is different than in the stretched arm condition (Fig. 2, right). For both experiments 2 and 3 data have been collected.

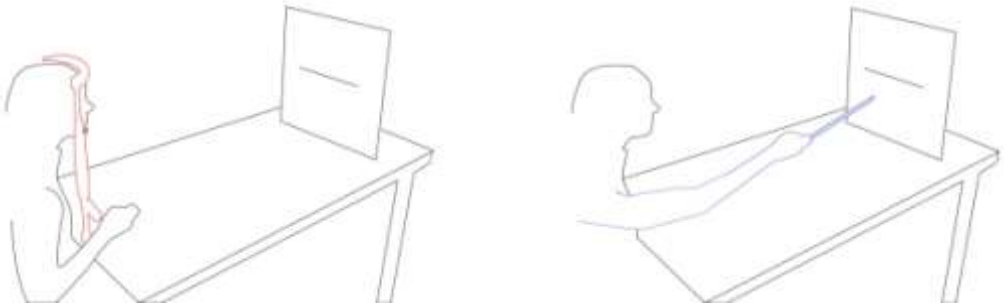


Fig. 11 - *A sketch of the experimental setting in the chinrest study (left) and in the arm position study (right)*

2.7.2.4 Q4

- **T7.1**

  The literature review started in Q3 was completed, as well as the first draft of the usability guidelines to be included in D7.1.

- **T7.2**

  During Q4, UNIPD completed the analysis of Exp.2 (with vs. without chinrest) and Exp.3 (bended vs. stretched arm position) in the series of studies planned to investigate spatial cognition during object manipulation in 3D spaces. Results have been discussed.

  In addition, a fourth study in this series was started, investigating the role of the visual continuity between the portion of the stick hold in participants' hand and the tip of the stick bisecting the line (Fig. 12 -). Is the tool's visual continuity needed to make the extrapersonal space closer? A virtual environment was developed integrating a Nintendo Wiimote as the tool adopted by participants to bisect the line in both conditions. Data were collected.

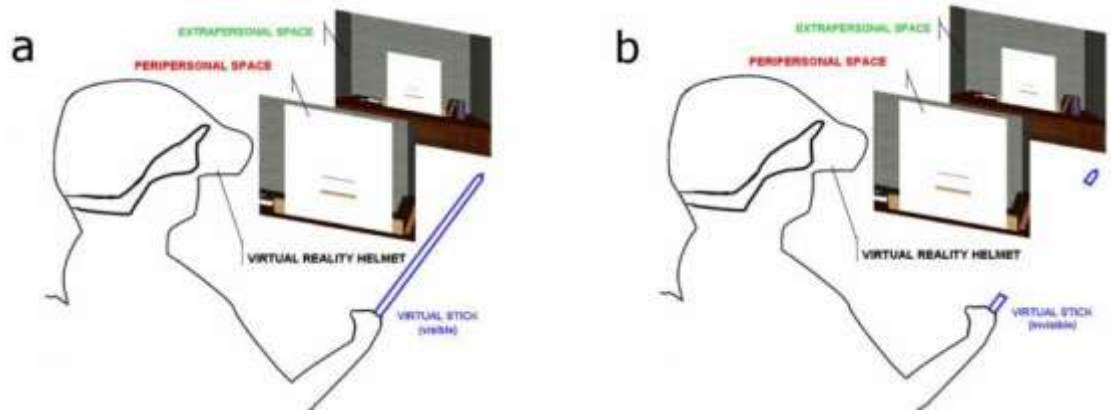


Fig. 12 - *A diagram sketching the two conditions (with and without visual continuity)*

- **T7.5**

  During this period CERTH started working in the relevance feedback task. CERTH developed an implicit response relevance feedback model to enhance the search process (Fig. 13 -).

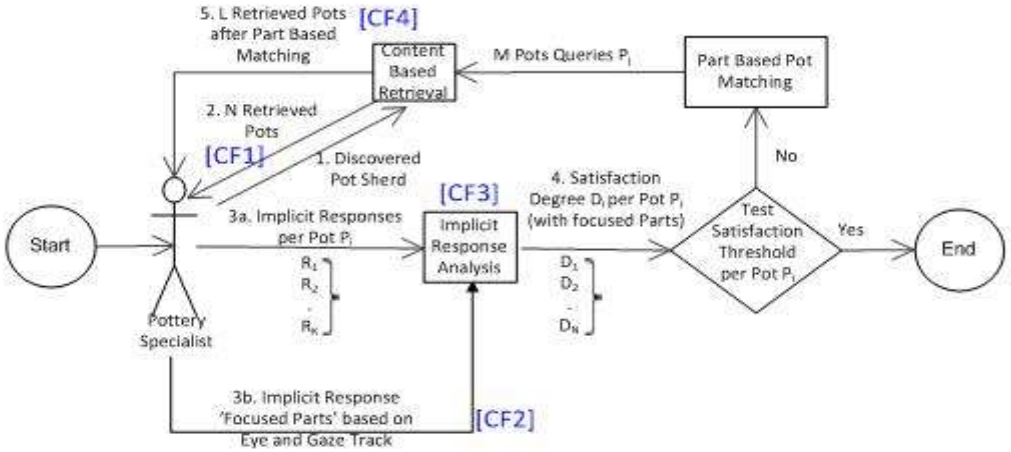


Fig. 13 - *Workflow for use of implicit responses for relevance feedback*

As an evaluation of the model and to get some first results for experimentation, CERTH started working on a psychological framework to map eye gaze and facial expressions to emotions and from them extract affective tags for the query objects (Fig. 14 -).

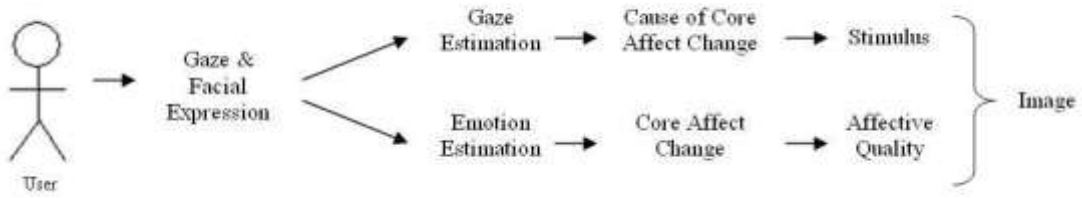


Fig. 14 - *System outline*

2.7.3 Deviations from the Project Work Programme

No deviation to be reported.

2.8 WP8 – Use Cases and Scenarios

2.8.1 Work Package Objectives

WP8 will focus on identifying how best to apply CEEDS technologies to enable diverse groups of users to better perform a range of tasks. An initial focus in WP8 will be to conduct user research in a selection of the domains to which CEEDS technology could potentially be applied, to identify currently unmet user needs. A key objective of WP8 is to ensure that the applications (both generic and customised) to be developed within CEEDS are genuinely useful and pleasurable for their target users; based on user- and application- needs, and not on technology push.

These objectives will be met through three work streams within WP8:

- User requirements capture and specification, involving the project's Stakeholder Advisory Group
- User characterisation (developing a typology of potential beneficiaries of CEEDS applications)
- Scenario development and use cases

These three work streams will be undertaken as a collaborative process with target end users of future CEEDS applications, using rigorous user research and engaging creative techniques appropriately.

WP8 comprises the following tasks:

- Task 8.1 Scenario development and use cases (Task Leader: GOLD. Other partners involved: UNIPD, UPF, ELECTROLUX, UH, UAU, UDP, BME)
- Task 8.2: Specifications and use case updates (Task Leader: GOLD. Other partners involved: UNIPD, UPF, ELECTROLUX, UH, UAU, UDP, BME)
- Task 8.3: Benchmarking and future outlook (Task Leader: GOLD. Other partners involved: UNIPD, UPF, ELECTROLUX, UH, UAU, UDP, BME)

2.8.2 Progress towards Objectives

These are presented below as they were reported by partners at the request of the Coordination Office (at each quarter).

2.8.2.1 Q1

- **T8.1**

  Q1 progress has focused on the following activities in Task 8.1.

  - Develop the Stakeholder Advisory Group (SAG): At the project set-up stage, several potential stakeholders from the different application areas were invited to participate as members of the CEEDs SAG. Three CEEDs partners are also SAG members. Activities conducted in relation to this goal have been:
    - Pooling together all information that will be required/ to be received from initial SAG members, based on the Description of Work;
    - Drafting a 'welcome letter' and associated documents for SAG members;
    - Extending and further refining the inclusion criteria for SAG membership against which to judge future potential SAG members and advertising for new SAG members
    - Literature review of projects exploring visualization and other representations of large datasets has identified a number of potentially relevant SAG members to target.
  - Research scoping (secondary/desk research) to inform the context for conducting primary research regarding the significance of CEEDs to end users**.** Preliminary (and ongoing) literature review and desk research conducted to: identify types of data used by potential CEEDs applications users and current visualisation techniques used to explore their data; identify commonalities in data across different application areas covered in CEEDs; and understand characteristics of potential CEEDs application users to ensure that CEEDs applications are driven by user needs not technology push.
  - Qualitative research tools: development and planning: Initial desk research has been conducted on conceptualizing use cases based on the goals of each application area. Draft use cases in pictorial form to be further developed for use as prompts in primary research with stakeholders.

2.8.2.2 Q2

Substantial effort has been expended on conceptualizing use cases based on the goals of each application area.

Stakeholder feedback on the initial use cases and scenarios presented in Annex 1 (Description of Work document) was received and collated in late January/early February 2011.

A full series of pictorials were developed illustrating the various inputs and outputs in any CEEDs experience (e.g., type of data displayed (pre-tagged or not), storage of user data, and real time influence of user data on display). These supported the identification of a number of goal dependent variations in use cases which were outlined in the form of a model of CEEDs experience. Finally a series of 5 high level initial (core) use cases were specified which can describe the full range of goals thus far supplied by the stakeholders (in their response to the initial consultation).

At different stages of the development of this work, other relevant partners were consulted via face to face and remote meetings (e.g., UNIPD, UH, UPF).

The development of the initial use cases was drafted into an internal document (due for circulation in early March) for discussion at the next Consortium meeting in April.

In addition, GOLD submitted a poster for the FET11 conference.

2.8.2.3 Q3

Progress in Q3 has focused largely on further developing an integrated framework for CEEDs that facilitates partners' ability to define applications that are in-scope of the project. The work has been conducted largely through extensive internal discussions and consultations. To this end, the following meetings/presentations that have included specific discussions about WP8 activities have taken place:

- 4th March 2011, Barcelona (Host: UPF), Attendees: GOLD, UNIPD, UH.
    - Discussion foci: GOLD's input-output conceptualisation and initial use cases and application scenarios
- 18th March 2011, SKYPE, Attendees: GOLD, UPF
    - Discussion foci: CEEDs conceptualisation in WP8 and History and Neuroscience application goals
- 6-7th April 2011, 2nd Consortium Meeting, London (Host: GOLD), Attendees: All partners
    - Discussion foci: presentation and debate on GOLD's input-output conceptualisation and initial use cases and application scenarios
- 4-6th May 2011, Fet Conference and Exhibition, Budapest
    - Poster presentation at Conference
- 5th May 2011, Budapest (Host: BME), Attendees: GOLD
    - Discussion foci: BME's research activities
- 17th May 2011, SKYPE, Attendees: GOLD, UH
    - Discussion foci: Commercial (Electrolux) application
- 18th May 2011, SKYPE, Attendees: GOLD, CERTH
    - Discussion foci: use cases and scenario internal document outlining archaeology and commercial (Electrolux) applications
- 25-27th May 2011, London (Host: GOLD), Attendees: UPF
    - Discussion foci: redefining use cases as core features and further specifying in-scope potential applications
- 27th May 2011, Porcia (Host: ELECTROLUX), Attendees: GOLD, UH, UNIPD, TEES, CERTH
    - Discussion foci: discussion of Electrolux's appliance scenario building on the document circulated by CERTH and GOLD's core features

As a result of these activities project partner groupings and leads have been established to work on each application area: Archaeology, History, Commerce, and Astrophysics/Neuroscience (now grouped as "Science"). The project groups have been refining their planned scenarios and activities whilst ensuring the CEEDs core features are being met.

Other SAG activities have involved updating partners on interest received by external stakeholders in the CEEDs project (via the web site advert, Fet conference, and contacts through other projects). Involvement of external stakeholders at this stage has been limited because of the importance of establishing a coherent internal CEEDs framework.

Based on the CEEDs poster presentation at Fet, a 2 page manuscript was written and submitted to Fet11*Essence*.

2.8.2.4 Q4

Progress in Q4 has focused on further activity for T8.1 Scenario Development and Use Cases. The Core Features were established in Q3 and initial scenarios were developed for each

application area based on the inputs from stakeholders received in the consultation work earlier in the year. There was a wide range of application goals suggested by the partners, but the focus here was on identifying one or two workable (and relatively simple) scenarios that met the core features and could be achieved as a first step. Generating scenarios was largely a collaborative activity with some partners providing more rich information about their application and this being re-written by GOLD into simple steps with core features placed at each step. In Q4, effort by GOLD was given to disseminating the final core features and illustrative scenarios internally and revising/reformatting some of the scenarios on request by other Application partners. An internal document describing the core features was circulated to key partners (UPF, UH, UNIPD, TEES, CERTH/ITI and ELECTROLUX). The work was also discussed at the Integration meeting (with technical partners) in early June (see meetings below). The purpose was for Application partners (WP6) to elaborate on their respective scenarios and develop the concepts into workable prototypes.

Q4 also focused on engaging new SAG members. Several contacts were made by GOLD with stakeholders related to the 'retail' application area. Most were marketing and advertising companies; all were organisations that in some way were seeking to alter the user experience of a space for different purposes (e.g., more personalized product selection; facilitating speedy behaviour through a space in which the user complies with rules).

Q4 also focused on writing up the work conducted in year 1 for D8.1.

Attendance at the following meetings in Q4 (note need to include Adidas):

- 8-10th June 2011, Barcelona (Host: UPF), Attendees: technology partners
    - Discussion foci: Integration meeting which included presentation of the finalized core features from WP8
- 22nd June 2011, London, (GOLD) Attendees: external stakeholder Focus Innovation
    - Discussion foci: included presentation of CEEDs and SAG membership
- 13th July 2011, (am), SKYPE (Host: GOLD), Attendees: TEES
    - Discussion foci: identification of type of experience (mental states, affective states) that application wishes to induce in user; specific user implicit inputs which are to be defined over the next year by partners exploring implicit measures of meaningful constructs
- 13th July 2011, (pm) London (Host: external stakeholder, Start Creative/Focus Innovation), Attendees: GOLD
    - Discussion foci: included SAG membership and user requirements
- 18th July 2011, SKYPE (host: GOLD), Attendees: All PCC members
    - PCC meeting
- 27th July 2011, London (Host: external stakeholder, Start Judge Gill)
    - Discussion foci: included presentation of CEEDs and SAG membership
- 25th August, London (Host: GOLD), Attendees: external stakeholder Start Judge Gill
    - Discussion foci: measurement and evaluation of consumer needs in advertising context

2.8.3 Deviations from the Project Work Programme

No deviation to be reported.

2.9 WP9 – Dissemination, Exploitation Planning, Training and Networking

2.9.1 Work Package Objectives

WP9 is dedicated to raise project results awareness, design IPR strategy, support future exploitation and dissemination activities, and support cross-disciplinary education and training of researchers within the consortium. The main aim of WP9 is to disseminate and prepare for the exploitation of CEEDs' achievements.

WP9 comprises the following tasks:

- **Task 9.1: Dissemination Planning and Monitoring / Exploitation Planning** (Task leader: GOLD, Other partners involved: All).
- **Task 9.2: Dissemination through press releases, workshops, installations, performances and exhibitions** (Task leader: GOLD, Other partners involved: UNIPD, UPF, Teeside).
- **Task 9.3: Networking with scientific communities and other EU projects Exploitation and Experience** (Task leader: GOLD, Other partners involved: All).
- **Task 9.4: Joint Collaborative Task with similar FET projects** (Task leader: GOLD, Other partners involved: All).
- **Task 9.5: Education and training** (Task leaders: GOLD, Other partners involved: All).

2.9.2 Progress towards Objectives

These are presented below as they were reported by partners at the request of the Coordination Office (at each quarter).

2.9.2.1 Q1

- The project website was developed and is up and running at: ceeds-project.eu. A CEEDS blog was also developed and will be used to post news about the project. A new Facebook page and group was created in order to further promote the project.
- Initial contact has been made with the Virtual Embodiment and Robotic Re-Embodiment (VERE), an Integrated Project also funded under the European Seventh Framework Program, Future and Emerging Technologies (FET).
- Initial draft of deliverable Dissemination, Collaboration and Training Report Yr1 was developed by producing some initial market studies and conducting an initial SWOT analysis (Strength, Weaknesses, Opportunity and Threat) for CEEDS applications.
- Press releases have been released announcing the start of CEEDs.
- An initial draft of the project presentation was developed and was presented at 6th FP7 Networked Media Concertation Meeting - User Centric Media Cluster, 30th November 2010.
- CEEDs logo was created.
- The text and provision layout for the CEEDs project brochure was developed.

2.9.2.2 Q2

- The CEEDs brochure was designed in line with the project's identity, which gives general information about the project's vision. Additionally, the brochure presents the project's objectives and expected results and includes the projects partners, the project

coordinator contact details and address of the project website. A quick response (QR) code was also included that direct viewers to the CEEDs website. The CEEDs brochure will be disseminated to interested universities, institutions, as well as potential stakeholders, during large educational and commercial events, such as expos, conferences, workshop and seminars.

- The project web site and blog was updated and new events/news were reported.
- Progress on deliverable Dissemination, Collaboration and Training Report Yr1 were made
    - Initial exploitation plan, which includes the details of the IPR Agreement concerning the application and use of CEEDs, as agreed and signed by all project's partners; a list of the potential stakeholders from different application areas participating as internal and external members of the CEEDs Stakeholder Advisory Group (SAG); and a list of national and international projects working on objectives related with the CEEDS environment;
- Press releases have been released.
- A meeting with the VERE project coordinator was held in March 2011 to discuss collaboration between the projects. Following the meeting, in April the CEEDs Consortium approved CEEDs involvement in all the concertation areas discussed during the meeting:
    - linked/collaborative student-led summer workshops/conferences;
    - high level regular (at least 6-monthly) concertation between Jonathan Freeman and Mel Slater as respective coordinators of the HC2 projects, CEEDs and VERE; and
    - joint dissemination under the aegis of the HC2 CA from Starlab.
- A workshop will be organised together with VERE during the second year of the project.

2.9.2.3 Q3

- A list of potential international conferences and relevant journals for dissemination was circulated during the 2nd Consortium meeting to all partners. The list was then updated progressively by adding other events/journals as suggested by CEEDs partners, and circulated again via email. The list is constantly updated and is available to all partners on the CEEDs collaborative space.
- A general CEEDs slide pack for public facing dissemination was developed and made available by GOLD.
- A second video highlighting the project concept and developments – "embodied interaction with complex neuronal data in the mixed-reality space XIM" - was made available on the CEEDs website (http://ceeds-project.eu/ceeds-in-pictures/a-prototype-of-a-neural-simulator-application-implemented-in-the-xim/). This video, along with the "CEEDs: FUTURE IMPRESSIONS" video issued by UPF at the beginning of the project, will be shown on various events (e.g., conferences, industry events, workshops).
- CEEDs was presented at the European Future Technologies Conference and Exhibition (FET), which was held in May 4-6, 2011 in Budapest, Hungary.
- A CEEEDs poster was also accepted for publication at FET2011.
- The CEEDs brochure was finalised and circulated to all partners at the 2nd Consortium meeting.

2.9.2.4 Q4

- A preliminary template was distributed to all partners to capture their initial ideas and individual plans for the *exploitation of the potential foreground* (i.e., projects' results that each partner expects to exploit at the end of the project). The template indicated great potential in terms of both *commercial exploitation of R&D results* (CEEDs engine; user interfaces supporting subconscious user interaction with interactive narratives and

interactive media) and *general advancement of knowledge* (e.g., theoretical model of conscious presence and its absence, theoretical and practical insights into adaptive sampling). A complete *questionnaire* that aims to identify the most attractive opportunities for exploitation and then planning to investigate these opportunities will be developed in Year 2 and will be distributed to all partners and SAG members.

- A review was conducted of the *key trends* and of the *existing tools* for the exploration and analysis of large datasets in application domains of scientific research relevant to the project. The analysis (and benchmark table) outlined how the CEEDs system has some strong and innovative characteristics compared to its "competitors". Compared to similar virtual environments tools for data visualization, analysis and understanding, CEEDs offers unique features such as, for example, the ability to produce a virtual and interactive world that adapts its visual appearance (and other data representation formats, e.g. sonification) to the implicit behaviour of its users, which is the key to direct users to areas of potential interest in the visualizations and to guide users' discovery of patterns and meaning in the datasets
- The preliminary findings of the SWOT analysis, which helps to recognise CEEDs' *strengths (S)* and *weaknesses (W)*, as well as to spot *opportunities (O)* and any *threats (T)* the project will face, were reported in D.9.1.

A list of scientific (peer-reviewed) articles/papers published (or in press), and of (generic) external dissemination activities carried out, in Year 1 is presented in the next pages.

Tab. 2 - *List of scientific (peer-reviewed) articles/papers published (or in press) in Year 1 by partner (and in chronological order).*

Title	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publ.	Year of publ.	Rel pages	Permanent identifiers (if avail)	Open access provided?	Partner
Unleashing the Power of the Subconscious	J. Lessiter, A. Miotto, J. Freeman, P. Verschure, U. Bernardet	Procedia Computer science		Elsevier		2011		http://www.fet11.eu/images/final_posters/171_final_poster.pdf	Yes	GOLD UPF
Real time fMRI: A tool for local brain regulation	A. Caria, R. Sitaram, N. Birbaumer	The Neuroscientist		SAGE		2011		http://www.pdf-archive.com/2011/06/21/nf-fmri-caria-2011/nf-fmri-caria-2011.pdf	Yes	EKUT
Hydrostatically coupled dielectric elastomer actuators: new opportunities for haptics	F. Carpi, G. Frediani and D. De Rossi (UDP)	Materials Research Society Symposium Proceedings	Vol. 1312			In press		Presentation available at: http://www.dexmart.eu/fileadmin/dexmart/public_website/downloads/presentations/USAAR-Workshop-A6.pdf		EKUT
Age and gender classification from speech using decision level fusion and ensemble based techniques	F. Lingenfelser, J. Wagner, T. Vogt, J. Kim, E. Andr	INTERSPEECH 2010			Makuhari - Chiba (JP)	2010	2798-2801	http://www.isca-speech.org/archive/interspeech_2010/i10_2798.html		UAU
The Social Signal Interpretation Framework (SSI) for Real Time Signal Processing and Recognition	J. Wagner, F. Lingenfelser, E. André	Interspeech 2011				In press		http://www.isca-speech.org/archive/interspeech_2010/i10_2798.html		UAU
Exploring Fusion Methods for Multimodal Emotion Recognition with Missing Data	J. Wagner, F. Lingenfelser, E. André, J. Kim	IEEE Transactions of Affective Computing				In press		http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=5871582		UAU
Social Signal Interpretation (SSI): A Framework for Real-Time Sensing of Affective and Social Signals	J. Wagner, F. Lingenfelser, N. Bee, E. André,	Künstliche Intelligence, Special Issue on Emotional Computing				In press		http://cat.inist.fr/?aModele=afficheN&cpsidt=24348377		UAU
An Evaluation of Emotion Units and	T. Vogt, E. André	Künstliche Intelligence, Special Issue on Emotional				In press		http://www.springerlink.com/content/du53		UAU

Feature Types for Real-Time Speech Emotion Recognition		Computing				502q6j6t57un/	
Wearable Systems for Brain body Reading and Mind Healing	A. Tognetti, E. P. Scilingo, G.Anania, N.Carbonaro, A. Lanatà, F.Lorussi, D.Mazzei, G.Valenza, D. De Rossi	CyberTherapy & Rehabilitation (C&R) Magazine- Personalized Health Systems issue			2011		UDP
Dielectric elastomer actuators with granular coupling	F. Carpi, G. Frediani, M. Nanni and D. De Rossi (UDP)	Smart Structures and Materials 2011: Electroactive Polymer Actuators and Devices	Vol. 7976	Y. Bar-Cohen Editor, Proc. of SPIE	2011	http://spiedigitallibrary.org/proceedings/resource/2/psisdg/7976/1/79760X_1?isAuthorized=no	UDP
Hydrostatically coupled dielectric elastomer actuators	F. Carpi, G. Frediani and D. De Rossi	Materials Research Society Symposium Proceedings	Vol. 1312		In press	http://spiedigitallibrary.org/proceedings/resource/2/psisdg/7976/1/79760X_1?isAuthorized=no	UDP
Eye tracking and pupil size variation as response to affective stimuli: a preliminary study	A. Lanatà, A. Armato, G. Valenza, E. P. Scilingo	Proceedings of the 5th International Conference on Pervasive Computing Technologies for Healthcare 2011			In Press		UDP
Electroactive polymer actuators as artificial muscles: are they ready for bioinspired applications?	F.Carpi et al.	Bioinspiration & Biomimetics			In press		UDP
Electroactive polymer patches for wearable haptic interfaces	E.Scilingo, F.Carpi, A.Tognetti, N. Carbonaro, D. De Rossi	Proceedings of 33 Annual International Conference of the IEEE -Engineering in Biology Society Integrating Technology and Medicine for a Healthier Tomorrow- Boston (MA), 30 Aug-			In Press	https://embs.papercept.net/conferences/scripts/abstract.pl?ConfID=14&Number=1419	UDP

		3 Sept 2011			
Enhancing the Performance of Upper Limb Gesture Reconstruction Sensory Fusion"	F. Lorussi, A.Tognetti, N. Carbonaro, G. Anania, D. De Rossi	Proceedings of 33 Annual International Conference of the IEEE -Engineering in Biology Society Integrating Technology and Medicine for a Healthier Tomorrow Boston (MA), 30 Aug-3 Sept 2011	In Press	https://embs.papercept.net/conferences/scripts/abstract.pl?ConfID=14&Number=1110	UDP

Tab. 3 - *List of (generic) external dissemination activities carried out in Year 1 by partner (and in chronological order)*

Type of activities	Main leader	Title	Date	Place	Type of audience	Size of aud	Countries addressed	Link	Partner
INVITED TALK on CEEDs User Centred approach	J. Freeman	User Centred Media Cluster of the Networked Electronic Media Directorate (EC) 6th Concertation meeting	30 Nov 2010	Brussels (BL)			European Countries		GOLD
INVITED TALK "Shape Revisited: Beyond Marr"	F. Fol Leymarie		7 Oct 2010	Barcelona (ES)	Academic		Spain		GOLD
CEEDs LOGO, FONTS, COLOURS AND TEMPLATES FOR PRESENTATIONS	A. Miotto	na	Sep 2010	London (UK)	General public	na	Worldwide		GOLD
CEEDs WEBSITE AND BLOG	A. Miotto	na	Avail from Oct 2010	London (UK)	General public	na	Worldwide	Hyperlink	GOLD
INVITED RESEARCH TALK on Virtual reality, digital media, social networking sites and Psychology	J. Freeman	London and Home Counties (L&HC) Branch of the British Psychological Society	15 Feb 2011	London (UK)			UK		GOLD
PRESS RELEASE	A. Miotto	na	6 April 2011	London (UK)	General public	na	Worldwide	Hyperlink	GOLD
CEEDs BROCHURE	A. Miotto	na	Printed in May 2011	London (UK)	General public	na	Worldwide	Hyperlink	GOLD
CEEDs VIDEO	P. Verschure	na	Sep 2010	Barcelona	General	na	Worldwide	Hyperlink	UPF

Future impression				(ES)	public				
CEEDs VIDEO Embodied interaction with complex neuronal data in the mixed-reality space XIM	P. Verschure	na	Apr 2011	Barcelona (ES)	General public	na	Worldwide	Hyperlink	UPF
INVITED TALK	U. Bernardet	The large-scale neuronal systems simulator iqr, and its application in modeling and the construction of artifacts	12 May 2011	Pisa (IT)	Academic	na		Hyperlink	UPF
INVITED LECTURE on Consciousness"Measuring consciousness: from behaviour to neurophysiology"	A. Seth	Goldsmiths, University of London London (UK)	27 Nov 2010		Academic	50	UK	Hyperlink	UOS
PUBLIC EVENT "Neuroscience and the Guitar"	A. Seth	Art of Life Science Festival	22 Oct 2010	Shoreham (UK)	General public	200	UK		UOS
INVITED TALK "Measuring consciousness"	A. Seth	Cognitive Science Lecture Series	23 Mar 2011	Amsterdam (NL)	Academic	100	NL		UOS
INVITED TALK "Measuring consciousness"	A. Seth	Computer Science Semninar, Bristol	2011	Bristol UK	Academic	50	UK		UOS
INVITED LECTURE "Multimodal Analysis of Paralinguistic and Non-Verbal Behaviors"	E. André	Workshop on Linguistische Analysen in der Mensch-Maschine-Interaktion	15 Oct 2010	Magdebur (DE)					UAU
INVITED LECTURE "Real-time Sensing of Affective and Social Interactions with Smart Artifacts"	E. André	Symposium on Interaction with Smart Artifacts	8 Mar 2011	Tokyo (JP)					UAU
PRESS RELEASE	J. Jost		22 Jun 2011					Hyperlink	MPG
PRESS RELEASE	T. Barnabas	National Geographic (Hungarian version)	October 2010		Generic	na	Hungary	Hyperlink	BME
TV INTERVIEW	T. Barnabas	DELTA			General public	na	Hungary	Hyperlink	BME
INVITED TALK "Trend and perspective to network robots in EU"	A Sanfeliu	The first International Symposium on Ubiquitous Network Robot	8 November 2011	Osaka (Japan)	General public	200	Japan		UPC
INVITED TALK	A Sanfeliu	Monodukuri summit	9	Osaka	General	200	Japan		UPC

"Developing tools for urban services"		(sponsored by Osaka city office) Human Interface society of Japan	November 2011	(Japan)	public				
INVITED TALK Robotica Urbana	A Sanfeliu	Campus Party	13 July 2011	Valencia (Spain)	General public	na	Spain		UPC
INVITED LECTURE "New Frontiers of e-textiles"	D. De Rossi	IX Edition of BergamoScienza conference	16 Oct 2010	Bergamo (IT)					UDP
INVITED LECTURE "Smart textiles for the information society"	D. De Rossi	Conference "La ricerca paga?"	24 Feb 2011	Pavia (IT)					UDP
PRESS ARTICLE "Il cervello impara dalle esperienze"	A. Smaniotto	INNOV'AZIONE Magazine n. 11 (Italian Science Park Magazine)			Academic	na	Italy		UDP
INVITED TALK "Wearable systems for healthy and wellness"	D. De Rossi	Conference on Science & Technology for the sportwear- Security, comfort and quality for sportwear	11 April 2011	Roma (I)	Generic public	na	Italy		UDP
INVITED TALK "Towards variable-stiffness dynamic hand splints based on dielectric elastomer transducers	F. Carpi	EuroEAP 2001, First International conference on Electromechanically Active Polymer (EAP) transducers & artificial muscles	8-9 June 2011	Pisa (I)	Academic & Industries		Italy		UDP
INVITED TALK "Improving performance of dielectric elastomer actuators via corona charging"	F. Galantini	EuroEAP 2001, First International conference on Electromechanically Active Polymer (EAP) transducers & artificial muscles	8-9 June 2011	Pisa (I)	Academic & Industries		Italy		UDP
INVITED TALK Refreshable Braille cells based on dielectric elastomer actuators	F. Carpi	EuroEAP 2001, First International conference on Electromechanically Active Polymer (EAP) transducers & artificial muscles	8-9 June 2011	Pisa (I)	Academic & Industries		Italy		UDP
Conference participation	D. Zanella	The ASME 2011 World Conference on Innovative Virtual Reality (WINVR2011)	27-29 Jun 2011	Milan (IT)	Academic	na	Italy	Hyperlink	ELX
INVITED TALK "Greek city planning and society"	J. Bintliff	Den Haag European Archaeology Conference	1 Sep 2010						UL

INVITED TALK "Research on the ancient city of Koroneia"	J. Bintliff	International Boeotia Conference	9 Sep 2010	Livadheia (GR)				UL
INVITED TALK "Problems of surveying ancient cities"	J. Bintliff	International Survey Workshop	3 Nov 2010	Ghent (BL)				UL
INVITED TALK "The Ancient Cities of Boeotia Project"	J. Bintliff		27 Nov 2010	Crete (GR)				UL
INVITED TALK "Reconstructing invisible ancient cities"	J. Bintliff, C. Piccoli	International Honours Class Workshop	24 Mar 2011	Leiden (NL)				UL
PRESS RELEASE	J. Bintliff		10 May 2011		General public	na	Worldwide Hyperlink	UL
Design Research	G. Jacucci	Seminar Aalto Uni	Sep-Dec 2010	Helsinki	Academic (Students)		Finland	UH
Advanced Topics in HCI,	G. Jacucci	Seminar, UH	Sep-Dec 2010	Helsinki	Academic (Students)		Finland	UH

2.9.3 Deviations from the Project Work Programme

No deviation to be reported.

2.10 WP10 - Management, Coordination and Ethics

2.10.1 Work Package Objectives

The main aim for WP10 is to manage the project to a successful completion and to achieve its tasks and objectives, within the agreed time schedule and budget, and with results that meet the agreed high quality standards.

WP10 comprises the following tasks:

- **Task 10.1: Consortium Management** (Task leader: GOLD, PCC, PMB; Other partners involved: All)
- **Task 10.2: Financial Management** (Task leader: GOLD, Other partners involved: All)
- **Task 10.3: Activity Planning and Reporting to the Commission** (Task leader: GOLD, Other partners involved: All)
- **Task 10.4: Scientific Co-ordination and WP Interfacing** (Task leader: UPF, Other partners involved: All)
- **Task 10.5: Ethical considerations in confluent systems** (Task leader: UNIPD, Other partners involved: GOLD)

2.10.2 Progress towards Objectives

These are presented below as they were reported by partners at the request of the Coordination Office (at each quarter).

Please note that – as requested in the guidelines for producing this report – Tasks 10.1, 10.2, 10.3, and 10.4 of this work package will be reported upon in a separate section (Chapter 3).

2.10.2.1 Q1

- **T10.5**

  A literature review was carried out, focusing on the ethical issues of the research with Information and Communication Technologies. About 40 relevant papers were selected and examined to extract a list of ethical issues, a set of measures to deal with these issues and some references to regulations/codes of conducts. These results will inform the activity of the next quarter (i.e., identifying CEEDs risk areas in terms of privacy and ethics).

2.10.2.2 Q2

- **T10.5**

  An on-line survey was designed and administered to the unit leaders of the CEEDs consortium. The survey allows to identify if risks for privacy and ethics derive from the

project's activities, in addition to other information to include in CEEDs confidentiality policy. The items in the survey are based on the literature review carried out in Q1

2.10.2.3 Q3

- **T10.5**

  UNIPD wrote a document containing CEEDs Ethical Guidelines and submitted it for feedback to all partners

2.10.2.4 Q4

- **T10.5**

  Ethics guidelines document was finalized.

2.10.3 Deviations from the Project Work Programme

No deviation to be reported.

3 Project Management During the Period

Consortium management tasks and achievements

The management of the CEEDs consortium includes the organisation of the kickoff meeting, the annual project meetings and the regular work package meetings, regular monitoring of the progress within the work packages, managing the annual report, and the establishment of the decision-making structure for the project, ensuring it the involves all contractors in management decision-making. With regards to this last task, the CEEDs Project Management Board (PMB, with one member per participant) and Project Coordination Committee (PCC, which comprised Coordinator, Scientific Director, and WP leaders) were set up during the kick off meeting in Barcelona on October 4th-5th, 2010.

Composition of both PCC and PMB as below:

PCC	
GOLD	Jonathan Freeman
UPF	Paul Verschure (Scientific Director)/ Pedro Omedas
UOS	Anil Seth
UDP	Danillo de Rossi
BME	Barnabas Takas
UPC	Alberto Sanfeliu
UNIPD	Luciano Gamberini

PMB	
GOLD	Jonathan Freeman
UPF	Paul Verschure
UOS	Anil Seth
ITI	Michael Gerassimos Strintzis or Petros Daras
EKUT	Niels Birbaumer
UAU	Elisabeth Andre
TEESSIDE	Marc Cavazza
UNIPD	Luciano Gamberini
MPG	Jürgen Jost
ENS Paris	Sid Kouider
BME	Barnabas Takacs
UPC	Alberto Sanfeliu
UDP	Danillo de Rossi
ELECTROLUX	Claudio Cenedese
UL	John Bintliff
UH	Giulio Jacucci

The K-O meeting was also devoted to: a) introduction of the partners and their planned contribution to the project; b) brain storming on different issues, including basic research, technology research and applied/user research; c) detailed planning for interaction and collaborative work for the first 6 months of the project.

The progress of the project and the work packages were further monitored during the CEEDs 2nd Consortium meeting held at Goldsmiths, University of London (April 6-7, 20011). Other meetings (including five PCC and two PMB meetings) also took places at different partners'

institutions (please see a full list of meetings attended by CEEDs partners during the reporting period). In order to allow for additional interaction between the CEEDs participants, an account was created with Box.net, a leading content management and collaboration service with over 2 million users. Box.net is intended to be the main dissemination channel among the project partners. It is used for collaborating on deliverables, reports, publications, etc.

Moreover, four different mailing lists [1) *Project Coordination Committee (PCC)*; 2) *Project Management Board (PMB)*; 3) *All CEEDs Researchers*; 4) *CEEDs Administration and PMB*] were created with Google Groups, to allow for an easy and fast communication among all project members.

Changes in the consortium, if any

Centre National de Recerche Scientifique was added as a 3rd Party to Ecole Normale Superieur (ENS, CEEDs partner 10) at ENS' request, via a Amendment 1 to the CEEDs GA, agreed by exchange of letters between Goldsmiths and the Commission.

List of project meetings, dates and venues

For a description of each event and attendees, please see D9.1

Tab. 4 - *List of internal dissemination carried out in Year 1 (in chronological order)*

Type of activities	Place	Date
1st (Kick-off) Consortium meeting	Barcelona (ES)	4-5 Oct 2010
1st PCC meeting	Barcelona (ES)	5 Oct 2010
1st PMB meeting	Barcelona (ES)	5 Oct 2010
WP6 application development	[Conference call]	23 Nov 2010
2nd PCC meeting	[Conference call]	16 Dec 2010
3rd PCC meeting	[Conference call]	3 Feb 2011
User needs meeting	London (UK)	10-11 Feb 2011
XIM Upgrade Design meeting	Barcelona (ES)	22-25 Feb 2011
User needs meeting	Barcelona (ES)	4 Mar 2011
2nd Consortium meeting	London (UK)	6-7 Apr 2011
2nd PMB meeting	London (UK)	6-7 Apr 2011
4th PCC meeting	London (UK)	6-7 Apr 2011
User needs meeting	London (UK)	26-27 May 2011
Application "Appliance" Scenario	Porcia (IT)	27 May 2011
Technical Integration Meeting	Barcelona (ES)	8-10 Jun 2011
Archaeology scenario meeting	Leipzig (DE)	20-21 Jun 2011

Historic data applications side visits	Bergen Belsen (DE)	12-13 Jul 2011
Neuronal data meeting	Barcelona (ES)	14-15 Jul 2011
5th PCC meeting	[Conference call]	18 Jul 2011

Project planning and status

The project is running according to schedule and all the deliverables and milestones planned for the reporting period have been realised. The following CEEDs meetings have been planned:

- November, 9-10, 2011: CEED pre-review meeting in Brussels, BL.

- Early April, 2011: CEEDs 4th Consortium meeting in Crete (location to be confirmed).

The project timetable is presented in Annex I.

Impact of possible deviations from the planned milestones and deliverables, if any

All the deliverables and milestones planned for the reporting period have been realised.

Any changes to the legal status of any of the beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs

There have not been any changes in the legal status of the participants

Development of the Project website, if applicable

An interactive and accessible project web site, ended for dissemination to the scientific/technological community and to the general public, was set up by GOLD and made available in Month 2. The website's address ceeds-project.eu has been reserved by the Consortium and will be referred to in all CEEDs public documents and presentations. The website was designed and developed using Wordpress (i.e., an open source blog tool and publishing platform powered by PHP and MySQL), and is available in English. A counter of visitors and other statistical tools are used to monitor the usability and interest created by the website and the project. At the moment of writing this deliverable, the CEEDs website is receiving an average of 1100 views per month (Figure 4). Since the launch of the website in October 2010, more than 12.000 people have visited CEEDs web pages.

4 List of Deliverables (M1-12)

Table below shows the deliverables allocation of the CEEDs project with deadlines for each deliverable and their actual/forecast delivery date.

Tab. 5 - *Deliverables allocation with deadlines and actual/forecast delivery dates.*

Del n.	Deliverable Name	WP	Lead Ben.	Nat.	Diss. Lev.	Date Due	Delivered Yes/No	Actual/ Forecast Del. Date	Comments
D10.1	Project information manual and quality plan	10	GOLD	R	PU	30/11/10	Yes	30/11/10	
D10.2	Project ethical guidelines	12	UNIPD	R	PU	30/02/11	Yes	30/02/11	
D1.1	Theory of human unified experience, Year 1 Report	1	UPF	R	PU	31/08/11	Yes	31/08/11	
D2.1	Sensing systems: requirements	2	UDP	R	CO	31/08/11	Yes	31/08/11	
D3.1	CEEDS engine: definitions, architecture, narratives and data discovery	3	UPF	R	PU	31/08/11	Yes	31/08/11	
D4.1	CXIM 2.0 Environment	4	BME	P	PU	31/08/11	Yes	31/08/11	
D5.1	Specifications and architecture	5	UPC	R	PU	31/08/11	Yes	31/08/11	
D6.1	Conceptualization and Design of CEEDS system architecture for Applications	6	UPF	R	PU	31/08/11	Yes	31/08/11	
D7.1	CEEDs user-experience research plan and year 1 report	7	UNIPD	R	PU	31/08/11	Yes	31/08/11	
D8.1	CEEDS uses: use cases for different types of user and their needs	8	GOLD	R	PU	31/08/11	Yes	31/08/11	
D9.1	Dissemination, Collaboration and Training Report Yr1	9	GOLD	R	PU	31/08/11	Yes	31/08/11	
D10.3	Year 1 Progress Report and Implementation plan	10	GOLD	R	PU	31/08/11	Yes	31/08/11	

5 List of Milestones (M1-12)

Table below shows the Milestones of the CEEDs project with deadlines and actual/forecast delivery date.

Tab. 6 - *Milestones with deadlines and actual/forecast delivery dates.*

Mil n.	Milestone Name	WP	Lead Ben.	Date Due	Achieved Yes/No	Actual/ Forecast Del. Date	Comments
MS40	Kick-off meeting	10	GOLD	30/09/10	Yes	04/11/10	
MS6	Requirements and user needs	2	UDP	30/11/10	Yes	30/11/10	
MS25	Definition of guidelines template and user experience evaluation methods	7	UNIPD	28/02/11	Yes	28/02/11	
MS32	Stakeholder Advisory Group set-up	8	GOLD	28/02/11	Yes	28/02/11	
MS1	Abstract theoretical model developed	1	UPF	31/08/11	Yes	31/08/11	
MS10	Specification of CEEDS engine architecture and components	3	UPF	31/08/11	Yes	31/08/11	
MS14	Upgrade of XIM to CXIM 2.0	4	BME	31/08/11	Yes	31/08/11	
MS18	Specifications and architecture	5	UPC	31/08/11	Yes	31/08/11	
MS21	Unified technical and scientific vision on potential Applications	6	UPF	31/08/11	Yes	31/08/11	
MS26	First definition of guidelines	7	UNIPD	31/08/11	Yes	31/08/11	
MS33	Draft use cases	8	GOLD	31/08/11	Yes	31/08/11	
MS37	Identified first dissemination and exploitation targets	9	GOLD	31/08/11	Yes	31/08/11	

6 Explanation of the Use of the Resources

6.1 PM Report by Partner and WP compared to Budget Y1

Y1	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9	WP10	Total used in reporting period	Planned for reporting period	Total used accum.	Total planned (48M)
	(PMs)	(PMs)	(PMs)	(PMs)	(PMs)	(PMs)	(PMs)	(PMs)	(PMs)	(PMs)	(PMs)	(PMs)	(PMs)	(PMs)
GOLD	0.00	0.00	0.36	0.00	0.00	0.62	0.00	11.35	2.10	8.95	23.38	24.75	23.38	99
UPF	6.10	0.50	21.08	1.92	0.20	16.45	0.00	0.60	0.00	2.75	49.60	35.75	49.60	143
UOS	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.17	1.57	11.25	1.57	45
ITI	0.00	0.00	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.80	5	3.80	20
EKUT	6.00	8.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.50	18.75	14.50	75
UAU	0.00	15.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.75	14.25	15.75	57
TESSIDEE	0.00	0.00	8.00	0.00	0.50	1.50	0.00	0.00	0.00	0.00	10.00	10.5	10.00	42
UNIPD	0.00	0.00	0.00	0.00	0.00	0.00	12.85	0.50	0.00	3.25	16.60	16	16.60	64
MPG	0.20	0.00	11.70	0.00	0.00	0.00	0.00	0.00	0.00	0.10	12.00	15	12.00	60
ENS	7.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	7.25	10.75	7.25	43
BME	0.00	0.00	0.00	15.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	15.25	15.00	61
UPC	0.00	0.00	1.50	0.00	12.65	0.00	0.00	1.30	0.25	0.27	15.97	14.5	15.97	58
UDP	0.00	12.10	0.00	4.71	0.00	0.00	0.00	0.00	0.00	0.27	17.08	18	17.08	72
ELECTROLUX	0.00	0.00	0.00	0.00	0.00	0.50	0.30	1.35	0.00	0.35	2.50	4.75	2.50	19
UL	0.00	0.00	0.00	0.00	0.00	3.14	0.00	2.13	0.00	0.00	5.27	3.75	5.27	15
UH	0.00	0.00	0.00	0.00	0.00	3.20	0.00	0.00	0.00	0.00	3.20	6.5	3.20	26
Total used in reporting period	20.84	36.85	46.44	21.63	13.35	25.41	13.15	17.23	2.36	16.21	**213.47**			
Planned for reporting period	37.75	30.25	35	26.25	15.25	20.25	23.5	14.75	7.25	14.5		**224.75**		
Total used accum.	20.84	36.85	46.44	21.63	13.35	25.41	13.15	17.23	2.36	16.21			**213.47**	
Total planned (48M)	151	121	140	105	61	81	94	59	29	58				899

As shown in the above table, person months reported in year 1 are in line with a linear projection (plan), with around one quarter (213.5) of the total project person months (899) invested. The majority of partners' person months used in reporting period 1 are on budget and schedule. UPF involved more staff at lower cost than originally envisaged for RP1 so was able to provide the project with additional PMs relative to plan, within budget. It is also worth noting that because several WP1 tasks were only scheduled to start at month 6, we expected a lower PM report on WP1 in RP1 than the linear distribution over years 1-4 we are using for our

monitoring would predict. In relation to WP1 activity it is also worth noting that CNRS was added as a 3rd party (to ENS) via Amendment 1 to the GA. WP1 outputs have not delayed by these minor deviations, all of which have now been rectified. The Coordination office anticipates PM budget normalisation in WP1 over year 2.

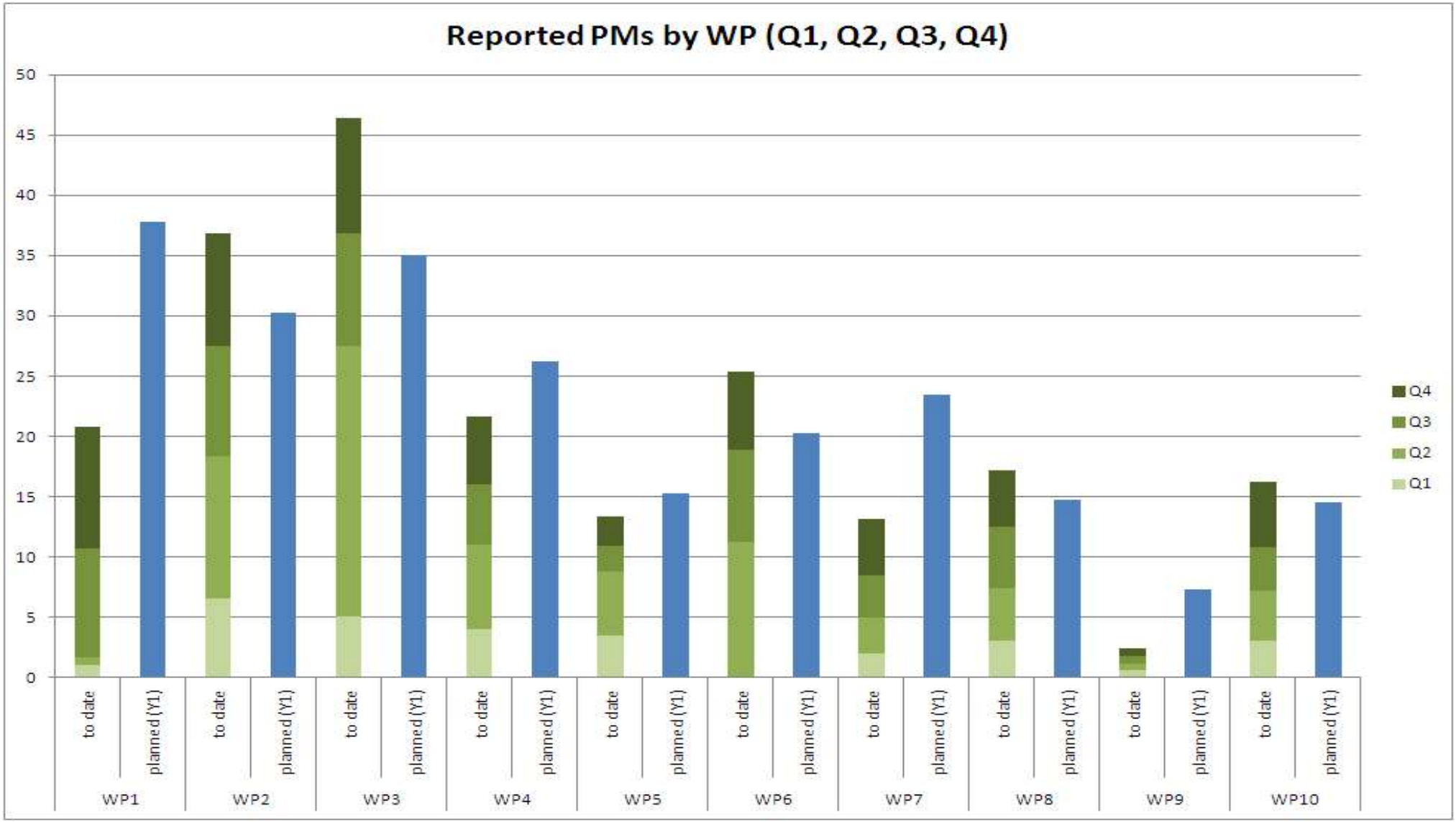
It is also noted that WP7 and WP9 have lower PM reported than a linear distribution over years 1-4 would predict. Again this because a a linear projection is not fully appropriate for these WPs. WP7 has a large focus on testing components of CEEDs, and its applications. WP9 is substantially focussed on dissemination. Whilst nearly all partners were active in dissemination in RP1 (as described in D9.1), only a few reported PMs in WP9. The Coordination office will advise partners to report dissemination effort in WP9 going forward. Based on this remedial action, and the increasing activity in WP7 in years 2-4, we anticipate PM budget normalisation in WPs 7 and 9 over year 2.

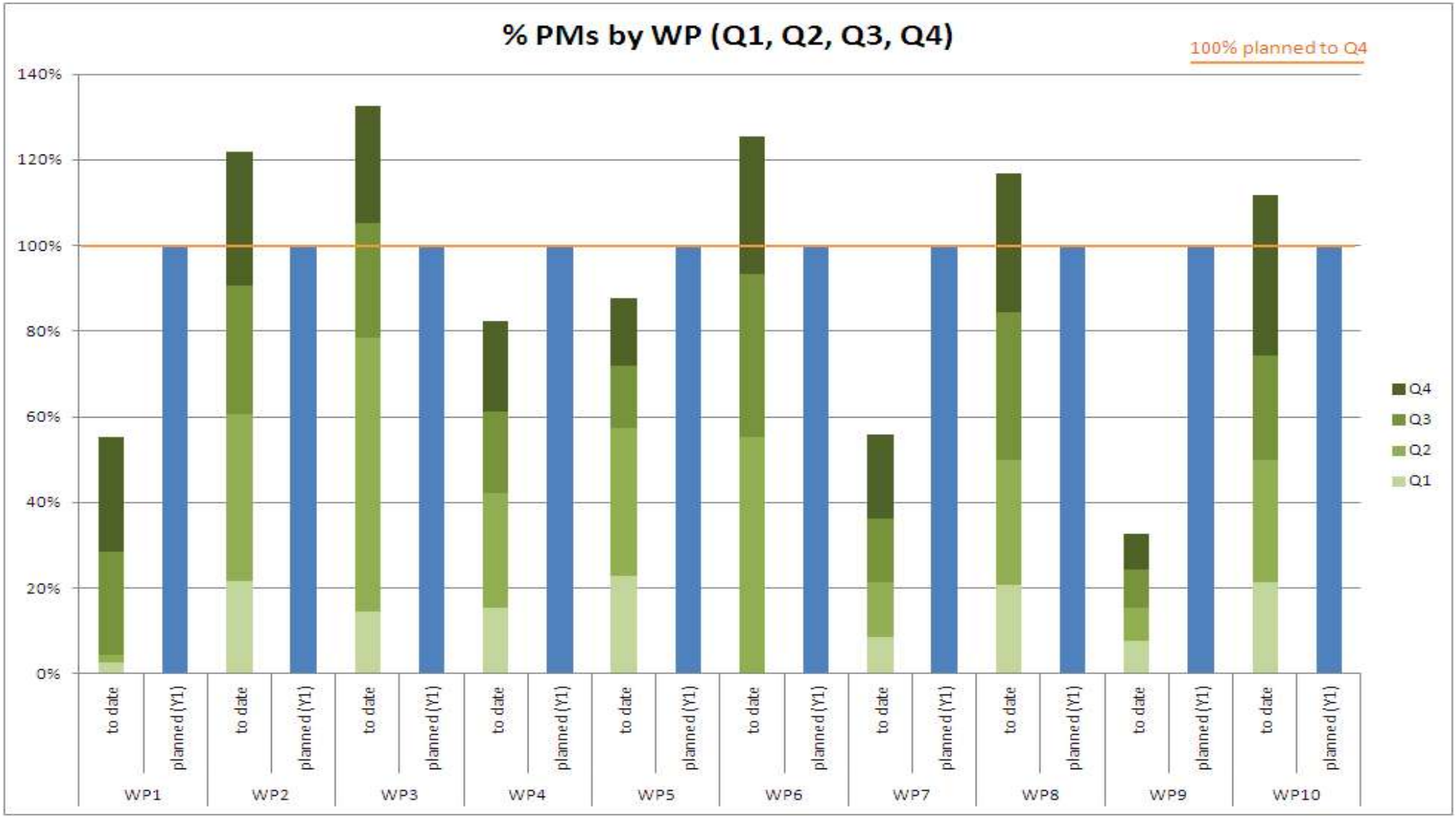
6.2 Year 1 PM Report by Partner and WP compared to Plan

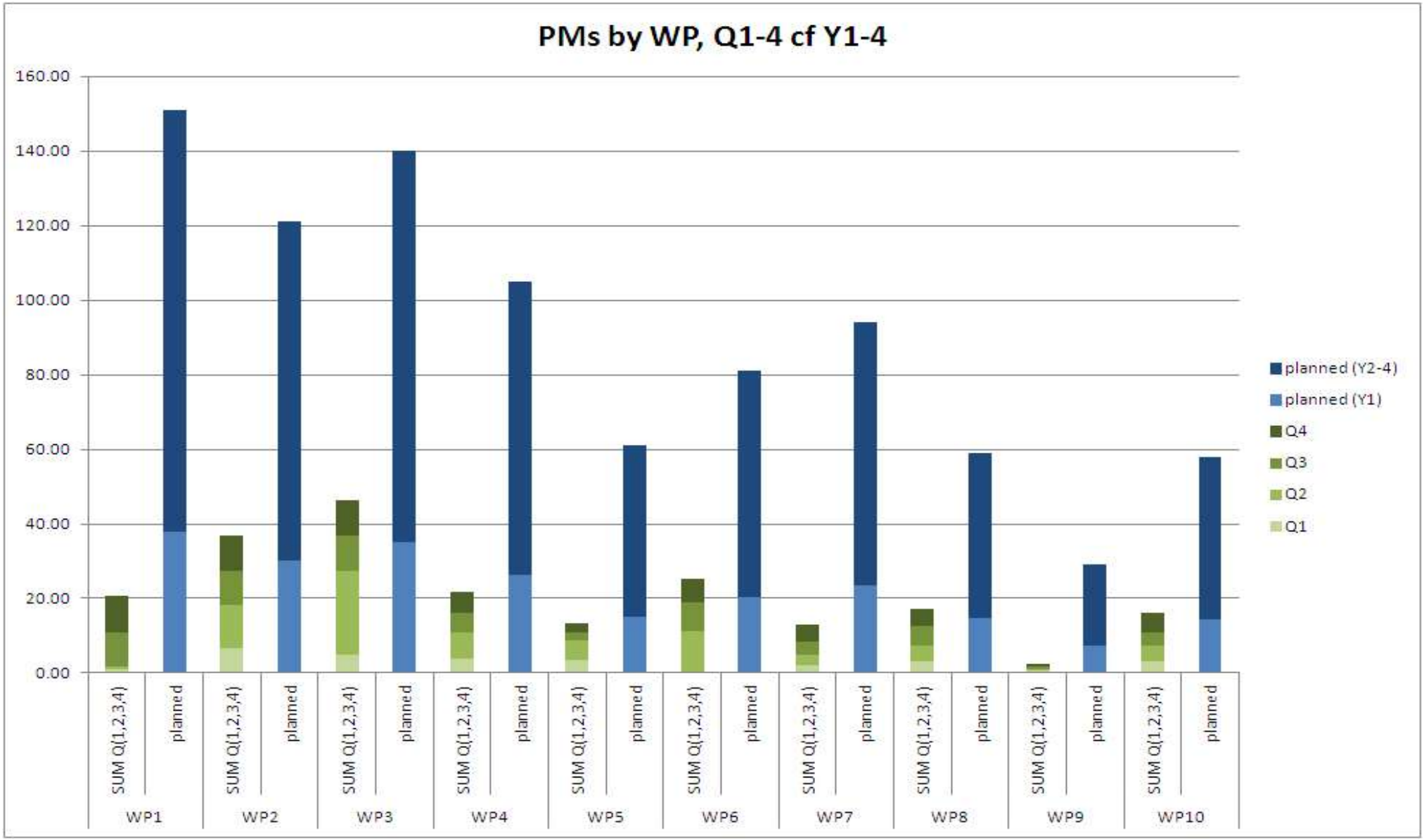
Y1	WP1		WP2		WP3		WP4		WP5		WP6		WP7		WP8		WP9		WP10		Total	
	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned
GOLD	0.00	0.00	0.00	0.00	0.36	2.50	0.00	1.25	0.00	0.25	0.62	1.25	0.00	2.50	11.35	7.50	2.10	2.00	8.95	7.50	**23.38**	24.75
UPF	6.10	6.00	0.50	0.75	21.08	10.75	1.92	6.25	0.20	1.50	16.45	5.75	0.00	0.75	0.60	0.75	0.00	0.25	2.75	3.00	**49.60**	35.75
UOS	1.39	9.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	1.00	0.00	0.00	0.01	0.25	0.17	0.25	**1.57**	11.25
ITI	0.00	0.00	0.00	0.00	3.80	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.25	0.00	0.25	**3.80**	5.00
EKUT	6.00	7.50	8.50	9.25	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.25	0.00	0.25	**14.50**	18.75
UAU	0.00	0.00	15.75	9.25	0.00	0.00	0.00	1.25	0.00	0.25	0.00	1.25	0.00	1.25	0.00	0.75	0.00	0.00	0.00	0.25	**15.75**	14.25
TESSIDEE	0.00	0.00	0.00	0.00	8.00	7.00	0.00	0.00	0.50	0.25	1.50	1.75	0.00	0.00	0.00	0.00	0.00	1.25	0.00	0.25	**10.00**	10.50
UNIPD	0.00	1.00	0.00	0.00	0.00	0.75	0.00	0.00	0.00	0.25	0.00	0.00	12.85	10.50	0.50	1.50	0.00	1.00	3.25	1.00	**16.60**	16.00
MPG	0.20	5.00	0.00	0.00	11.70	8.00	0.00	0.00	0.00	0.25	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.25	0.10	0.25	**12.00**	15.00
ENS	7.15	8.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.25	0.10	0.25	**7.25**	10.75
BME	0.00	0.00	0.00	0.00	0.00	0.00	15.00	11.50	0.00	1.25	0.00	1.25	0.00	0.00	0.00	0.75	0.00	0.25	0.00	0.25	**15.00**	15.25
UPC	0.00	0.00	0.00	0.00	1.50	2.50	0.00	0.00	12.65	10.00	0.00	0.75	0.00	0.00	1.30	0.75	0.25	0.25	0.27	0.25	**15.97**	14.50
UDP	0.00	0.00	12.10	11.00	0.00	0.00	4.71	6.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.27	0.25	**17.08**	18.00
ELECTROLUX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.50	1.00	0.30	1.00	1.35	2.00	0.00	0.25	0.35	0.25	**2.50**	4.75
UL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.14	3.00	0.00	0.00	2.13	0.50	0.00	0.25	0.00	0.00	**5.27**	3.75
UH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.20	3.00	0.00	3.00	0.00	0.00	0.00	0.25	0.00	0.25	**3.20**	6.50
TOTAL	**20.84**	37.75	**36.85**	30.25	**46.44**	35.00	**21.63**	26.25	**13.35**	15.25	**25.41**	20.25	**13.15**	23.50	**17.23**	14.75	**2.36**	7.25	**16.21**	14.50	**213.47**	224.75

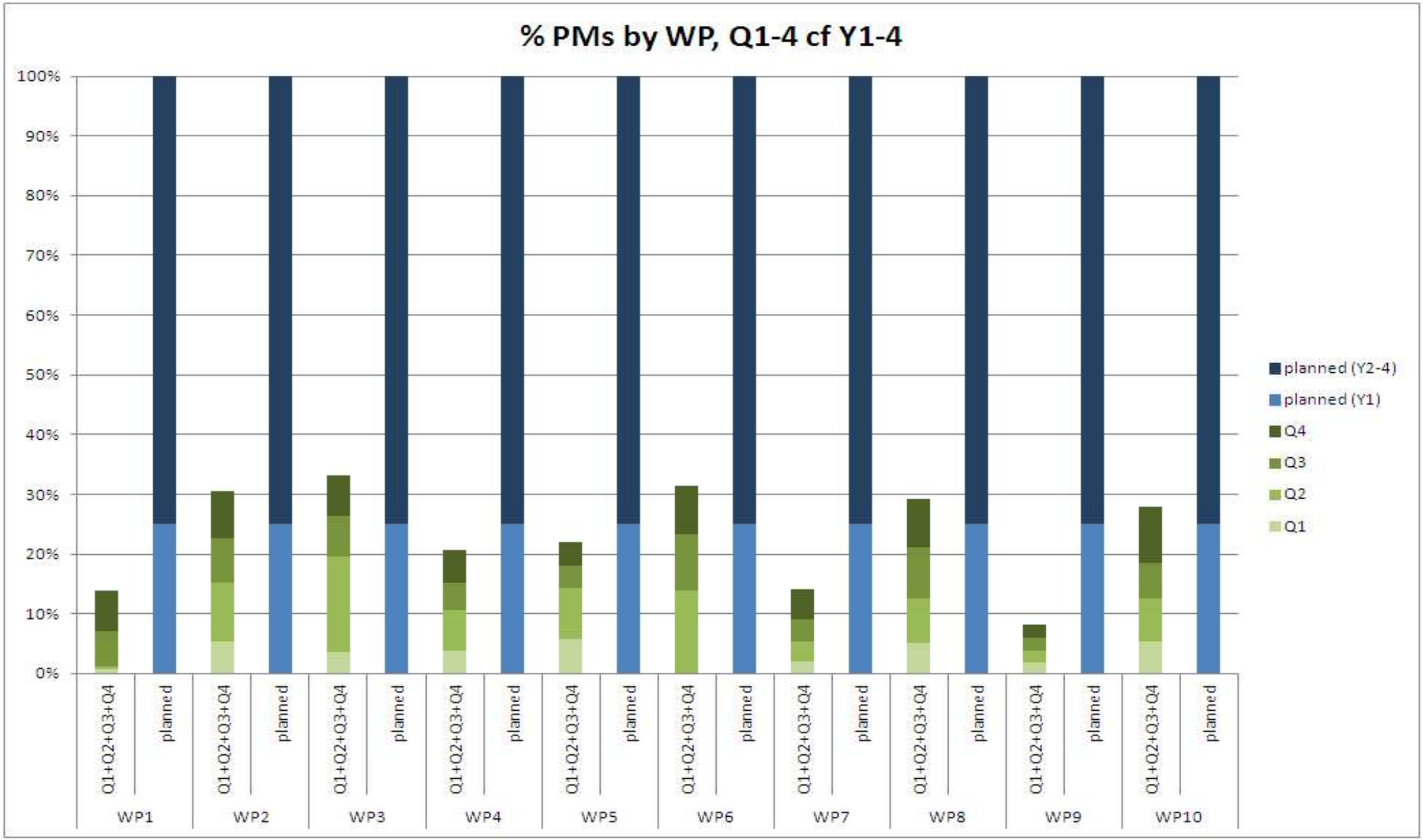
The charts shown in 6.3 provide easy views of the data shown in 6.1 and 6.2.

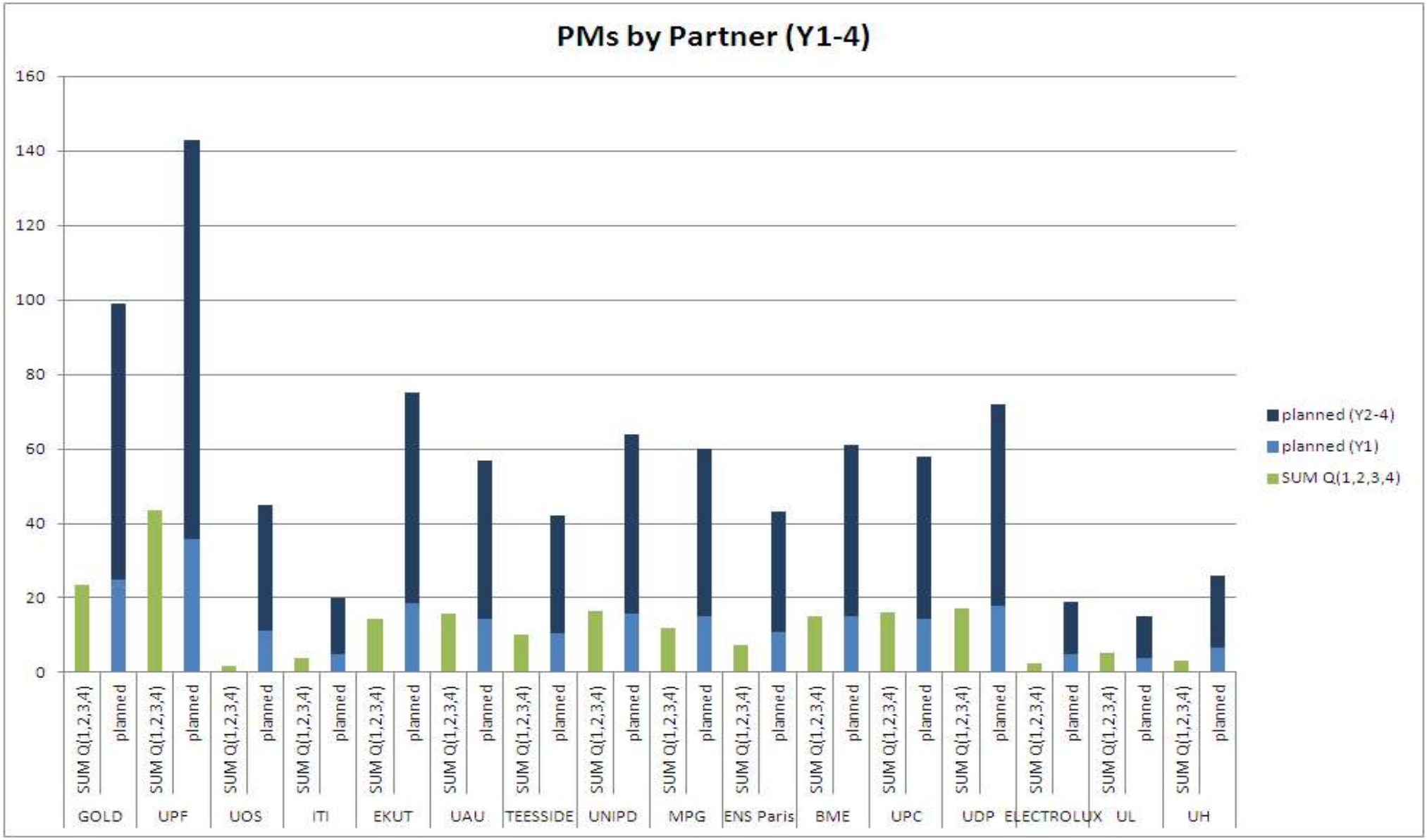
6.3 Charts on PM usage

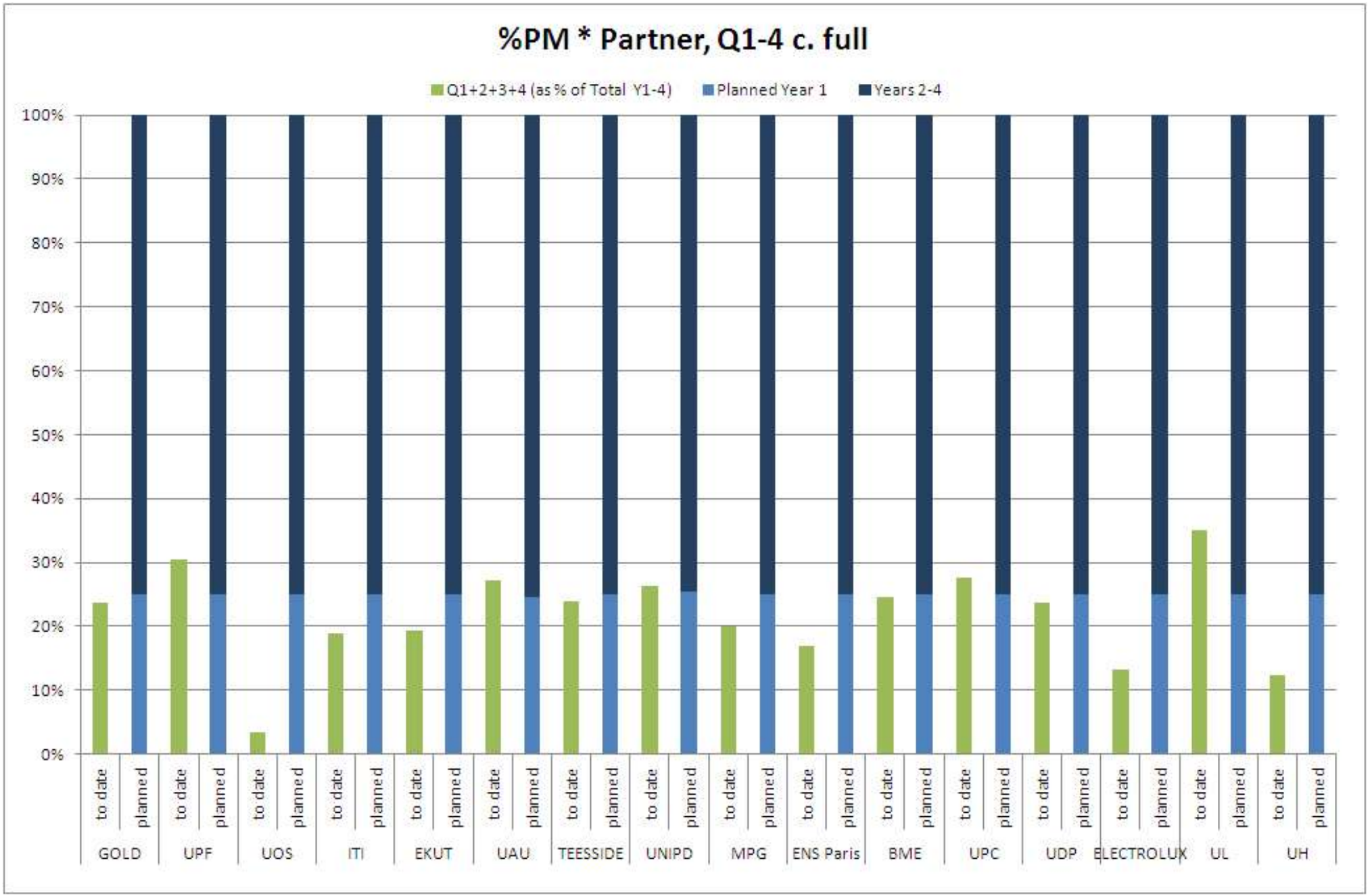











%PM * Partner, Q1-4 c. full
Q1+2+3+4 (as % of Total Y1-4)
Planned Year 1
Years 2-4
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
to date
planned
GOLD
UPF
UOS
ITI
EKUT
UAU
TEESSIDE
UNIPD
MPG
ENS Paris
BME
UPC
UDP
ELECTROLUX
UL
UH

6.4 Detailed report on Partners CS1 reports

Below we show the detailed reports provided by each Partner on how their CS1 is composed.

First though it is of note that overall, the project is on budget. In RP1, project partners have collectively requested an EC contribution 1,330,585 euro towards costs invested of 1,792,800 euro (across all cost categories). This requested contribution amounts to 20% of the maximum EC contribution to the project over its full duration. This is an appropriate level for RP1 (year 1) of a 4 year project, in whose duration we anticipate inflation and some euro/ GBP exchange rate variation.

It is also important to note that some partners reported substantially lower CS1 data than a simple linear projection would predict. These lower than linear CS1 data are in line with partners' PM reports, with the same rationale as given above (delays in hiring appropriately qualified staff: UoS; timing of addition of 3rd party: ENS/ CNRS). UK based partners also tended to report slightly lower than what a linear projection would predict. The reason for this is that at the end of RP1 there was a favourable euro/GBP exchange rate (~1.15). The Coordination Office's finance department anticipates some variation in the euro/GBP exchange rate within the remaining three RPs of the CEEDs project.

Finally in relation to expenditure, it is important to note that no partner reported costs substantially above what a linear projection of expenditure over the course of the 4 year project would predict (25% of contribution claimed). Indeed, only 3 partners claimed above 25% of their total budget and only marginally so (to a maximum of 29%.)

Beneficiary Name:	GOLD		
Work Package number	**Item description**	**Amount in € with 2 decimals**	**Explanations**
8, 9, 10	**Personnel direct costs**	**130430.00**	*Salaries: Management [Coordinator (4 person months), coordination office support (5 person months); RTD [Prof (1.5 person months), Postdoctoral Senior Research Fellow (8 person months) and Research staff (4.5 person months)]*
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' …….		
8, 9, 10	**Remaining direct costs: travel and consumables**	**11793.00**	T*ravel and attendance costs for consortium meetings (Barcelona, Spain, Oct 2010: four attendees: 2107 euro), overseas meetings with partners (BCN, March 2011: 2 attendees, 812 euros; Barcelona integration week, June 2011, 2 attendees: 1547 euros), conferences (FET2011, May 2011, 2 attendees, Budapest, 1760 euros), meeting with other projects in BRU (1 person November 2010, 526 euro), meeting with Archaeology team (1 attendee: 541 euro), plus 236 euros for local travel to CEEDs meetings over the year.* *Consumeables: box.net subscription (shared project workspace): 737 euros; meeting resourcing: 1547 euro; CEEDs brochure print (3,000 copies: 1688 euro); miscallaneous (incl journal subs, books etc.: 1156 euro)*
8, 9, 10	**Indirect costs**	**85334.00**	
	TOTAL COSTS	**227557.00**	

Beneficiary Name:	UPF		
Work Package number	**Item description**	**Amount in € with 2 decimals**	**Explanations**
1,2,3,4,6,8,10	**Personnel direct costs**	**179731.00**	*Salaries of PI (5,5 PM), 1 Technical Director (8PM), 1 senior technical staff (3PM), 2 postdoc (10PM), 3 PhD students (5,8*

			PM), 3 technical support staff (11,3 PM)
	Subcontracting		
1,2,3,6	**Equipment**	**4379.71**	*Software: Unity Pro + Asset Server client license, Apple Developer Program, Apple software , Avatar license. Hardware: Eye Tracker, 2@ Apple Computer, 1 @ Laptop, 2 @ 21.5" screens, Mini Mac, external Hard Disk, Ipad2, Servers and Harware for XIM Architecture.*
1,2,3,6	**Consumables**	**259.53**	*Small Hardware: Mac Adaptors/Chargers, Batteries, Device Motion - plugin, Corelocation plugin. Other: Applications Manuals*
1,2,3,4,6,8,10	**Travel, Accommodation**	**26978.76**	*• Attendance, organization and travels cost for CEEDS Meetings in: Barcelona Kick Off Meeting - 4-5 October 2010, Barcelona Project meeting - February 2011, London, 2nd Consortium meeting - 5-7 April 2011, Barcelona, Technical Integration Week - 8-10 June 2011, Pisa, Project Meeting - 11-15 April 2011, Paris, Project Meeting - 20-22 April 2011, London, Project Meeting - 25-28 May 2011, Barcelona, Project Meeting (UPF-Groenix) - 14/July 2011, FET2011 Conference, Budapest - May 2011, CEEDS work @ Bergen Belsen - July 2011, CEEDS work @ Univ.Eberhard Karls - july 2011, CEEDS work @ Univ California US - April 2011.* *• Attendance to the following conferences: BCBT 2010 & BCBT 2011, Registration fees, Barcelona, EVOLF MMX - Christmas Islands - December 2010, TEI 2011 - Portugal - January 2011, Engage Summer School - Zermatt (Suissa) - Sept 2010, Commemoration of the 66th Anniversary of the liberation - Hamburg - April 2011, Network Architecture of Brain Structures and Functions - Sta. Barbara (US) - July 2011.*
	Indirect costs	**126808.00**	
	TOTAL COSTS	**338157.00**	

Beneficiary Name: UOS

Work Package number	Item description	Amount in € with 2 decimals	Explanations
1	**Personnel direct costs**	**516.00**	*Salary for PI Dr Anil Seth x 12 months*
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' …….		
1	**Remaining direct costs**	**1229.00**	Travel Anil Seth: Project Mtg Spain Oct10 461.42 euros; Mtg Austria Mar11 318 euros; Project Mtg London Apr11 86.64 euros. Consumables: Virtual reality equipment (Vuzix VR920 goggles) 363 euros.
1	**Indirect costs**	**1046.00**	
	TOTAL COSTS	**2791.00**	

Beneficiary Name: ITI

Work Package number	Item description	Amount in € with 2 decimals	Explanations
3	**Personnel direct costs**	**17002.52**	*Salary of a senior researcher (P. Daras) for 0,91MMs. Salary of one assistant researcher (D. Zarpalas) for 1,93MMs. Salary of one assistant researcher (Th. Semertzidi) for 0,96MMs*
	Subcontracting		
	Major cost item 'X'		

	Major cost item 'Y' …….		
3	**Remaining direct costs**	**2180.14**	*Travel and attendance costs for consortium meeting in Barcelona, Spain, 7-10/6/2011: two attendees (P. Daras, Th. Semertzidis) = 2180,14 euros*
3	**Indirect costs**	**15302.26**	
	TOTAL COSTS	**34484.92**	

Beneficiary Name: EKUT

Work Package number	Item description	Amount in € with 2 decimals	Explanations
1,2	**Personnel direct costs**	**61603.32**	*Salary of 2 postdoctoral students for 13 person months*
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' …….		
1,2	**Remaining direct costs**	**5016.07**	*Travel and attendance costs for consortium meetings (Barcelona, Spain: one attendee 1139.80 euros; London, UK: 1 attendee, 706.23 euros), local meetings, MEG: 150.00 euros; consumables: 3020.04 euros*
1,2	**Indirect costs**	**39971.63**	
	TOTAL COSTS	**106591.02**	

Beneficiary Name: UAU

Work Package number	Item description	Amount in € with 2 decimals	Explanations
WP2	**Personnel direct costs**	**90292.00**	*Salaries of 1 PI (full professor) for 3.5 months, 2 doctoral students for 13.5 months and one student assistant of 240 hours*
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' …….		
	Remaining direct costs	**3158.00**	*Travel and attendance costs for consortium meetings (London, UK: three attendess, 1598.27 euros, Barcelona, Spain: two attendees, 1247.54 euros), for bilateral project meeting (Tübingen, Germany, 1 attendee, 49.97 euros; compensation for participants of experiments (300 euros)*
	Indirect costs	**56070.00**	
	TOTAL COSTS	**149520.00**	

Beneficiary Name: TEESSIDE

Work Package number	Item description	Amount in € with 2 decimals	Explanations
3, 5, 6	**Personnel direct costs**	**40259.00**	*Salary of 1 postdoctoral student (David Pizzi) for 10 months*
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' …….		

3, 5, 6	**Remaining direct costs**	**5202.00**	*Travel and attendance costs for consortium meetings (Barcelona, Spain, October 2010, one attendee (Marc Cavazza) 523 euros; London, UK, April 2011: 2 attendees (Marc Cavazza, David Pizzi), 982 euros;Barcelona, Spain, September 2011, one attendee (David Pizzi) 863 euros), Integration Week (Barcelona, Spain, June 2011: two attendees (David Pizzi, Jean-Luc Lugrin), 2834 euros)*
3, 5, 6	**Indirect costs**	**27276.00**	
	TOTAL COSTS	**72737.00**	

Beneficiary Name: UNIPD

Work Package number	Item description	Amount in € with 2 decimals	Explanations
7, 8 , 10	**Personnel direct costs**	**55585.00**	*Salaries of PI (Professor) 4.5 months; 3 Researchers 6.6 months; 1 research collaborator 5.5 months*
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' ……..		
7, 8, 10	**Remaining direct costs**	**5102.00**	*Travel and attendance costs for consortium meetings (Barcelona, Spain - October 2010: 2 attendees 786.32 euros; London, UK - February 2011: 3 attendees, 2091.74 euros; Barcelona, Spain - March 2011: 1 attendee 565.55 euros; London,UK - April 2011: 2 attendees, 1589.12 euros)* *Pro rata equipment depreciation: 69.04 euros*
	Indirect costs	**36412.00**	
	TOTAL COSTS	**97099.00**	

Beneficiary Name: MPG

Work Package number	Item description	Amount in € with 2 decimals	Explanations
1, 3	**Personnel direct costs**	**66571.00**	*Salary of 1 postdoctoral researcher for 12 months*
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' ……..		
1, 3	**Remaining direct costs**	**5338.00**	*Travel and attendance costs for consortium meetings (3.-4.10.2010, Barcelona, Spain: 2 attendees 1816,47 euros; 6.-7.4.2011 London, UK: 2 attendees, 1922,50 euros), 13.-15.07. Neuronal data meeting Barcelona, Spain: 2 attendees, 1026,45 euros), 1 flight ticket for consortium meeting 12./13.09.2011 517,84 euros ; Employers liability insurance association 54,90 euros*
1, 3	**Indirect costs**	**91229.00**	
	TOTAL COSTS	**163138.00**	

Beneficiary Name:	ENS Paris		
Work Package number	**Item description**	**Amount in € with 2 decimals**	**Explanations**
1	**Personnel direct costs**	**14073.00**	*Salary of 1 Research Assistant for 4 months*
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' ……..		
1	**Remaining direct costs**	**7092.00**	*Travel and attendance costs for consortium meetings (Barcelona, Spain: one attendee 312,00 euros), conferences (Seminat at CSN New York University & Society for Neuroscience Conference, USA : one attendee 2 924,76 euros, Association for Psychological Science, Washington, USA : one attendee 2 165,41 euros) Scientific Publications : 702,11 euros Consommables: 987,59 euros)*
1	**Indirect costs**	**12699.00**	
	TOTAL COSTS	**33864.00**	

Beneficiary Name:	CNRS *Only joint project in July 2011		
Work Package number	**Item description**	**Amount in € with 2 decimals**	**Explanations**
	Personnel direct costs		
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' ……..		
	Remaining direct costs		
	Indirect costs		
	TOTAL COSTS	**0.00**	

Beneficiary Name:	BME		
Work Package number	**Item description**	**Amount in € with 2 decimals**	**Explanations**
4	**Personnel direct costs**	**51110.00**	*Salary of 1 lab technician for 6 months 2785,67EUR,* *Salary of 1 research engineer for 1 month 1477,25EUR* *Salaries of 1 research engineer and 1 project manager for 11 months 31817,90EUR* *Salary of 1 financial staff for 2 months 2474,21EUR* *Salary of 1 software developer for 10 months 12554,73EUR.*
4	**Subcontracting**	**69.00**	*Audit cost (69,41EUR)*
	Major cost item 'X'		
	Major cost item 'Y' ……..		
4	**Remaining direct costs**	**4241.00**	*Travel and attendance costs for consortium meetings (Barcelona, Spain: one attendee 548,14EUR; London, UK: one attendee, 521,97EUR; Barcelona, Spain: 512,54EUR),*

			Travel and attendance costs for technical conference (FET2011, 275,82 euros), Other costs (delivering 11,98EUR, XIM system 2.370,42EUR)
	Indirect costs	**33210.00**	
	TOTAL COSTS	**88630.00**	

Beneficiary Name: UPC

Work Package number	Item description	Amount in € with 2 decimals	Explanations
WP 3,5,6,8,9,10	**Personnel direct costs**	**76929.00**	*Prof. Alberto Sanfeliu (4,87 pm -person month); Prof. Antoni Grau (4,6 pm); Prof. Rene Alquezar (4,4 pm); PhD student: Edmundo Guerra (1,23 pm); PhD student: Alex Goldhorn (0,9 pm)*
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' …….		
WP 10, 3	**Remaining direct costs**	**2835.00**	*Travel: Barcelona, Spain: 1 attendee (J. Andrade) 30,93 euros; Barcelona integration meeting: 2 attendees(A. Sanfeliu& A. Corominas) 65,04€ euros; London, UK: 2 attendees (A. Sanfeliu& A. Corominas), 1164,77 euros Consumables: 1,229,75€ Dinamixel pin cable sets; Equipment: 344,82€ (depreciation PC & laptop)*
WP 3,5,6,8,9,10	**Indirect costs**	**75134.00**	*Actual indirect costs rate 2009(107,42% applied over PM reported by A. Sanfeliu & A. Grau);(71,80% rate over PM of Renato Alquezar); (71,55% over PM of Phd students Guerra and Goldhorn). The % is different because the team members belong to different departments.*
	TOTAL COSTS	**154898.00**	

Beneficiary Name: UDP

Work Package number	Item description	Amount in € with 2 decimals	Explanations
2, 4	**Personnel direct costs**	**93198.00**	*Salaries of 2 postdoc for 12 and 8 months each; one PhD student for 8 months; dedicated hours of 1 Full Professor and 1 Senior Researcher for the first year of the project*
	Subcontracting		
2, 4	**Major cost item 'Travel'**	**8124.10**	*Travel and attendance costs for Consortium meetings (Barcellona, Spain- kick off meeting, 5 attendants- 1265,37 euros; Brussels, Belgium, Technical meeting, 1 attendant 511,88 euros; Padova, Italy, technical meeting 1 attendant 179,28 euros; London UK. Technical meeting 2 attendants, 1.568,74 euro) conferences (Roman 2010, 239,07 euros; Boston, USA, MRS - Fall 2010, 1563,84 euros; Pervasive health 2011, 995,88 euros; EMBC 2011, 1144,89 euros), PhD Summer school 630,15 euros)*
2, 4	**Major cost item "Consumable"**	**41348.27**	*Smartex srl. full body sensor suits via consumables/equipment partial provision 36.750 euros; electronic components and PCB for prototype realization, 4.598,27 euros.*
2, 4	**Major cost item "Other Costs"**	**200.64**	*conference registration, meeting expenses*
2, 4	**Total remaining direct costs**	**49673.00**	
2, 4	**Indirect costs**	**85722.00**	
	TOTAL COSTS	**228593.00**	

Beneficiary Name:	ELECTROLUX		
Work Package number	**Item description**	**Amount in € with 2 decimals**	**Explanations**
6, 7, 8, 9, 10	**Personnel direct costs**	**18673.00**	*Salaries of 1 project leader and 1 junior researcher*
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' ……..		
6, 8, 10	**Remaining direct costs**	**1886.00**	*Travel and attendance costs for consortium meetings (Barcelona, Spain: one attendee 434.97 euros; London, UK: one attendee 610,94 euros; Barcelona, Spain: one attendee 839,80 euros)*
6, 7, 8, 9, 10	**Indirect costs**	**9150.00**	*Overhead costs on personnel costs*
	TOTAL COSTS	**29709.00**	

Beneficiary Name:	UL		
Work Package number	**Item description**	**Amount in € with 2 decimals**	**Explanations**
6, 8	**Personnel direct costs**	**16537.00**	*Salary of 1 researcher for 10 months*
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' ……..		
6, 8	**Remaining direct costs**	**2856.00**	*Travel and attendance costs for consortium meetings (Barcelona, Spain: 2 attendees 935.59 euros; London, UK: 2 attendees, 524.28 euros; Leipzig, Germany: 2 attendees 804.88 euros), Travels to Greece for data gathering (April 2011: 219.72 euros; August 2011: 371.72 euros)*
	Indirect costs	**17841.00**	
	TOTAL COSTS	**37234.00**	

Beneficiary Name:	UH		
Work Package number	**Item description**	**Amount in € with 2 decimals**	**Explanations**
6	**Personnel direct costs**	**8338.00**	*Salary of 2 researchers Markus Roine Dinesh Wijekoon, 5 PM*
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' ……..		

6	**Remaining direct costs**	**9037.00**	*Travel and attendance costs for:* *CEEDS project kickoff 3-6.10.2010 (Barcelona, Spain: one attendee),* *CEEDS EU Project meeting 10-12.2.2011 (London, UK: one attendee),* *CEEDS EU Project meeting 3-5.3.2011 (Barcelona UPF, Spain: one attendee),* *CEEDS plenary meeting 5-8.4.2011 (London, UK: one attendee),* *CEEDS Project Meeting 26-27.5.2011 (Venice, Italy: one attendee),* *CEEDS Project Meeting 7-9.6.2011 (Barcelona, Spain: two attendees) Total 6.998,26 euros,* *Other costs technologies for prototyping Computer program licence (1.000,00 euros), tablet device (649,00 euros), research equipment (400,00 euros) and Pc-accessory (8,48 euros).*
6	**Indirect costs**	**10425.00**	
	TOTAL COSTS	**27800.00**	

7 Financial Statements – Form C and Summary Financial Report

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	GOLDSMITHS' COLLEGE	Participant Identity Code	999882791
Organisation Short Name	GOLD	Beneficiary nr	1

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	72,078	0	58,352	0	130,430
Subcontracting	0	0	0	0	0
Other direct costs	8,992	0	2,801	0	11,793
Indirect costs	48,642	0	36,691	0	85,333
Total costs	129,712	0	97,844	0	227,556
Maximum EU contribution	97,284	0	97,844	0	195,128
Requested EU contribution					195,128

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest according to Art.II 19 ?	Yes
If yes, please mention the amount (in €)	179

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?	No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			Yes
Name of the auditor	Knox Cropper	Cost of the certificate (in €)	1,073

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligble costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Marie Fallon
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	UNIVERSITAT POMPEU FABRA	Participant Identity Code	999867077
Organisation Short Name	UPF	Beneficiary nr	2

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	164,020	0	13,873	1,838	179,731
Subcontracting	0	0	0	0	0
Other direct costs	30,670	0	948	0	31,618
Indirect costs	116,814	0	8,892	1,102	126,808
Total costs	311,504	0	23,713	2,940	338,157
Maximum EU contribution	233,628	0	23,713	2,940	260,281
Requested EU contribution					260,281

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Eva Martin
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	UNIVERSITY OF SUSSEX	Participant Identity Code	999852721
Organisation Short Name	UOS	Beneficiary nr	3

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	0	0	267	249	516
Subcontracting	0	0	0	0	0
Other direct costs	1,229	0	0	0	1,229
Indirect costs	737	0	160	149	1,046
Total costs	1,966	0	427	398	2,791
Maximum EU contribution	1,474	0	427	398	2,299
Requested EU contribution					2,299

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Julian Golland - Head of Research Finance
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	CENTRE FOR RESEARCH AND TECHNOLOGY HELLAS	Participant Identity Code	998802502
Organisation Short Name	CERTH	Beneficiary nr	4

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	N/A

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	17,002	0	0	0	17,002
Subcontracting	0	0	0	0	0
Other direct costs	2,180	0	0	0	2,180
Indirect costs	15,302	0	0	0	15,302
Total costs	34,484	0	0	0	34,484
Maximum EU contribution	25,863	0	0	0	25,863
Requested EU contribution					25,863

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligble costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Scientific Responsible: Dr. Petros Daras Authorized Financial officer: Dr. Evagelia Perperi
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	EBERHARD KARLS UNIVERSITAET TUEBINGEN	Participant Identity Code	999991916
Organisation Short Name	EKUT	Beneficiary nr	5

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	61,603	0	0	0	61,603
Subcontracting	0	0	0	0	0
Other direct costs	5,016	0	0	0	5,016
Indirect costs	39,971	0	0	0	39,971
Total costs	106,590	0	0	0	106,590
Maximum EU contribution	79,942	0	0	0	79,942
Requested EU contribution					79,942

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Prof Niels Birbaumer
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	UNIVERSITAET AUGSBURG	Participant Identity Code	999598678
Organisation Short Name	UAU	Beneficiary nr	6

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	90,292	0	0	0	90,292
Subcontracting	0	0	0	0	0
Other direct costs	3,158	0	0	0	3,158
Indirect costs	56,070	0	0	0	56,070
Total costs	149,520	0	0	0	149,520
Maximum EU contribution	112,140	0	0	0	112,140
Requested EU contribution					112,140

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Alois Zimmermann
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	UNIVERSITY OF TEESSIDE	Participant Identity Code	999662504
Organisation Short Name	TEESSIDE	Beneficiary nr	7

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	40,259	0	0	0	40,259
Subcontracting	0	0	0	0	0
Other direct costs	5,202	0	0	0	5,202
Indirect costs	27,276	0	0	0	27,276
Total costs	72,737	0	0	0	72,737
Maximum EU contribution	54,552	0	0	0	54,552
Requested EU contribution					54,552

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligble costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Mr Alan E Oliver
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	UNIVERSITA DEGLI STUDI DI PADOVA	Participant Identity Code	999995602
Organisation Short Name	UNIPD	Beneficiary nr	8

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	39,263	0	16,322	0	55,585
Subcontracting	0	0	0	0	0
Other direct costs	5,102	0	0	0	5,102
Indirect costs	26,619	0	9,793	0	36,412
Total costs	70,984	0	26,115	0	97,099
Maximum EU contribution	53,238	0	26,115	0	79,353
Requested EU contribution					79,353

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligble costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	prof. Patrizia Bisiacchi
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	MAX PLANCK GESELLSCHAFT ZUR FOERDERUNG DER WISSENSCHAFTEN E.V.	Participant Identity Code	999990267
Organisation Short Name	MPG	Beneficiary nr	9

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	N/A

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	64,876	0	1,695	0	66,571
Subcontracting	0	0	0	0	0
Other direct costs	3,522	0	1,816	0	5,338
Indirect costs	88,910	0	2,319	0	91,229
Total costs	157,308	0	5,830	0	163,138
Maximum EU contribution	117,981	0	5,830	0	123,811
Requested EU contribution					72,514

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?	No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?	No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Dietmar RUDZIK (Head of Administration)
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	ECOLE NORMALE SUPERIEURE	Participant Identity Code	999854758
Organisation Short Name	ENS Paris	Beneficiary nr	10

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	14,073	0	0	0	14,073
Subcontracting	0	0	0	0	0
Other direct costs	7,092	0	0	0	7,092
Indirect costs	12,699	0	0	0	12,699
Total costs	33,864	0	0	0	33,864
Maximum EU contribution	25,398	0	0	0	25,398
Requested EU contribution					25,398

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?	No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?	No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Nathalie HENAULT-BARBE
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by Third Party) Only applicable if special clause nr 10 is used

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

3rd party legal Name	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE		
3rd party Organisation Short Name	CNRS	Working for beneficiary nr	10

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	0	0	0	0	0
Subcontracting	0	0	0	0	0
Other direct costs	0	0	0	0	0
Indirect costs	0	0	0	0	0
Total costs	0	0	0	0	0
Maximum EU contribution	0	0	0	0	0
Requested EU contribution					

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Christine d'Argouges
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	BUDAPESTI MUSZAKI ES GAZDASAGTUDOMANYI EGYETEM	Participant Identity Code	999904228
Organisation Short Name	BME	Beneficiary nr	11

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	51,110	0	0	0	51,110
Subcontracting	0	0	69	0	69
Other direct costs	4,241	0	0	0	4,241
Indirect costs	33,210	0	0	0	33,210
Total costs	88,561	0	69	0	88,630
Maximum EU contribution	66,420	0	69	0	66,489
Requested EU contribution					66,489

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligble costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Dr Péceli, Gábor and Kaszásné Mészáros, Éva
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	UNIVERSITAT POLITECNICA DE CATALUNYA	Participant Identity Code	999976202
Organisation Short Name	UPC	Beneficiary nr	12

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	N/A

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	72,780	0	2,160	1,989	76,929
Subcontracting	0	0	0	0	0
Other direct costs	2,835	0	0	0	2,835
Indirect costs	70,677	0	2,320	2,137	75,134
Total costs	146,292	0	4,480	4,126	154,898
Maximum EU contribution	109,719	0	4,480	4,126	118,325
Requested EU contribution					118,325

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligble costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Cristina Costa
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		
Legal Name	UNIVERSITA DI PISA	Participant Identity Code	999862712
Organisation Short Name	UDP	Beneficiary nr	13
Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	91,933	0	1,265	0	93,198
Subcontracting	0	0	0	0	0
Other direct costs	49,673	0	0	0	49,673
Indirect costs	84,963	0	759	0	85,722
Total costs	226,569	0	2,024	0	228,593
Maximum EU contribution	169,926	0	2,024	0	171,950
Requested EU contribution					171,950

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligble costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Immacolata Viva
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		
Legal Name	ELECTROLUX ITALIA S.P.A.	Participant Identity Code	998312749
Organisation Short Name	ELECTROLUX	Beneficiary nr	15
Funding % for RTD activities (A)	50.0	If flat rate for indirect costs, specify %	N/A

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	15,020	0	0	3,653	18,673
Subcontracting	0	0	0	0	0
Other direct costs	1,886	0	0	0	1,886
Indirect costs	7,360	0	0	1,790	9,150
Total costs	24,266	0	0	5,443	29,709
Maximum EU contribution	12,133	0	0	5,443	17,576
Requested EU contribution					17,576

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligble costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Dario Pascotto
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	UNIVERSITEIT LEIDEN	Participant Identity Code	999974553
Organisation Short Name	UL	Beneficiary nr	16

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	N/A

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	16,537	0	0	0	16,537
Subcontracting	0	0	0	0	0
Other direct costs	2,856	0	0	0	2,856
Indirect costs	17,841	0	0	0	17,841
Total costs	37,234	0	0	0	37,234
Maximum EU contribution	27,925	0	0	0	27,925
Requested EU contribution					27,925

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			Yes
Name of the auditor		Cost of the certificate (in €), if charged under this project	0

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligble costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Cees Pafort
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Form C - Financial Statement (to be filled in by each beneficiary)

Project Number	258749	Funding scheme	Collaborative project
Project Acronym	CEEDs		
Period from	01/09/2010	Is this an adjustment to a previous statement ?	No
To	31/08/2011		

Legal Name	HELSINGIN YLIOPISTO	Participant Identity Code	999994535
Organisation Short Name	UH	Beneficiary nr	18

Funding % for RTD activities (A)	75.0	If flat rate for indirect costs, specify %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	8,338	0	0	0	8,338
Subcontracting	0	0	0	0	0
Other direct costs	9,037	0	0	0	9,037
Indirect costs	10,425	0	0	0	10,425
Total costs	27,800	0	0	0	27,800
Maximum EU contribution	20,850	0	0	0	20,850
Requested EU contribution					20,850

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II. 17 of the grant agreement ?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1 ?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligble costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls whithin the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Finanancial Statement
	Tarja Hämäläinen
	Date & signature

FP7 - Grant Agreement - Annex VI - Collaborative project

Summary Financial report - Collaborative project

Project acronym	CEEDs	Project nr	258749	Reporting period from	01/09/2010	to	31/08/2011	Page	1/1

Funding scheme	CP

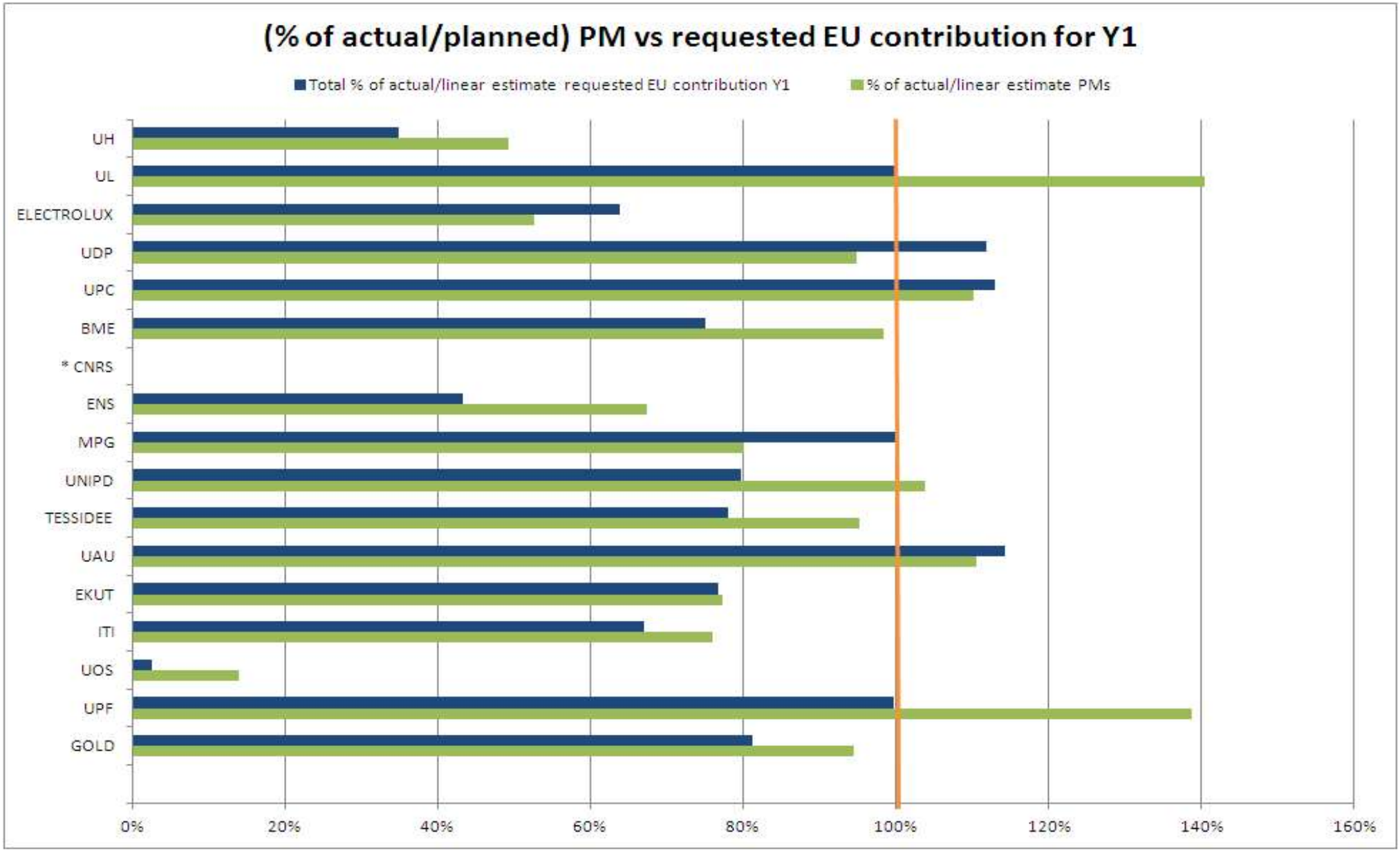
				Type of activity								Total				
				RTD (A)		Demonstration (B)		Management (C)		Other (D)		Total (A+B+C+D)				
Benef. nr	If 3rd Party, linked to benef.	Adjustment (Yes/No)	Organisation Short Name	Total	Max EC Contrib.	Total	Max EC Contrib.	Total	Max EC Contrib.	Total	Max EC Contrib.	Total	Max EC Contrib.	Req. EC Contrib.	Receipts	Interest
1		No	GOLD	129,712	97,284	0	0	97,844	97,844	0	0	227,556	195,128	195,128	0	179
2		No	UPF	311,504	233,628	0	0	23,713	23,713	2,940	2,940	338,157	260,281	260,281	0	
3		No	UOS	1,966	1,474	0	0	427	427	398	398	2,791	2,299	2,299	0	
4		No	CERTH	34,484	25,863	0	0	0	0	0	0	34,484	25,863	25,863	0	
5		No	EKUT	106,598	79,942	0	0	0	0	0	0	106,598	79,942	79,942	0	
6		No	UAU	149,520	112,140	0	0	0	0	0	0	149,520	112,140	112,140	0	
7		No	TEESSIDE	72,737	54,552	0	0	0	0	0	0	72,737	54,552	54,552	0	
8		No	UNIPD	70,984	53,238	0	0	26,115	26,115	0	0	97,099	79,353	79,353	0	
9		No	MPG	157,308	117,981	0	0	5,830	5,830	0	0	163,138	123,811	72,514	0	
10		No	ENS Paris	33,864	25,398	0	0	0	0	0	0	33,864	25,398	25,398	0	
-998	10	No	CNRS	0	0	0	0	0	0	0	0	0	0	0	0	
11		No	BME	88,561	66,420	0	0	69	69	0	0	88,630	66,489	66,489	0	
12		No	UPC	146,292	109,719	0	0	4,480	4,480	4,126	4,126	154,898	118,325	118,325	0	
13		No	UDP	226,569	169,926	0	0	2,024	2,024	0	0	228,593	171,950	171,950	0	
15		No	ELECTROLUX	24,266	12,133	0	0	0	0	5,443	5,443	29,709	17,576	17,576	0	
16		No	UL	37,234	27,925	0	0	0	0	0	0	37,234	27,925	27,925	0	
18		No	UH	27,800	20,850	0	0	0	0	0	0	27,800	20,850	20,850	0	
Total				1,619,304	1,209,473	0	0	169,502	169,502	12,907	12,907	1,792,808	1,381,882	1,330,585	0	

7.1 Total Actual vs Linear Estimate EU Contribution Y1

Partners	*Total* actual requested EU contribution in Y1	*Total* linear estimate requested EU contribution in Y1	*Total* overall requested EU contribution in Y1-4	*Total* budget Y1-4	*Total* % of actual/linear estimate requested EU contribution Y1	% (Y1 actual requested / overall requested EU contribution)
GOLD	195,128.00	240,346.25	961,385.00	1,154,406.67	81.2%	20.3%
UPF	260,281.00	261,075.00	1,044,300.00	1,351,280.00	99.7%	24.9%
UOS	2,299.00	92,655.00	370,620.00	485,920.00	2.5%	0.6%
ITI	25,863.00	38,541.75	154,167.00	198,384.67	67.1%	16.8%
EKUT	79,942.00	104,111.50	416,446.00	546,520.00	76.8%	19.2%
UAU	112,140.00	98,097.50	392,390.00	515,800.00	114.3%	28.6%
TESSIDEE	54,552.00	69,875.50	279,502.00	362,936.00	78.1%	19.5%
UNIPD	79,353.00	99,580.00	398,320.00	515,050.00	79.7%	19.9%
MPG	72,514.00	72,517.00	290,068.00	558,102.00	100.0%	25.0%
ENS	25,398.00	58,627.25	234,509.00	305,612.00	43.3%	7.4%
* CNRS	0.00	27,123.50	108,494.00	141,992.00	0.0%	0.0%
BME	66,489.00	88,700.75	354,803.00	467,070.67	75.0%	18.7%
UPC	118,325.00	104,794.75	419,179.00	547,082.33	112.9%	28.2%
UDP	171,950.00	153,596.50	614,386.00	811,448.00	111.9%	28.0%
ELECTROLUX	17,576.00	27,521.50	110,086.00	209,372.00	63.9%	16.0%
UL	27,925.00	27,926.50	111,706.00	148,941.33	100.0%	25.0%
UH	20,850.00	59,906.00	239,624.00	307,632.00	34.8%	8.7%
TOTAL	**1,330,585.00**	**1,624,996.25**	**6,499,985.00**	**8,627,549.67**	**81.9%**	**20.5%**

7.2 (Actual/Linear Estimate) PM vs Requested EU Contribution & Ratio

Partner	Total PMs (Y1)		% of actual/linear estimate PMs	Total actual requested EU contribution in Y1	Total linear estimate requested EU	Total % of actual/linear estimate requested	Ratio
	Actual	Linear estimate					
GOLD	23.38	24.75	94.5%	195,128	240,346	81.2%	1.16
UPF	49.6	35.75	138.7%	260,281	261,075	99.7%	1.39
UOS	1.569	11.25	13.9%	2,299	92,655	2.5%	5.62
ITI	3.8	5	76.0%	25,863	38,542	67.1%	1.13
EKUT	14.5	18.75	77.3%	79,942	104,112	76.8%	1.01
UAU	15.75	14.25	110.5%	112,140	98,098	114.3%	0.97
TESSIDEE	10	10.5	95.2%	54,552	69,876	78.1%	1.22
UNIPD	16.6	16	103.8%	79,353	99,580	79.7%	1.30
MPG	12	15	80.0%	72,514	72,517	100.0%	0.80
ENS	7.25	10.75	67.4%	25,398	58,627	43.3%	1.56
* CNRS	0.00	0.00	0.0%	0	27,124	0.0%	0.00
BME	15	15.25	98.4%	66,489	88,701	75.0%	1.31
UPC	15.97	14.5	110.1%	118,325	104,795	112.9%	0.98
UDP	17.08	18	94.9%	171,950	153,597	111.9%	0.85
ELECTROLUX	2.5	4.75	52.6%	17,576	27,522	63.9%	0.82
UL	5.27	3.75	140.5%	27,925	27,927	100.0%	1.41
UH	3.2	6.5	49.2%	20,850	59,906	34.8%	1.41
TOTAL	**212.33**	**224.75**	**94.5%**	**1,330,585**	**1,624,996**	**81.9%**	**1.15**



Annex I - Project Timetable

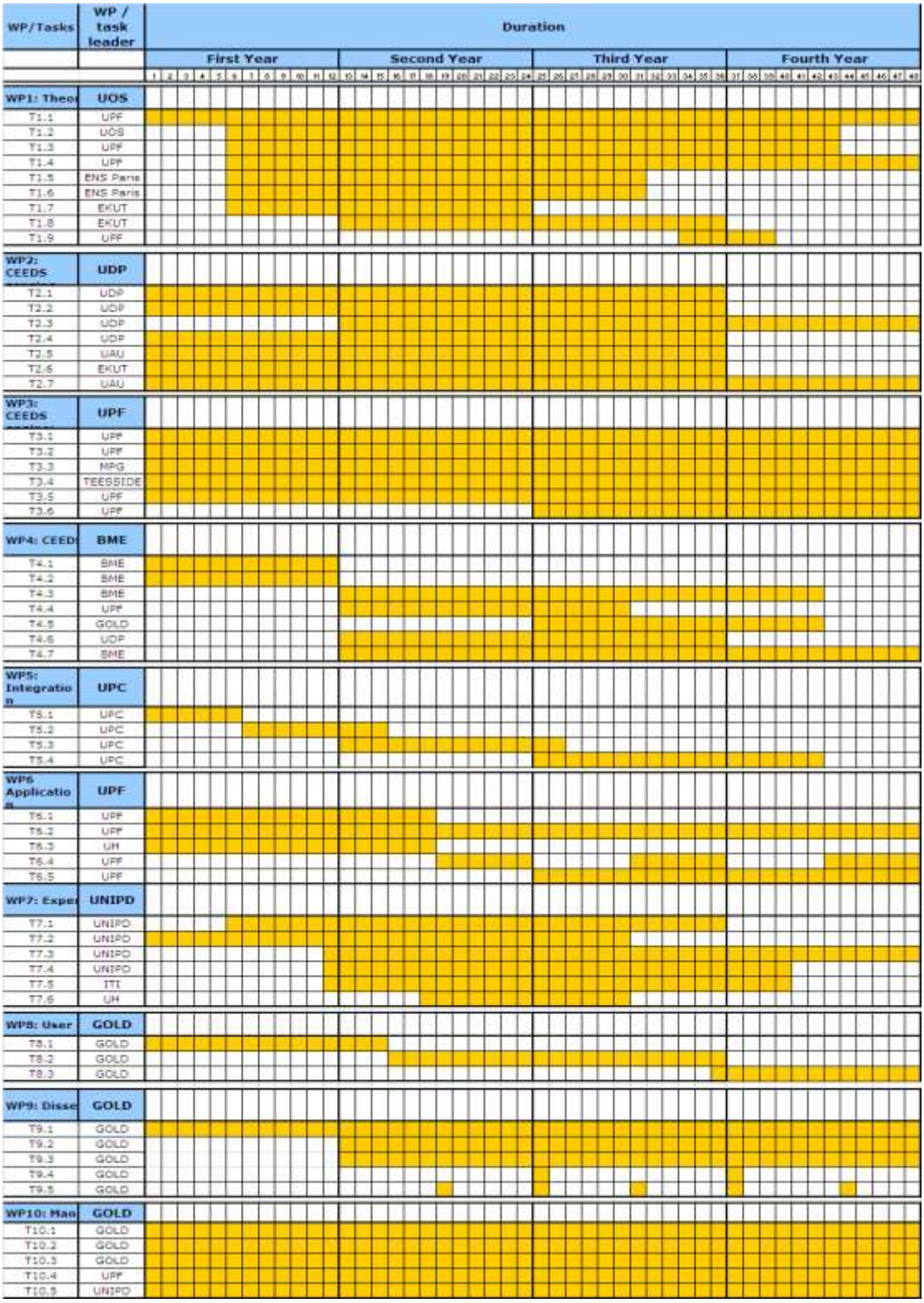


Fig. 15 - *CEEDs' GANTT chart*