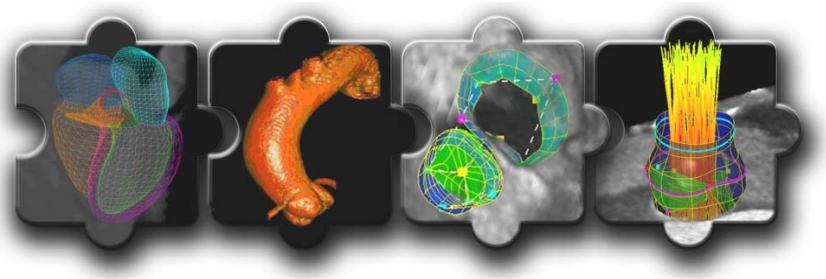
FP7-ICT-2009-4 (248421)
SeC
Sim-e-Child
http://www.sim-e-child.org/



Collaboration Project

Thematic Priority: ICT

Deliverable D1.4.1
Periodic Report 1

Due date of delivery: 31 October 2010
Actual submission date: 30 December 2010

Start date of project: 1 January 2010
Ending date: 30 June 2012

Partner responsible for this deliverable: Siemens AG

Revision 1

Project co-funded by the European Commission within the FP7

Dissemination level	
RE	Restricted to a group specified by the consortium,

Document Classification

Title	Periodic Report 1
Deliverable	D1.4.1
Reporting Period	January 2010 - October 2010
Authors	
Workpackage	WP1 - Coordination & Project Management
Security	Restricted
Nature	Report
Keywords	Periodic Report

Document History

Name	Remark	Version	Date
William McFadden	First draft	0.1	23.09.2010
Michael Sühling	Edited Section 3	0.2	10.11.2010
Michael Sühling	Final modifications	1.0	29.12.2010

List of contributors

Name	Affiliation	Co-author of
William McFadden	Lynkeus	
Michael Sühling	Siemens	
Edwin Morley-Fletcher	Lynkeus	
Allen Everett	JHU	
Razvan Ionasec	SCR	
Jerome Revillard	Maat	
Kristof Ralovich	TUM	

List of reviewers

Name	Affiliation
Michael Sühling	Siemens

Sim-e-Child Consortium

The partners in this project are:

01. Siemens AG (Siemens)
02. Lynkeus Srl (Lynkeus)
04. maat France (MAAT)
05. Technische Universität München (TUM)
06. I.R.C.C.S. Ospedale Pediatrico Bambino Gesù (OPBG)
07. Siemens Corporate Research, Inc. (SCR)
08. Johns Hopkins University (JHU)
10. American College of Cardiology Foundation (ACCF)
11. Siemens Program and System Engineering srl (PSE)

Table of Contents

1. 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):

☐ 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

☑ 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 3.4) 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 3.2.3 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of scientific representative of the Coordinator: Michael Sühling

Date: 30 / Dec / 2010

Signature of scientific representative of the Coordinator: .....

2. Publishable Summary

The FP7 STREP Sim-e-Child (SeC) started in January 2010 and has now completed the first of three 10 month reporting periods that have been planned for the project.

The objective of the SeC is to strengthen the impact of the FP6 Integrated Project "Health-e-Child" (HeC) which was completed in April 2010, rated as "surpassing expectations" by the EC and the winner of the ICT08 Best Exhibition Award, by creating an international simulation and validation environment for paediatric cardiology, supported by integrated data repositories. The project is working to go beyond the state-of-the-art by providing comprehensive and patient specific models for the dynamic and longitudinal interactions occurring in the left heart, with a focus on the congenital aortic arch disease and repair.

In addition to some of the original HeC partners (Siemens AG, Ospedale Bambino Gesù, maat France and Lynkeus Srl), three major US centres of excellence (John Hopkins Children's Centre, Siemens Corporate Research and the American College of Cardiology), and two further European partners (Technische Universität München and Siemens Program and Systems Engineering, Romania) complete the consortium.

Since the development of the project's proposal, the SeC consortium has been motivated by aiming at improving clinical outcomes of paediatric cardiology patients. The treatment of paediatric congenital heart disease is hampered by the scarcity of relevant cases, the lack of integrated data and the limited opportunities for clinical comparison among others. Yet, advances in paediatric cardiac surgery, interventional cardiology, intensive care and non-invasive imaging have led to a substantial increase in life expectancy for many patients with congenital heart disease. However, difficult challenges still persist due to the evolving nature of a child's heart and vascular system.

In order to achieve better and more reliable risk stratum, to improve and personalise therapies, and to ultimately increase the patient survival rate, SeC is focused on developing comprehensive and accurate computer models from patient specific data and simulated physical constraints.

Results of the first reporting period

The first 10 months of work has seen SeC develop the first Trans-Atlantic platform for large scale simulations in cardiology. SeC's clinical applications are being built on an evolution of HeC's original grid infrastructure based on the EGI Grid middleware (the gLite technology and European Grid Infrastructure - www.egi.eu) and the enabling GÉANT network, that together they provide virtually unlimited computing power, data storage capacity and network bandwidth across continents.

SeC's applications are based around the concept of data integration, in the way that HeC integrated the data from four European hospitals over three disease areas (cardiology, rheumatology and neuro-oncology). As indicated in Figure 1, SeC is further integrating the legacy cardiology data with a large number of cases from two ongoing US multi-centre studies, the Coarctation Of the Aorta Stent Trial [COAST] and the National Registry of Genetically Triggered Thoracic Aortic Aneurysms and Cardiovascular Conditions [GenTAC] with the support of the American College of Cardiology (Washington, D.C). At the same time the Johns Hopkins Children's Centre (Baltimore, Maryland) is validating the existing HeC models and will validate those that are developed by SeC.

Figure 1: The Expansion of the HeC network to the USA

SeC has engaged a significant infrastructure setup and migration in the first reporting period, aimed at interconnecting HeC and SeC, with the ultimate goal of making HeC's mature components sustainable and therefore reusable in SeC, while giving SeC a significant technical basis onto which further expansion will take place for the duration of the project. This infrastructure setup is now well advanced and the SeC Web portal, with public and private parts, is providing users with access to the grid and integrated applications. In the first ten months of operation, SeC has started utilising the high bandwidth pan-European GÉANT research network to:

- Establish a multi-site, web-accessible database of paediatric cardiology data, information and knowledge for translational research
- Develop a grid-based platform, supporting the definition, execution and sharing of scientific cardiac modelling and simulations.

Some of the operation features include:

- The SeC Grid infrastructure and computing resources, using a standard and internationally recognized GridPMA certificate. The Portal is cross-platform and therefore works under MS W7/XP, major Linux distributions and Mac OS X in latest version.
- The SciPort database and interfaces for manipulating data and simulations' outputs is being integrated to the security infrastructure so that it will be possible to enter SciPort directly once logged in the SeC portal in the future.

- The Desktop Fusion facility, a remote desktop service allowing to run demanding and/or "Web unaware" applications such as the HeC Case Database, the HeC Patient Browser as well as the HeC CaseReasoner for knowledge discovery (Figure 2).

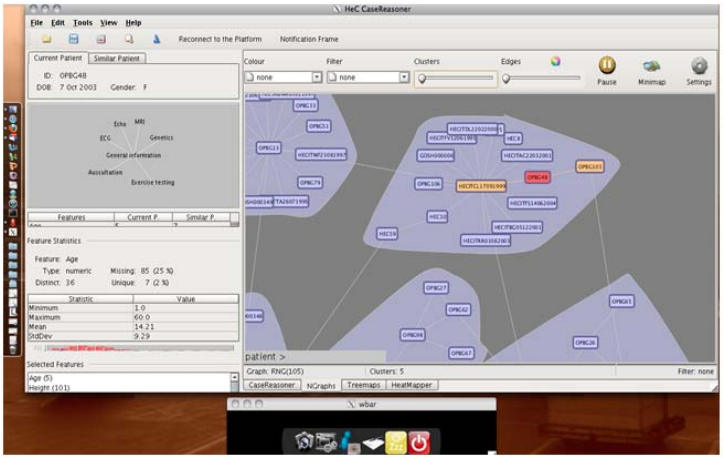


Figure 2: HeC's CaseReasoner working through the SeC portal

Besides technical interoperability requirements elicitation and infrastructure bridging, the work focused also on the development and validation of a comprehensive cardio-vascular anatomical model enabling first patient-specific haemodynamics simulations. The main achievements were:

- The existing HeC heart models were validated by the clinical partners on MRI data from Tetralogy of Fallot (TOF) cases. Using linear regression and Bland Altman plots, left and right ventricular systolic (LV ESV and RV ESV) and diastolic volumes (LV EDV and RV EDV) and ejection fractions (LV EF, RV EF) were compared between manual and automated methods. In addition, the average processing time per patient was compared between techniques.
- The existing HeC heart models were extended by integrating and enhancing existing Siemens Corporate Research models, of the aortic and mitral valve. To exploit the morphological, functional and pathological dependencies and variations of the different heart valves, the pulmonary valve (PV) and tricuspid valve (TV) have been modelled in addition (Figure 3). The heart valves represent a critical component for the analysis, modelling, and simulation of the whole heart function and this work represents the first data-driven modelling of the complete valvular apparatus.

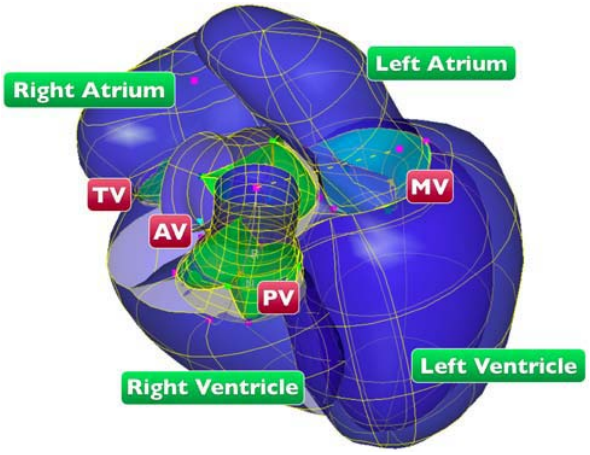


Figure 3: Comprehensive, patient-specific heart model including the complete valvular apparatus.

- Clinicians were provided with first, simulated, patient-specific cardiac blood flow across the entire cycle (Figure 4). Clinicians will, for instance, benefit from a better understanding of the vorticity which can convey crucial information about the formation and dynamics of potentially harmful "spins".

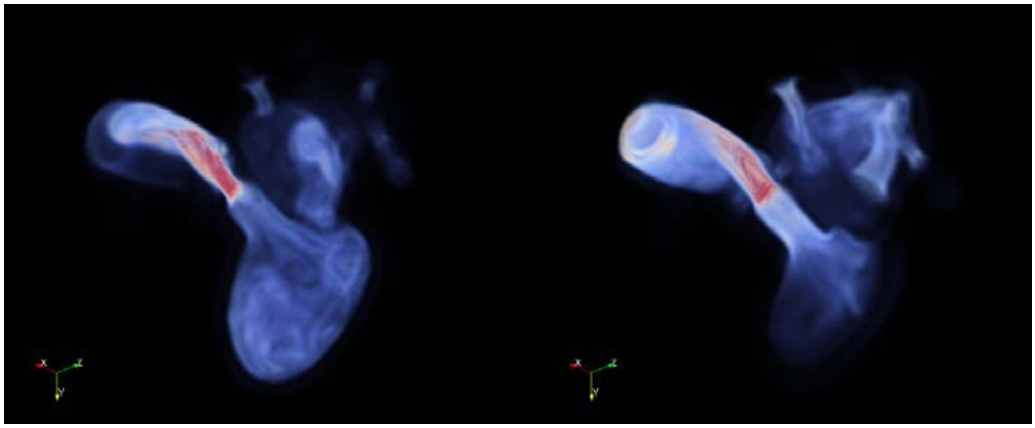


Figure 4: CFD blood flow simulation results based on patient-specific anatomical model: Vorticity pattern in patient with bicuspid aortic valve during early systole (left) and mid systole (right). Notice the helix formation which increases the wall shear stress values in the lower ascending aorta

By integrating these elements, SeC will provide paediatric cardiology professionals in Europe and the US with a Virtual Physiological Human based decision support and virtual laboratory. This will enable them to construct and validate multi-scale and personalised models of a growing child's heart and blood vessels. Ultimately this will support their clinical decisions and allow better understanding of their patient's condition.

Dissemination Highlights

In the first quarter of 2010 the SeC website went live providing visitors with information about the goal of the project, the work already done and background information on HeC. The website's address is www.sim-e-child.org.

SeC at ICT2010

One highlight of SeC's dissemination activities was the cooperation with **GÉANT** and **neuGrid** at **ICT2010** on running jointly a booth that gave practical examples of how the data networking services developed within the GÉANT project, such as Bandwidth-on-Demand and performance monitoring tools, were having an impact on EC funded research.

SeC's demonstration showed off a prototype of the services that will become available to clinicians by combining the use of an iPad and Augmented Reality (AR) to display medical image processing pipeline outputs. 3D/4D models were personalized from HeC's patient records and displayed in augmented reality instead of regular visualization. The iPad was used as an advanced remote controller to browse datasets and select pipelines to be run (everything was delivered through Web interfaces interacting with a grid

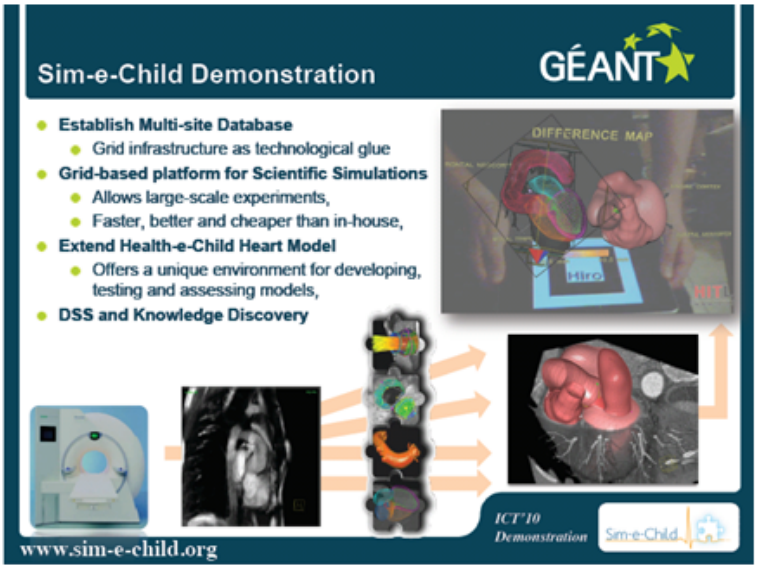


Figure 5: SeC's dissemination activities in cooperation with GÉANT and neuGrid at ICT2010

infrastructure underneath). Once the analysis was completed, the iPad could display the resulting AR pattern, the latter being then interpreted in a dedicated AR spot (a short video clip can be seen at www.youtube.com/watch?v=LXuL__W4-FE).

SeC at MICCAI 2010

The high quality of SeC's work on cardiac anatomical modelling was recognised in September 2010 when two members of the consortium, Sasa Grbic (Siemens) and Razvan Ionasec (SCR), both PhD students supervised by Prof. Nassir Navab (TUM), received the MICCAI Young Scientist Award for 2010 in Beijing, China. The winning paper was supported by SeC and represents the first data-driven modelling of the complete valvular apparatus. The heart valves represent a critical component for the analysis, modelling, and simulation of the whole heart function. The MICCAI awards commission citation read: "*The original contribution of this paper is in the estimation of patient-specific cardiac valve parameters from cine images enabled by a new constrained Multi-Linear Shape Model. This work addresses a very challenging clinical problem, which is a complex 4D modelling problem, and demonstrated impressive results.*"

Managerial Developments in the First Reporting Period

The first of two major management changes in the first reporting period was the replacement of the Project Coordinator. Dr. Martin Huber (who had also technically coordinated HeC, transferred from Corporate Technology to the Siemens Healthcare Sector) with Dr. Michael Sühling from Siemens Corporate Research, who was appointed as new Project Coordinator. Dr. Sühling leads the Medical Informatics Research Program within the Image Analytics and Informatics Global Technology Field at Siemens Corporate Technology, Siemens' central R&D organization, and is very well positioned to continue Martin Huber's excellent work.

The second major management operation was the addition of Siemens Program and System Engineering Srl, Romania to the consortium. The work that will be performed by Siemens PSE consists of the implementation of auxiliary software modules that are mainly related to internal data models and database storage and access.

Sim-e-Child Partners:

Siemens AG (Germany)
Lynkeus (Italy)
maat France (France)
Technische Universität München (Germany)
Ospedale Paediatrico Bambino Gesu (Italy)
Siemens Corporate Research, Inc. (USA)
Johns Hopkins University (USA)
American College of Cardiology Foundation (USA)
Siemens Program and System Engineering srl (Romania)

For more information:

Contact: Michael Sühling
Title: Project Coordinator, Siemens
Email: **michael.suehling@siemens.com**
Tel.: +49 (9131) 735350
Web site: **www.sim-e-child.org**

3. Core of the report for the period: Project objectives, work progress and achievements, project management

3.1. Project objectives for the period

With the aim of turning this interoperability and cooperation challenge into a concrete and focussed journey, the Sim-e-Child project partners have formalized a work plan implementing four major phases over the whole project period of 30 months. Within the first Reporting Period P1, the following two phases with corresponding objectives were in focus:

Phase 1 (Month 1 to 5) – Requirements Elicitation, Clinical Protocol and Assessment Procedures: consists in analysing and aligning the requirements from a user and system standpoint between the EU Health-e-Child infrastructure, the US COAST and GenTAC databases. A clinical protocol defining the criteria for the coding system, patient history, clinical findings, imaging and possibly genetics that will be used by both clinical institutions for assessing the aortic arch are established and the clinical assessment procedure for validating the heart models and their extensions is defined.

Phase 2 (Month 6 to 10) – Infrastructure Bridging and Validation of Health-e-Child models: Based on the established requirements, IT experts and physicians further define and implement the semantic mappings between databases. In parallel, the underlying grid infrastructure extension is prepared and deployed at JHU. The clinical validation of the Health-e-Child models takes place using the US data and current Health-e-Child infrastructure and tools, based on the clinical protocol and assessment procedures as defined early in the project.

The two planned phases “Interim Prototype Platform” and “Extended Models and Final Clinical Assessment” will be focused on during reporting period two and three, respectively.

3.2. Work progress and achievements during the period

3.2.1. WP1: Coordination and Project Management (WP Leader: Siemens)

WP1 ensured smooth project execution through appropriate project management. Detailed activities and work progress are described in Section 3.3 “Project Management during the Period”. The actual and planned effort person-months per beneficiary for WP1 are shown in Table 1.

WP1 Part. No.	Partic. Short Name	WP1 P1	WP1 P2	WP1 P3	WP1 Cumulative Effort Since Start	WP1 Funded Effort Whole Project	WP1 Unfunded Effort Whole Project	WP1 Total Effort Whole Project	WP1 Remaining Effort
1	Siemens	0.36			0.36	1	3	4	3.64
2	Lynkeus	2.5			2.5	4		4	1.5
4	MAAT	0			0		1	1	1
5	TUM	0			0		1	1	1
6	OPBG	0.3			0.3		1	1	0.7
7	SCR	0.22			0.22		1	1	0.78
8	JHU	0			0		1	1	1

10	ACCF	0			0		1	1	1
11	PSE	0			0	0.5		0.5	0.5
Total		3.38	0	0	3.38	5.5	9	14.5	11.12

Table 1: Actual and planned effort person-months per beneficiary for WP1

3.2.2. WP2: Interoperability Requirements Analysis (WP Leader: Siemens)

The objective of this work package was to establish a common understanding between the end-users and IT experts in the tasks which have to be carried out during the project's duration. In particular the tasks and achievements within this Reporting Period P1 are:

T2.1. Requirements Elicitation and Conceptualization (Month 1-5) and T2.2. Requirements Documentation (Month 3-10)

The concepts, models and data formats to be used during the project have been worked out between technical and clinical partners during several brainstorming and analysis activities. Finally, these requirements have been documented in Deliverable D2.1 "Initial Interoperability Requirements Analysis Document" which will be used to guide the technical implementation further on. The technical requirements comprise the following areas:

- Overall system architecture
- Descriptions of different system components
- Interface definitions between different system components
- Web-enabled data and result storage and sharing
- A description of a typical simulation use case highlighting user interaction and system response
- Re-use of existing Health-e-Child components and functionality
- A description of graphical user interfaces

The interoperability between clinical and technical domains is defined by describing:

- Requirements for automatic cardio-vascular geometrical models
- Execution of aortic and left heart haemodynamics simulation workflows

The clinical requirements for the assessment and validation of the anatomical models and blood flow simulations have been discussed among the clinical partners P6 OPBG, P8 JHU and P10 ACCF and have been documented in WP3.

Use of Resources and Deviations between Actual and Planned Person-Months

Overall, the Tasks T2.1 and T2.2 have been carried out completely as planned during Reporting Period P1. The actual and planned effort person-months per beneficiary for WP2 are shown in Table 2. As planned, requirements will be updated during the reminder of the project in Task T2.3 resulting in an updated Deliverable D2.2 "Interoperability Requirements Analysis Document" at the end of Reporting Period P2 (M20). It is expected that remaining efforts in this work package will be needed for the analysis, clarification and adaptation of the requirements during the implementation phase.

WP2 Part. No.	Partic. Short Name	WP2 P1	WP2 P2	WP2 P3	WP2 Cumulative Effort Since Start	WP2 Funded Effort Whole Project	WP2 Unfunded Effort Whole Project	WP2 Total Effort Whole Project	WP2 Remaining Effort
1	Siemens	0.2			0.2	2		2	1.8
2	Lynkeus	0			0			0	0
4	MAAT	2			2	3		3	1
5	TUM	0			0	1		1	1
6	OPBG	0			0	2		2	2
7	SCR	0.5			0.5	2		2	1.5
8	JHU	0			0		2	2	2
10	ACCF	0			0	3		3	3
11	PSE	0			0			0	0
Total		2.7	0	0	2.7	13	2	15	12.3

Table 2: Actual and planned effort person-months per beneficiary for WP2

3.2.3. WP3: Clinical Protocol and Data Alignment, Ethical Clearance and Monitoring (WP Leader OPBG)

The clinical partners P6 OPBG, P8 JHU and P10 ACCF have discussed and defined their needs on the clinical assessment and validation of heart models and simulated haemodynamics. The specific tasks and work progress within WP3 in Reporting Period P1 are as follows:

T3.1. Clinical Protocols Alignment (Month 1-30)

The clinical protocols to be used in Sim-e-Child were discussed on April 22nd in Sestri Levante, Italy, among Allen Everett (JHU), Giacomo Pongiglione (OPBG) and Gerard Martin (ACC) in presence of IT representatives from Siemens and MAAT. Existing protocols for COAST, GenTAC and Health-e-Child will be reused in Sim-e-Child. In addition, new data will be acquired at P6 OPBG. Since the clinical trials are dealing with different diseases, a subset of the existing protocols and data has been selected for use in Sim-e-Child and the data models in SciPort will mimic the common protocol and data sub-sets.

T3.2. Clinical Assessment Procedures and Documentation (Month 1-5)

The clinical assessment that aims to validate the quantitative measurements derived from the patient-specific left-heart models and haemodynamics simulations has been discussed and initially described for the left-heart chambers (left ventricle and left atrium), left-heart valves (aortic valve and mitral valve) and the aorta. The general approach is to compute the clinical parameters of interest using first the clinical gold-standard defined by the expert and second using the patient-specific heart model. Subsequently, the difference (error) between the two quantities will be analyzed using standard statistical tools.

As main results, the clinical protocols used for acquiring the data utilized within Sim-e-Child (T3.1) and the clinical assessment procedure for validating the patient-specific models of the heart and aorta (T3.2) have been documented in Deliverable D3.1 “Aligned Clinical Protocol and Assessment Report”.

T3.3. Data Model Analysis (Month 6-10)

The Sim-e-Child project requires a database of anonymized cases with medical images in specific formats and relevant clinical parameters. Such a database will allow the development of models and simulations and interpretation and validation thereof by clinicians. The data will be contributed by partners in the EU (OPBG) and the US (JHU and their partners in clinical trials and registries).

- The cardiology data from the Health-e-Child project was extracted from the databases for right ventricular overload (RVO) which contains the Tetralogy of Fallot (ToF) cases relevant for Sim-e-Child.
- The clinical data from the COAST trial was provided by JHU as PDF forms and spreadsheets with a data export from the database.
- The clinical data from OBPG is extracted directly from the Hospital and Radiology Information Systems (HIS, RIS) and from the PACS in the form of Word documents and DICOM images together with clinician notes and clinical parameters.

Data formats of the different data sources at P6 OPBG, P8 JHU and extisting HeC data have been analyzed and compared in detail. Accordingly, semantic mappings between data structures were specified and are currently being implemented. The mapping and integration of the data from different sites and sources is described in Deliverable D3.2 “Data Model Mapping Report”.

During the analysis of existing clinical data bases (COAST, GenTAC, HeC), it turned out that a large part of the image data was not suitable for 3D cardio-vascular anatomical modelling. The major part of the data was acquired using 2D imaging protocols. However, realistic and clinically meaningful haemodynamic simulations can only be performed based on 3D models. The GenTAC data, in

particular, does not contain image data that is useful for the intended use. GenTAC imaging is acquired with a mixture of CT and MRI with no standard protocol and from multiple institutions. As corrective action, P8 JHU has submitted an amendment to the existing HeC IRB protocol to allow retrieving data on patients with aortic aneurysms. Once the IRB amendment will be approved by the ethics commission, additional data will be collected for Sim-e-Child.

Data acquisition at P6 OPBG is ongoing with about two patients per week. About 25 patients have been provided so far. To improve scanning performance and volumetric MRI imaging further, OPBG has purchased new MRI imaging systems to be installed in 2011.

P8 JHU, with approval of the expanded HeC IRB protocol, has identified 71 MRI and 56 CT cases with coarctation, most of which will be adequate for modeling. In addition, JHU has modified their protocol in the cardiac MR suite to include flow acquisition for validation purposes.

T3.4. Ethical Clearance and Monitoring (Month 1-30)

P8 JHU has submitted an amendment to the existing HeC IRB protocol to allow retrieving data on patients with aortic aneurysms.

P8 JHU has received permission from the US Food and Drug Administration to access COAST trial data and imaging and consent patients for more advanced MRI studies as necessary for modelling.

Use of Resources and Deviations between Actual and Planned Person-Months

The actual and planned effort person-months per beneficiary for WP3 are shown in Table 3. Deviating from original planning, it turned out that the definition and analysis of clinical assessment procedures (T3.2) will need to be extended beyond the first project phase. In particular, the quantitative measures to be derived from the heart modelling (wall stress, wall shear stress, elasticity, distensibility, stiffness, fluid structure interactions, aortic wall bio-energetics, etc) as well as the effects of interventions on morphology, dynamics, and haemodynamics are difficult to define in detail without having preliminary experimental results and mechanisms to extract and analyze these parameters. Therefore, the initially defined clinical assessment and validation procedures (T3.2) will be refined during the reminder of the project based on first experimental assessments. Corresponding efforts of P1 Siemens, P6 OPBG, P8 JHU, and P10 ACCF will be spent mainly during Project Period 2 and if necessary also Period 3. It is expected that the total effort will remain within the original estimates.

WP3 Part. No.	Partic. Short Name	WP3 P1	WP3 P2	WP3 P3	WP3 Cumulative Effort Since Start	WP3 Funded Effort Whole Project	WP3 Unfunded Effort Whole Project	WP3 Total Effort Whole Project	WP3 Remaining Effort
1	Siemens	0.2			0.2	3		3	2.8
2	Lynkeus	0			0			0	0
4	MAAT	2			2	2		2	0
5	TUM	0			0			0	0
6	OPBG	15			15	16		16	1
7	SCR	1.2			1.2	1		1	-0.2
8	JHU	0.5			0.5		16	16	15.5
10	ACCF	0			0	12		12	12
11	PSE	0			0			0	0
Total		18.9	0	0	18.9	34	16	50	31.1

Table 3: Actual and planned effort person-months per beneficiary for WP3

3.2.4. WP4: Simulation and Collaboration Platform Development (WP Leader MAAT)

The specific tasks and work progress within WP4 in Reporting Period P1 are as follows:

T4.1. JHU Grid Connection (Month 1-5)

Migration of HeC Grid infrastructure Information Services to SeC. In order to facilitate the future maintenance of HeC and SeC as well as to renew the Grid infrastructure configuration so to match latest de facto standards from the European Grid Initiative (EGI), a complete migration of the SeC information system (i.e. grid infrastructure central services) has been operated.

Thus, the 2 first months of task T4.1 were devoted to the logistics setup and allowed carefully planning the progressive migration of infrastructural services. Great care was given to applying appropriate naming conventions, good practices and EGI compliant deployment procedures. Constant interactions took place with EGI system administrators in order to settle deployment questions that aroused from this migration.

As a consequence, SeC now hosts the HeC infrastructure pillars and is up-to-date with respect to acknowledged Grid standards. The infrastructure features the following services and versions:

Host name	OS	gLite service(s)
voms.maatg.eu	Scientific Linux 4 32b	VOMS
bdii.maatg.eu	Scientific Linux 5 64b	Top BDII
wms.maatg.eu	Scientific Linux 4 32b	WMS
lfc.maatg.eu	Scientific Linux 5 64b	LFC

The JHU Gateway (formerly deployed by and for HeC) has been kept as is, as a means to further utilizing the SeC simulation platform, i.e. offering a high quality of services access point. The technical partners, in particular MAAT and SIEMENS decided to externalize the US Grid node resources so to facilitate its expansion, while not impacting on JHU's IT department. Consequently, the US Grid node resources will be subcontracted from an appropriate Cloud provider on a requirements basis. This will make it possible to reconfigure the node on demand and will allow to rapid prototype and test SciPort and iKDD applications integration within the SeC simulation platform. The technical partners therefore expect to rent the following equipment to ensure the minimal site setup:

- 1 virtual machine for the CREAM-CE service
- 1 virtual machine for the site BDII service
- 1 virtual machine for the DPM service
- 1 or more virtual machine(s) for the WN(s) (on demand deployment)
- 1 virtual machine for the SciPort service

In parallel, technical partner MAAT is investigating the possibility of bridging and therefore using additional US grid resources from onsite initiatives. To do so, it has started discussing with the Open Science Grid (OSG http://www.opensciencegrid.org/) and the CardioVascular Research Grid (CVRG http://www.cvrgrid.org/) projects. CVRG is based at the Institute for Computational Medicine at Johns Hopkins University, which may make it more relevant SeC.

T4.2. Case Databases Connection (Month 6-10)

Migration of HeC database infrastructure and patient data to SeC. In order to facilitate the future maintenance of HeC and SeC databases as well as to improve the simulation platform interoperability between US and EU, suitable cardiac HeC data has been migrated to SeC using the SciPort technology as provided by technical partner SIEMENS. The latter constitutes a generic database

infrastructure allowing data acquisition on the one hand in the US and its further integration with the Integrated Case Database (ICD) of HeC in Europe, on the other hand. Similarly to the issues faced in HeC when accessing live Health Information Systems (HIS), the Consortium decided to setup the SciPort dedicated data migration facility outside the main hospitals' firewalls therefore allowing the anonymous and secure data sharing between participating centres.

In order to setup the technological bridge needed between the European HeC/SeC platforms and its counterparts in the US, technical partners SIEMENS and MAAT have setup 2 SciPort database containers, one in the US and one in Europe. The one in the US, is hosting the COAST data extracted for the sake of testing and further developing the SeC models, while the European SciPort entity is primarily used to host the data provided by P6 OPBG and the data migrated (filtered) from HeC to SeC. SciPort's intrinsic distribution capabilities makes it possible for end-users to query and utilize data in new simulation experiments seamlessly, as if it was located at the same place. Consequently two continental SciPort databases are available in SeC from within the simulation Web portal interface available at: http://sec-portal.maatg.fr/

T4.3. Simulation Data Management (Month 1-5)

As described in more detail in Deliverable D2.1, the SimSyS/iKDD component of each Sime-e-Child node provides workflows for patient-specific cardiac modelling and simulation of the left heart as well as advanced quantitative and qualitative analysis, and experiment validation capabilities. For the storage of simulation experiment definitions and generated results in the grid environment, custom data models have been defined that can be stored using the SciPort meta-data model. This includes models for simulation workflows, the heart models to be used, parameters for the modelling and simulation algorithms, and models for simulation results such as 4D models and derived quantitative measures.

The data interface of the SimSyS/iKDD component with SciPort is represented through a hierarchy of (SimSys) concepts as described in Figure 6. The data interface provides for each concept an IO module that serializes/deserializes SimSys concepts into SciPort concepts. Through an IOServer, part of the SimSys, concepts can be loaded/stored from/to to SciPort provided the subject concept instance, database location (url and ID), and corresponding IO module that will perform the serialization/deserialization. The SciPort concepts are available to SimSys in the form of a client library that encapsulates the storage and retrieval from remote servers via secure web services.

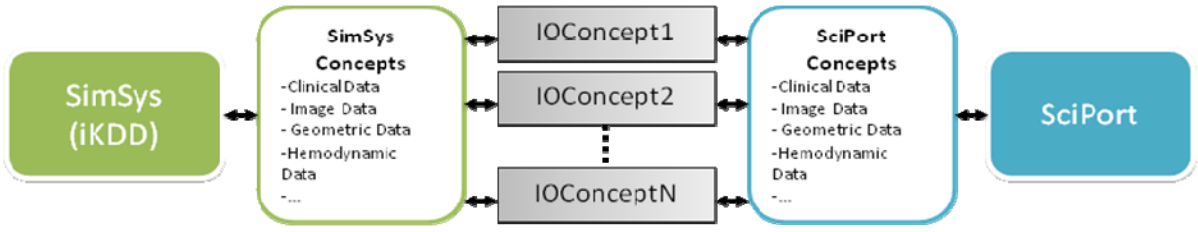


Figure 6: SimSyS/iKDD data interface with SciPort.

T4.4. Simulation Environment Gridification (Month 6-10)

A complete API of the Gateway and the Grid has been provided for integration with SimSys/iKDD and SciPort systems. The delivered API allows uploading and managing data within the Grid, as well as setting up, submitting and managing new simulations. The API will be duly documented in up-coming Deliverable D4.2 « Simulation and Collaboration Platform Interim Release and Report ». Consensus has also been found on API modifications and extensions, to better accommodate the integration of SimSys/iKDD in particular.

Deeper integration of SciPort and SimSys/iKDD is now being discussed and taking place. Developers have been provided with the latest Gateway and Grid API releases, as well as accompanying documentations as developed in and delivered by HeC last April 2010. Furthermore, assistance has been provided to developers on the use of low level Grid APIs such as the Simple API for Grid

Applications (SAGA) and higher level functions such as those provided by the Gateway. It is expected that this integration work will run over the next reporting period as well, so to strengthen the present interfacing of SimSys/iKDD with the simulation platform engine, i.e. the Gateway services and underlying Grid infrastructure, while taking into consideration eventual new requirements of models being developed.

T4.5. Simulation and Collaboration Platform Development (Month 1-30)

The SeC simulation platform developments have started with the integration of various legacy assets coming from HeC, as well as new ones coming from SeC technical partners, in particular SIEMENS. The simulation platform has been thought of as a Service Oriented Architecture (SOA) of biomedical research utilities, materializing as a scientific Web portal of portlet applications. The current portal prototype exhibits the following features and functions:

- A modular and highly extensible Web interface, leveraging on the portlet concept (i.e. using the LifeRay Open Source Free Web portal technology), that makes it possible to create, reference and rapidly deploy new loosely coupled Web applications,
- An integrated and harmonized security infrastructure (i.e. Single Sign On – SSO framework) interfacing with major security standards and technologies. The latter makes it possible to integrate existing Web-based platforms very efficiently, such as SciPort and others. Moreover, the framework has been thoroughly tested to accommodate with EUGridPMA official certificates. As a consequence:
    - IGTF (http://www.igtf.net/) standard certificates are accepted by SeC/HeC, in particular those from EUGridPMA (www.eugridpma.org) in Europe and TagPMA (http://www.tagpma.org/) in the US,
    - Grid proxy generation and MyProxy sessions are mapped to the CAS sessions mechanism, thus simplifying greatly user experience when connecting to the SeC simulation portal.
- The HeC PatientBrowser. The SeC simulation platform integrates the query interface to browse efficiently the HeC Integrated Case Database (ICD) and inner patient folders containing associated medical data from physical examinations to medical images,
- The HeC ICD service and interfaces, hosting securely the HeC patient medical records,
- The HeC CaseReasoner service and interface, making it possible to search through the large database of patient conditions and to look for interesting similarities/clusters,
- The SciPort service and interfaces, used as the SeC synchronization database between the US and Europe for sharing and operating Cardiology simulations,
- Online community tools, such as Wiki, CMS, Forum, Agenda and Live Messaging between connected end-users, to support collaborative work,
- A remote desktop and simulation toolkit environment, via the DesktopFusion facility, making it possible to deliver a turnkey environment to end-users encompassing pre-packaged software toolkits, data and other utilities from within which running simulations and visualizing outcomes.

The SeC simulation platform Web portal can be found online at the following URL: http://sec-portal.maatg.fr . Instructions to sign in and to use the SeC simulation portal facilities are provided online.

T4.6. Platform Integration and Testing (Month 7-30)

A development test-bed has been setup and provided by MAAT, which allows technical partners to exercise and test their respective platform components, as well as their integration within the SeC infrastructure and simulation platform.

Over the period, the following activities thus took place:

- New releases of the SeC/HeC services have been made available through the HeC software repository. The latter is also used by SeC for new developments and deployments in production,
- Tests were applied on the SeC Simulation and Collaboration Platform so to validate new functions as developed in tasks T4.1, T4.2, T4.3 and T4.4,
- Significant effort has been invested in the migration and integration of former HeC applications such as the HeC PatientBrowser, ICD database and CaseReasoner, in order to make these applications available to end-users through the newly released simulation platform portal. These applications could be migrated efficiently to Webapps, thanks to the DesktopFusion technology from technical partner MAAT.
- A development site has been installed in Archamps (France), at the onsite data center. It provides a small amount of computing resources installed and configured as those in Production for testing purposes.

T4.7. Sim-e-Child Platform Maintenance and Access Provision (Month 1-30)

The SeC Simulation and Collaboration Platform as well as underlying Grid infrastructure were appropriately maintained over the period, since their respective deployment. Partner MAAT provided special attention to the infrastructure access provision so to facilitate and assist developers in their daily work.

Assistance was also provided to technical partners during the deployment logistics preparation phase, so to support decision-making on respective US Grid node architecture and future maintenance requirements.

Regular updates were applied in the platform, using the formerly mentioned software repository.

T4.8. Health-e-Child Platform Maintenance (Month 5-30)

Migration of HeC Grid infrastructure Information Services to SeC. As formerly explained, in order to facilitate the future maintenance of both HeC and SeC as well as to renew the Grid infrastructure configuration so to match latest de facto standards from the European Grid Initiative (EGI), a complete migration of the SeC information system (i.e. grid infrastructure central services) has been operated.

The migration now being completed and first nodes hosting simulation and data being on the way, technical partners in task T4.8 will recontact former clinical centers to propose their migration to the latest version of the Grid middleware and Gateway.

Thus OPBG, NECKER, GOSH and IGG will be recontacted and their migration scheduled accordingly. OPBG will be treated first as being a partner of the SeC project with concrete simulation needs.

Former HeC end-users have been contacted and informed about the major infrastructural migration from HeC to SeC. Expressions of interest have been gathered so to keep concerned users informed until the simulation platform and pillar resources are online.

Use of Resources and Deviations between Actual and Planned Person-Months

The actual and planned effort person-months per beneficiary for WP4 are shown in Table 4. Actual efforts are considered to be mainly in alignment with planned efforts. Original plans to install a Grid node at JHU turned out to impact the JHU IT infrastructure. As described above, it has been decided to rent server infrastructure resources from an appropriate Cloud service provider. Different offers have been collected and evaluated already (see Deliverable D4.1). The set-up and installation of the US grid node is therefore planned for the beginning Project Period 2. To avoid multiple updates of the US grid node while the grid infrastructure is under development and to optimize rental costs, resources will be made available once the developed models will start undergoing clinical assessment by the clinical partners.

WP4 Part. No.	Partic. Short Name	WP4 P1	WP4 P2	WP4 P3	WP4 Cumulative Effort Since Start	WP4 Funded Effort Whole Project	WP4 Unfunded Effort Whole Project	WP4 Total Effort Whole Project	WP4 Remaining Effort
1	Siemens	0.2			0.2	2		2	1.8
2	Lynkeus	0			0			0	0
4	MAAT	6			6	14		14	8
5	TUM	0			0			0	0
6	OPBG	0			0	2		2	2
7	SCR	1.5			1.5	2.75		2.75	1.25
8	JHU	0.5			0.5		2	2	1.5
10	ACCF	0			0	6		6	6
11	PSE	5			5	17		17	12
Total		13.2	0	0	13.2	43.75	2	45.75	32.55

Table 4: Actual and planned effort person-months per beneficiary for WP4

3.2.5. WP5: Development and Assessment of Personalized Child Heart Models (WP Leader SCR)

The specific tasks and work progress within WP5 in Reporting Period P1 are as follows:

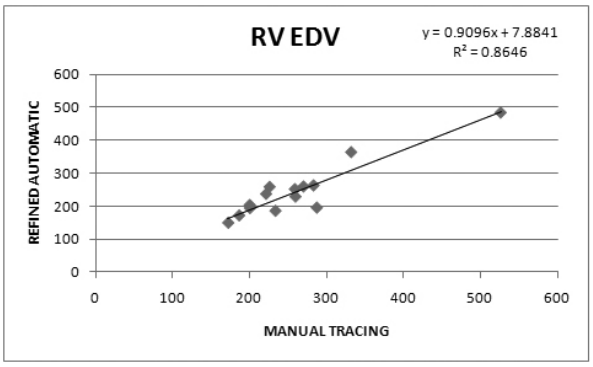
T5.1 Validation of Health-e-Child LV and RV Models (Month 1-10)

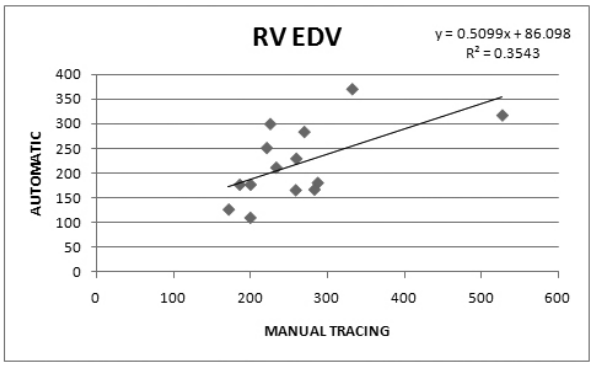
SCR and JHU used 15 Tetralogy of Fallot Cardiac MRI to validate the previously developed HeC automated learning-based algorithm volume algorithm (LBA). To validate the LBA method, we examined 15 additional patients with TOF and compared three methods blindly in measuring RVV and EF: current standard manual tracing (M-TRACE), fully automated LBA (AUTO), and LBA with manual boundary refinement of fully automated tracings (R-AUTO). Using linear regression, right ventricular systolic (RVESV) and diastolic volumes (RVEDV) and EF were compared between manual and automated methods. Average processing time per patient was compared between techniques.

Results:

Mean processing time (minutes) per patient was significantly reduced using the fully automated method but not when adding the overhead of manual correction: M-Trace, 5.7±0.9; AUTO, 0.7 ($p<0.001$); and R-AUTO, 16.2±2.0 ($p< 0.002$). Correlation with results from manual tracing demonstrated poor correlation with diastolic volumes (RVEDV AUTO 0.595; R-AUTO, 0.930); good correlation with systolic volumes (RVESV AUTO, 0.874; R-AUTO, 0.918), and superior EF measures (AUTO, 0.854; R-AUTO, 0.633). LBA volume inaccuracy was most commonly due to incorrect identification of the tricuspid and pulmonary annuli.

The figure below displays the relationship of RVEDV as measured by manual tracing with the results from fully automatic and refined automatic techniques.





Conclusions:

Our fully automated LBA method markedly reduces the time necessary to complete volumetric assessment of right ventricular function but due to failure to delineate accurately the tricuspid and pulmonary valve annuli, underestimates predominately diastolic right ventricular volume. With additional case training, LBDA offers the opportunity to develop fully automatic volumetric measures to overcome the complexity of right ventricular function assessment of congenital heart disease and thereby reduce operator variability. *This data is being submitted for presentation at the 2011 Association European Paediatric Cardiology annual meeting in May*.

In addition, JHU has just submitted 52 new cases of Tetralogy to SCR for further refinement of the LBDA. Overall, Task 5.1 was successfully completed as planned for. A detailed validation report is provided in Deliverable D5.1. “Health-e-Child Heart Models Clinical Validation Report”.

T5.2 Extension of the Health-e-Child Model with Aorta, Aortic Valve and Mitral Valve (Month 1-10)

The objective within this work item is to enhance the HeC cardiac models with anatomical models for the aorta, aortic valve, and mitral valve. Building upon our prior work on CT and ultrasound-based valve model estimation [Ionasec et al., 2010a], the work focus of P1 Siemens within Reporting Period P1 was on extending and enhancing a complete and modular model of the heart valves comprising the anatomy of the aortic and mitral valve. To exploit the morphological, functional and pathological dependencies and variations of the different heart valves even better, the pulmonary valve (PV) and tricuspid valve (TV) have been modelled in addition. The complete valves model is shown in Figure 7.

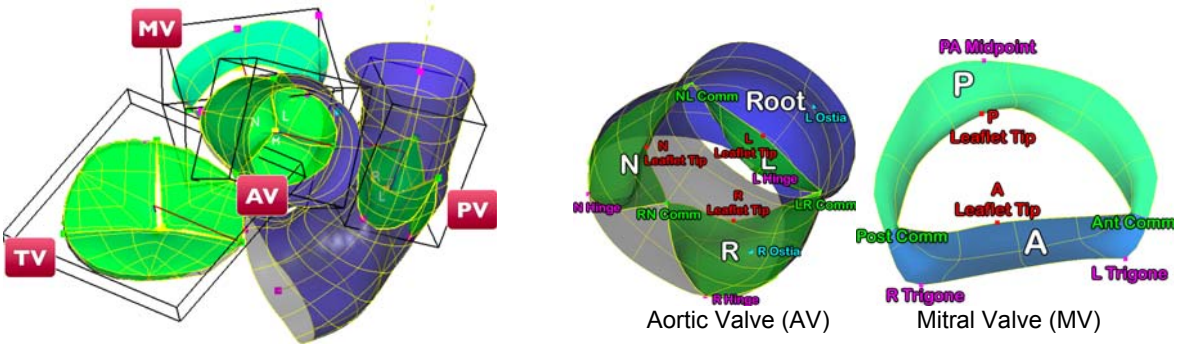


Figure 7: Left: Complete heart valves model consisting of aortic valve (AV), mitral valve (MV), pulmonary valve (PV) and tricuspid valve (TV). Right: Detailed anatomical aortic valve (AV) and mitral valve (MV) models.

The complete patient-specific valvular apparatus is estimated automatically from 4D Computed Tomography images, using a discriminative learning-based approach. Global valve location and motion, as well as the non-rigid movement of anatomical valvular landmarks, are computed using Marginal Space Learning (MSL) [Zheng et al., 2007] and Trajectory Spectrum Learning (TSL) [Veronesi et al., 2009] frameworks. P1 Siemens introduced a novel anatomical Constrained Multi-linear Shape Model (cMSM) [Grbic et al., 2010] to capture complex spatio-temporal statistics, and in conjunction with robust boundary detectors, to extract the complete valvular anatomy and motion. In September 2010, this work was presented at the internationally highly-recognized Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2010) in Beijing, China and *received the very prestigious MICCAI Young Scientist Award*.

The anatomical models were integrated into the so-called SimSys component that provides interfaces and workflows for patient-specific cardiac modelling and simulation as well as advanced quantitative and qualitative analysis and experiments validation capabilities. The graphical user interface together with exemplary anatomical models fitted to CT data is shown in Figure 8.

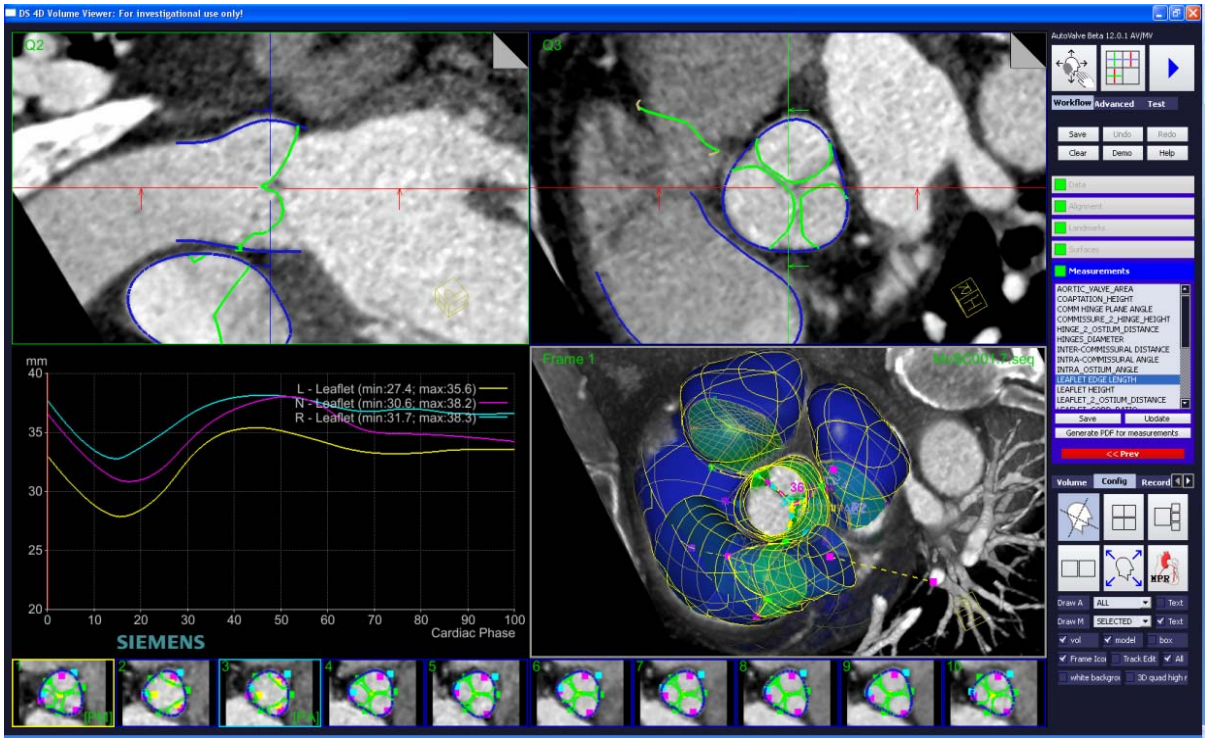


Figure 8: SymSys user interface and estimated cardio-vascular anatomical models.

So far, most of the worked focused on model estimation from CT data. CT data offers a high spatial resolution and also allows acquiring volumetric images across multiple heart phases of the cardiac cycle. Due to dose considerations, Magnetic Resonance Imaging (MRI) is often the modality of choice in paediatric cardiology to avoid exposition of children to ionizing radiation. MR images can be acquired in any spatial orientation. Commonly-used orientations are short axis (SA) views and long-axis (LA) views. The short-axis acquisitions consist of a stack of typically 4-12 (parallel) slices covering the heart from apex to base. Due to limited time resolution in MRI, those slices are usually acquired in a sparse fashion with ”gaps” in-between. These 2D cine images in any prescribed plane are typically acquired across multiple phases (frames) throughout the cardiac cycle. 3D scans of the whole heart are typically only acquired at the end-diastolic phase.

Ongoing work focuses an estimating the developed anatomical models from this sparse cardiac MRI data. Patient-specific models are estimated using hierarchical learning-based techniques. In particular, we have developed a novel dynamic regression-based reconstruction to infer the complete spatio-temporal anatomical models from the sparse MRI data [Vitanovski et al., 2010]. Preliminary results on the estimation of the mitral valve are shown in Figure 9. Average surface errors range between 1.2 and 1.7 mm. The size of the training and testing data sets were 184 and 15, respectively. For these experiments, data from the HeC project were re-used.

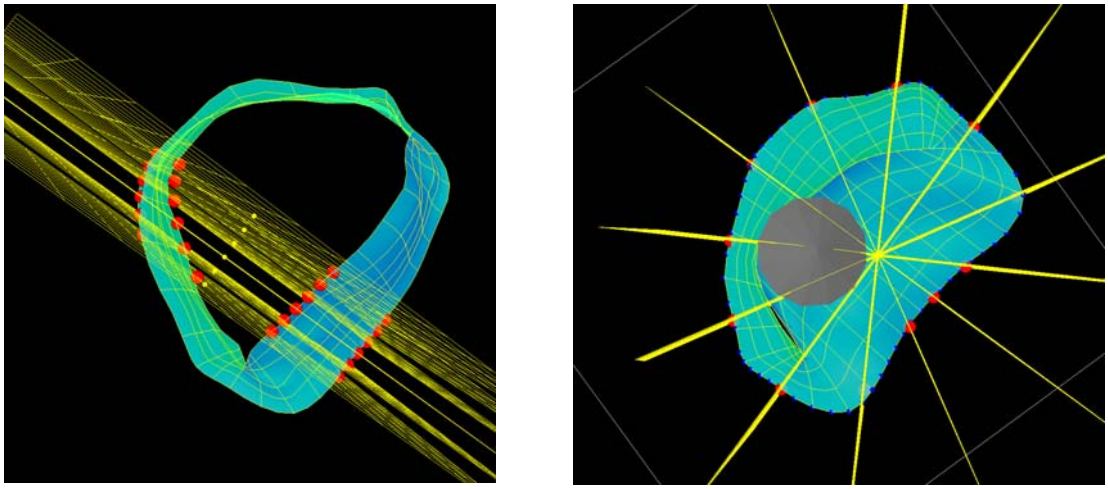


Figure 9: Mitral valve reconstruction from sparse MRI data. Regression-based reconstruction was applied to sparse parallel planes (left) and radially-oriented planes (right).

Besides cardiac valve models, an initial model of the aorta was also developed. The model currently consists of five annotation points, a spline-based vessel centerline fitted along the annotation points and a tubular surface extruded from the centerline to form the vessel wall (Figure 11). Based on the geometric mesh model, a level-set can be directly computed that is serving as boundary conditions during the CFD blood flow simulation. Ongoing work will focus on the automatic estimation of the aorta model from sparse MRI data analog to the cardiac valve model estimation.

T5.3 Extension of the Heart Models with Physical Constraints (Month 6-20)

P7 SCR developed and performed first computational fluid dynamics (CFD) blood-flow simulations from the integrated heart and aorta models [Mihalef et al., 2010a], [Mihalef et al., 2010b]. The haemodynamics computations applied use a classical continuum model for the blood. The incompressible Navier-Stokes equations with viscous terms are solved using direct numerical simulation in a level set formulation. Preliminary results in the form of colour-coded vorticity images from an example patient with a bicuspid aortic valve are shown in Figure 10. Vorticity, in particular, conveys crucial information about the formation and dynamics of the vortices in the flow, which are intrinsically related to the shear stress at vessels walls.

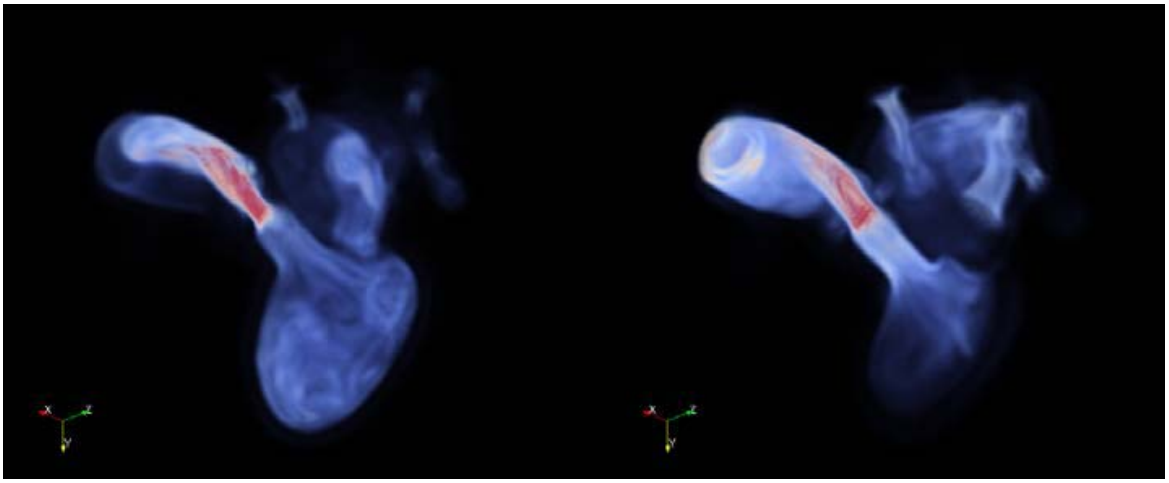


Figure 10: CFD blood flow simulation results based on patient-specific anatomical model:

Vorticity pattern in patient with bicuspid aortic valve during early systole (left) and mid systole (right). Notice the helix formation which increases the wall shear stress values in the lower ascending aorta.

P5 TUM developed an initial visualization of the blood flow (CFD simulated or Phase-Contrast MRI 3D velocity vector field) using line glyphs scaled according to the velocity magnitudes. As shown in Figure 11, the velocity magnitude patterns inside the aorta are visually highlighted by colour-coding the results based on a Blue-to-Red HSV lookup table.

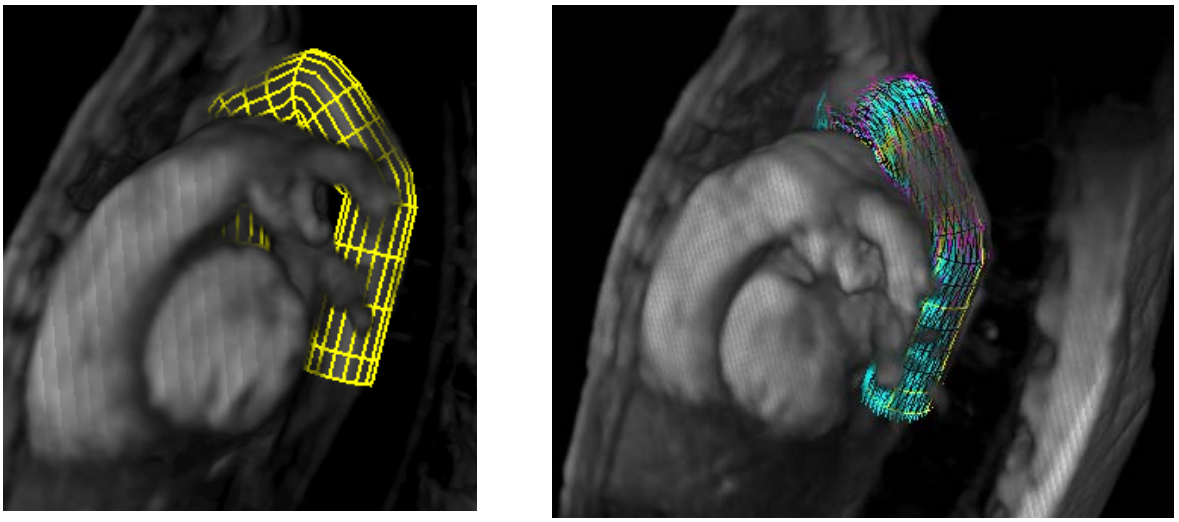


Figure 11: Aorta model derived from 3D MRI data (left) and initial visualization of the blood flow using line glyphs scaled according to the velocity magnitudes (right).

Use of Resources and Deviations between Actual and Planned Person-Months

The actual and planned effort person-months per beneficiary for WP5 are shown in Table 5. Overall, the development of the comprehensive valve model and first simulation results were successful and resulted in a number of peer-reviewed conference publications in 2010 that referenced the SeC project. One of which was presented at the internationally highly-recognized Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2010) in Beijing, China *receiving the very prestigious MICCAI Young Scientist Award*.

At P1 Siemens, the main contributions in Reporting Period P1 were done by two PhD students that are covered by indirect costs; therefore, those efforts do not appear explicitly in the reported efforts. During the first project phase, significant full-time resources at P1 Siemens were still bound with the HeC project that was extended beyond the planned termination end of 2009 until April 2010, thus overlapping to a large extend with the SeC project and delaying the allocation of more full-time employee resources to SeC. During Reporting Period P2, a full-time employee at P1 Siemens will be involved additionally to further enhance the cardiac and aortic model estimation. In particular, building upon the work in Period P1 that mainly focused on ultrasound and CT data, efforts will be spent on estimating the cardiac models from MRI data thereby extending Task T5.2 beyond the first reporting period. Similarly, methods for aorta model estimation from MRI data will be enhanced by extending related work at P7 SCR [Zheng et al., 2010].

Contributions from P5 TUM started slightly later than originally intended since the hiring for adequate personnel at TUM took longer than expected. The PhD student, Kristof Ralovich, was hired from October 2010 on. Before, the PhD student already contributed to the SeC project during July and August during his time as intern at P7 SCR in Princeton. These efforts do not appear explicitly since they were covered by indirect costs. P5 TUM will focus on developing modules for post-processing of

the simulation results and derive advanced parameters such as blood flow pattern types as well as advanced visualization techniques (T5.3-T5.5). All contributions are expected to be in time with the overall project schedule.

WP5 Part. No.	Partic. Short Name	WP5 P1	WP5 P2	WP5 P3	WP5 Cumulative Effort Since Start	WP5 Funded Effort Whole Project	WP5 Unfunded Effort Whole Project	WP5 Total Effort Whole Project	WP5 Remaining Effort
1	Siemens	0.46			0.46	7		7	6.54
2	Lynkeus	0			0			0	0
4	MAAT	0			0	1		1	1
5	TUM	1			1	14		14	13
6	OPBG	0			0	32		32	32
7	SCR	1.5			1.5	7		7	5.5
8	JHU	0			0		23	23	23
10	ACCF	0			0	5		5	5
11	PSE	0			0			0	0
Total		2.96	0	0	2.96	66	23	89	86.04

Table 5: Actual and planned effort person-months per beneficiary for WP5

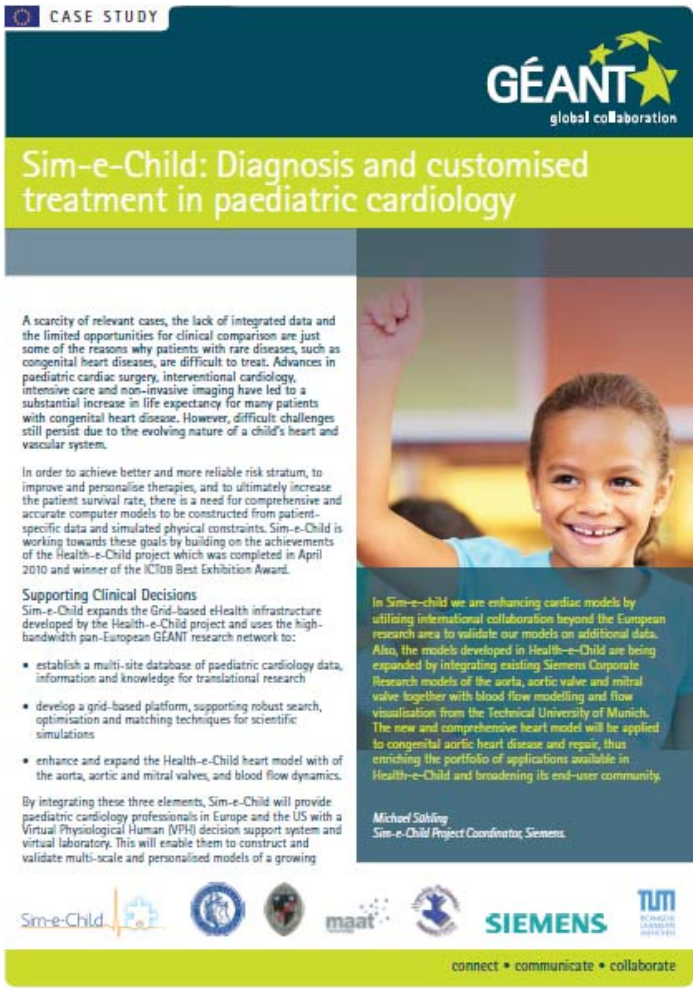
3.2.6. WP6: Dissemination and Exploitation (WP Leader Lynkeus)

T6.1 Project Web-site

The SeC website (www.sim-e-child.org) went live in the first quarter of 2010 in advance of the conclusion of the HeC project. The website was designed to be completely compatible with the directions laid out by the EC for all dissemination materials and Annex II of the Grant Agreement. More information on and screenshots of the website can be seen in Part 3.3.2 of the management section which is dedicated to it.

T6.2 Dissemination Materials

Paper-based and e-brochures were published and disseminated at conferences and workshops including the VPH NoE meeting in September and the ICT2010 conference. Below is front page of the brochure that was produced in conjunction with GÉANT at ICT2010.



Additionally posters were presented at MICCAI in Beijing in September, at the International Symposium of Grid Computing in March in Taipei, Taiwan and at the GARR's booth at the First National Conference on Health Research (http://www.garr.it/eventiGARR/cernobbio-ws/programma.php) which was held in Cernobbio, near Milan, on the 8/9th November 2010.

T6.3 Seminars, Workshops, Concertation Activities with Other ICT Funded Projects

Joint SeC and HeC Dissemination

The first 5 months of SeC's work saw the project heavily disseminated in conjunction with HeC project. In March 2010 the work and objectives of SeC were presented as part of HeC's final dissemination efforts. HeC had been invited by the EC to present its work at the invitation only ministerial day that preceded the World of Health IT and the EC's high level eHealth conference which for the first time were being held at the same time in Barcelona within the eHealth week 2010. As a concrete example of how HeC's results were to be exploited, SeC's objectives were central to all dissemination activities. Following on from this high level of dissemination, HeC and SeC were selected to be one of five success-stories of the ICT for Health unit to be highlighted in briefings for the new EC Vice-President and Digital Agenda Commissioner N. Kroes and the new Director General R. Madelin to raise awareness about eHealth research activities, its results and achievements.

HeC's final international conference was held in Sestri Levante in April 2010. The conference was designed to highlight the achievements of the project and place the work in the broader scheme of the EC's VPH framework. A special presentation was given by SeC's original Project Coordinator, Martin Huber, on the results of HeC and on how SeC had been designed to build on the most successful elements of the projects work in cardiology and further expand the grid network.

SeC and GARR

Over the summer and autumn of 2010 the SeC project was disseminated throughout Italy in conjunction with GARR, the Italian network of University research centres. In July SeC's Project Manager, Edwin Morley-Fletcher, wrote an article which was published in the "GARR News" magazine (Fig. 2 & 3 below), and was subsequently invited to present SeC's objectives on the first day and through GARR's booth at the First National Conference on Health Research (http://www.garr.it/eventiGARR/cernobbio-ws/programma.php) which was held in Cernobbio, near Milan, on the 8/9th November 2010.

SeC at ICT2010

SeC cooperated with GÉANT and neuGrid at ICT2010 at ICT10 to develop a booth that gave practical examples of how the data networking services developed within the GÉANT project, such as Bandwidth-on-Demand and performance monitoring tools were having an impact on EC funded research.

The demonstration showed off a prototype SeC service combining the use of iPad and Augmented Reality (AR) to display medical image processing pipeline outputs. 3D/4D models were personalized from HeC's patient records and displayed in augmented reality instead of regular visualization. The iPad was used as an advanced remote controller to browse datasets, select pipelines to be run, etc (everything was delivered through Web interfaces interacting with a grid infrastructure underneath). Once the analysis completed, the iPad could display the resulting AR pattern, the latter being then interpreted in a dedicated AR spot (a short video clip can be seen at www.youtube.com/watch?v=LXuL__W4-FE). The interactive nature of the demo was highlighted as one of the more interesting exhibits by the Grid Cast blog and on the Erin Africa website and is considered by SeC to be good model to follow for the duration of the project.

SeC at MICCAI (Beijing, September, 2010)

Two members of the SeC consortium, Sasa Grbic (Siemens) and Razvan Ionasec (SCR), both PhD students supervised by Prof. Nassir Navab (TUM) received the MICCAI Young Scientist Award for 2010 in Beijing, China.

The winning paper was supported by SeC and represents the first data-driven modelling of the complete valvular apparatus. The heart valves represent a critical component for the multi-scale modelling, simulation, understanding and prediction of the whole heart function.

The MICCAI awards commission citation read: "The original contribution of this paper is in the estimation of patient-specific cardiac valve parameters from cine images enabled by a new constrained

Multi-Linear Shape Model. This work addresses a very challenging clinical problem, which is a complex 4D modelling problem, and demonstrated impressive results."

Other Major Dissemination Events

During the VPH NoE's annual meeting, VPH 2010, in Brussels in September Razvan Ionasec of TUM presented a paper entitled "Patient-Specific Modelling of Whole Heart Anatomy, Dynamics and Hemodynamics from 4D cardiac CT Images".

David Manset of Maat G also introduced the work of SeC during his key note address "From Health-e-Child to Sim-e-Child, Experiences from Adopting the Grid to Adapting it to Translational Medicine for Paediatrics" at the International Symposium of Grid Computing in March 2010 in Taipei, Taiwan (http://event.twgrid.org/isgc2010/program.html).

Late in the reporting period Yannick Legré of MaatG and President of the International HealthGrid Association, presented SeC at the Health Informatics New Zealand 2010 Conference (November 3rd, Wellington, New Zealand, www.healthgrid.org) and at the kick off meeting of the FP7 project Decide (September 23rd Rome Italy, www.eu-decide.eu/launch_event/legre_decide_230910.pdf).

T6.4 Newsletter

The first SeC newsletter is planned to be published in January 2011.

T6.5 Community Liaison and Feedback

A concerted effort was made in the first 6 months of 2010 to involve and inform all the partners of the HeC of the current and planned activities of SeC. This work took the form a dedicated workshop at HeC's final conference in Sestri Levante in April and during HeC's final review which was held in Rome in June.

MAAT has continually liaised with the EGEE community, in particular, to ensure that the SeC simulation portal which was released in M10 followed EGI directives and was able to feedback into the corresponding Specific Support Center (SSC) in terms of middleware/end-users requirements.

The cornerstone of SeC efforts to formally keep the EU VPH community updated on the projects work took place at the VPH2010 conference which was held in September in Brussels. On the first day of the conference SeC partners Siemens, SCR and TUM present a paper entitled "Patient-Specific Modelling of Whole Heart Anatomy, Dynamics and Hemodynamics from 4D cardiac CT Images".

T.6.6 Impact of Health-e-Child Conclusion and Further Exploitation Plans

Due to the six month overlap between the end of HeC and the start of SeC all project partners were able to evaluate the impact of the end of HeC. HeC's final exploitation plan was written with the goal of SeC in mind and the project itself listed as one of the key outcomes. Further more HeC and SeC have both been included by OPBG as major stepping stone for the development of their Paediatric Cardiology Digital Repository which will make the tools of HeC and SeC clinically usable on all of the hospitals cardiology data from four geographically disparate sites.

Use of Resources and Deviations between Actual and Planned Person-Months

The actual and planned effort person-months per beneficiary for WP6 are shown in Table 6. In SeC's DoW for the first reporting period Lynkeus was expected to expend 2 MM within WP6. All the tasks were satisfactorily completed within the reporting period but at the expense of 3.05 MM. The reason for this discrepancy was that the work was carried out by one Junior Manager with the oversight of two Senior Partners and the IT Manager. The result was that the total cost in financial terms was in line with the original forecast but distributed over a longer period.

WP6 Part. No.	Partic. Short Name	WP6 P1	WP6 P2	WP6 P3	WP6 Cumulative Effort Since Start	WP6 Funded Effort Whole Project	WP6 Unfunded Effort Whole Project	WP6 Total Effort Whole Project	WP6 Remaining Effort
1	Siemens	0.1			0.1	1		1	0.9
2	Lynkeus	3.05			3.05	6		6	2.95
4	MAAT	0			0	1	2	3	3
5	TUM	0			0	1		1	1
6	OPBG	0			0	1		1	1
7	SCR	0.3			0.3	1		1	0.7
8	JHU	0			0		1	1	1
10	ACCF	0			0	5		5	5
11	PSE	0			0			0	0
Total		3.45	0	0	3.45	16	3	19	15.55

Table 6: Actual and planned effort person-months per beneficiary for WP6

3.2.7. Overall Work Progress and Efforts

The overall actual and planned effort person-months summing up efforts from WP1 to WP6 per beneficiary are shown in Table 7.

WP1-6 Part. No.	Partic. Short Name	WP1-6 P1	WP1-6 P2	WP1-6 P3	WP1-6 Cumulative Effort Since Start	WP1-6 Funded Effort Whole Project	WP1-6 Unfunded Effort Whole Project	WP1-6 Total Effort Whole Project	WP1-6 Remaining Effort
1	Siemens	1.52			1.52	16	3	19	17.48
2	Lynkeus	5.55			5.55	10	0	10	4.45
4	MAAT	10			10	21	3	24	14
5	TUM	1			1	16	1	17	16
6	OPBG	15.3			15.3	53	1	54	38.7
7	SCR	5.22			5.22	13.75	1	14.75	9.53
8	JHU	1			1	0	45	45	44
10	ACCF	0			0	31	1	32	32
11	PSE	5			5	17.5	0	17.5	12.5
Total		44.59	0	0	44.59	178.25	55	233.25	188.66

Table 7: Overall actual and planned effort person-months per beneficiary for WP1 to WP6

3.3. Project Management during the Period

3.3.1. Consortium Management Tasks and Achievements

During the first reporting period, which lasted from January to October 2010, SeC was managed by P1 Siemens and P2 Lynkeus. The kick-off meeting was held in Munich and was attended by all the EU partners and SCR. Subsequently a US kick off meeting was hosted by JHU in Baltimore in February. During the course of the year four further in person meetings were held in Europe and a second US meeting was planned for early 2011.

The first of two major management concerns in the first reporting period was the replacement of the Project Coordinator. Dr. Martin Huber who had also coordinated HeC transferred from Corporate Technology, Siemens' central research unit, to the Siemens Healthcare Sector. Within the central Business Unit SYNGO, Martin Huber assumed the Product Manager position being responsible to define and manage the development of components and future clinical applications of *syngo*, Siemens universal software platform for advanced visualization. In his place, Dr. Michael Sühling from Siemens Corporate Research was appointed Project Coordinator.

Dr. Sühling leads the Medical Informatics Research Program within the Image Analytics and Informatics Global Technology Field at Siemens Corporate Technology, Siemens' central R&D organization with nearly 3,000 employees worldwide. Dr. Sühling has been with Siemens for six years. At first, he managed the development and productisation of clinical Oncology Applications at the Healthcare Computed Tomography Business Unit. He then managed R&D projects during his time with Siemens Corporate Research, Princeton, USA. Dr. Sühling's Medical Informatics Program located in Erlangen, Germany, is focusing on research and development in machine learning, object and pattern recognition, and medical reasoning and decision support systems. The Program was involved in HeC and the THESEUS-MEDICO research consortium funded by the German Ministry of Economy.

The second major management operation was the addition of Siemens Program and System Engineering Srl, Romania (Siemens PSE) to the consortium. The work that will be performed by Siemens PSE does not concern the research work itself, but consist of the implementation of auxiliary software modules that are mainly related to internal data models and database storage and access. Siemens PSE will perform a total of 17PM of RTD work within WP4 which is coordinated by MAAT. The reasons that a competitive call was not carried out are three fold:

- Siemens PSE has already been deeply involved in highly relevant prior work (HeC) so no training efforts will be required for SeC.
- Siemens PSE offers a very competitive cost structure.
- Siemens PSE as part of the Siemens Corporate Technology Development Centre is a leading software development partner for the Siemens Sectors and Corporate Research and Technologies with a cutting edge software development process in place.

With the PSE inclusion, the overall project budget will be slightly lower than before and the budgets of non-Siemens partners are not affected. The EC supported the theoretical addition of Siemens PSE in October and all the required amendments to the GA were made in advance of the submission of SeC's first Periodic Report.

A third management issue was related to the reimbursement of JHU travel costs for two trips to Europe:

- Participation of Dr. Allen Everett at the review meeting in Brussels taking place on February 4th 2011,
- Presentation of the HeC heart model validation study by Dr. Philip Spevak at the Association of European Pediatric Cardiology (AEPC) annual meeting (Granada, Spain in May 2011).

As clarified with EC Project Officer, P10 ACCF agreed to reimburse JHU for these travel costs that are taken out of the project's travel budget under the conditions that

- ACCF does not send any other representative to the periodic review meeting and

- the work to be presented at the AEPC annual meeting will mention that it was partly funded by the EU FP7 Sim-e-Child project and the presentation will be published on the project's web site.

3.3.2. SeC Website

The SeC website (www.sim-e-child.org) went live in the first quarter of 2010 in advance of the conclusion of the HeC project. The website was designed to be completely compatibly with the directions laid out by the EC for all dissemination materials and Annex II of the Grant Agreement. The website currently contains sections entitled:

About
Partners
Events
Public Documents
Newsletter
Publications
Links
Health-e-Child
Contacts

In July 2010 the website was updated at the EC's request to include news from the High Tech Wire service. The website will be updated later in the project to reflect the achievements of the projects as opposed to the goals of the project as it is currently doing.

3.3.3. Project Meetings

Project meetings play a key role in the coordination and synchronization of activities among the partners, as they have fostered communication between the beneficiaries and synergies and cross-fertilization of approaches and results.

The meetings of Period P1 are listed in Table 8, specifying venues, dates, participants, and meeting purpose.

Date & Venue	Participants	Meeting Purpose
26.01.2010, Munich, Germany	Siemens SCR Maat OPBG Lynkeus	Organizational issues Presentation of TUM (Institute for Computer Aided Medical Procedures & Augmented Reality) OPBG: case presentation Refinement of clinical goals
09.02.2010, Baltimore, USA	Siemens SCR JHU ACC	Organizational issues Presentation of HeC tools (RV/LV analysis and pulmonary trunk analysis, both for cardiac MR); presentation of first results regarding modelling/simulation JHU: case presentation Refinement of clinical goals JHU data for Sim-e-Child, technical aspects (capabilities to export data; possibilities to link to systems; anonymization of data)
22.04.2010, Sestri Levante, Italy	Siemens SCR Maat JHU ACC OPBG Lynkeus	Alignment of clinical protocols JHU: presentation of forms used in COAST trial Definition of SeC forms Preparation of project presentation
17.06.2010, Erlangen, Germany	Siemens SCR Maat	IT infrastructure for Sim-e-Child New developments at Maat, Presentation of SciPort, Definition of SeC architecture
05.07.2010, Rome, Italy	Siemens Maat OPBG Lynkeus	Preparation of ICT 2010
29.09.2010, Brussels, Belgium	Siemens Maat Lynkeus	Following ICT2010, and preparing for the new phase.
21.-25.10.2010, Erlangen, Germany	TUM Siemens	During the meetings, TUM was provided with the latest clinical data and technical discussions took place on the topics of heart modelling and blood flow visualization.

Table 8: Project Meetings Overview

In addition to these physical meetings, a number of “unscheduled” phone conferences have been organized regularly with the help of an audio conferencing system. These meetings have proven to be a very useful (and cost-effective) means of sharing information, discussing research issues and preparing project material.

3.3.4. Project Planning and Status

According to Annex I, Description of Work, the focus of work during the second reporting period will be on Phase 3 of the project:

Phase 3 (running from month 11 to 20) – Interim Prototype Platform: Additional software components will be integrated with the grid and extended data driven physical heart models developed. An initial version of the simulation platform will be delivered at month 15 to start the validation of the intercontinental grid with computationally intensive simulations. At month 20, the first version of the collaboration web portal will be completed, demonstrating the underlying readiness of the infrastructure, while new VPH models will start undergoing clinical assessment.

Special management attention will be also given to tasks that extend beyond the first reporting period (see Section 3.2 for details):

- WP3: The definition and analysis of clinical assessment procedures (T3.2) will need to be refined and extended once preliminary experimental results and mechanisms to extract quantitative parameters are available and evaluable by the clinical partners.
- WP4: Original plans to install a Grid node at JHU turned out to impact the JHU IT infrastructure. Therefore, it has been decided to rent server infrastructure resources from an appropriate Cloud service provider. The set-up and installation of the US grid node will therefore be done at the beginning of Reporting Period P2.
- WP5: Due to the overlap with the Health-e-Child project during the first four months of the SeC project and the higher complexity of estimating anatomical models from MRI data, P1 Siemens will continue to work on Task T5.2 during Reporting Period P2 involving more resources.

4. Deliverables and milestones tables

4.1. Deliverables

Table 9: Deliverables

Del. no.	Deliverable name	Version	WP no.	Lead beneficiary		Dissemination level	Delivery date from Annex I (projected month)	Actual / Forecast delivery date Dd/mm/yyyy	Status Non submitted/ Submitted	Contractual Yes/No	Comments
D1.1	Project Presentation	1	1	Lynkeus	R	PU	M5	14/07/2010	Submitted	Yes	
D1.2	Self-Assessment Plan	1	1	Lynkeus	R	RE	M5	14/07/2010	Submitted	Yes	
D1.3	Quality Assurance Guidelines	1	1	Siemens	R	RE	M10	30/12/2010	Submitted	Yes	
D1.4.1	Periodic Report	1	1	Siemens	R	RE	M10	30/12/2010	Submitted	Yes	
D1.4.2	Periodic Report	2	1	Siemens	R	RE	M20			Yes	

D1.4.3	Final Report		1	Siemens	R	RE	M30			Yes	
D1.5	Awareness and Wider Societal Implications	1	1	Lynkeus	R	RE	M30			Yes	
D2.1	Initial Interoperability Requirements Analysis Document	1	2	Siemens	R	RE	M10	30/12/2010	Submitted	Yes	
D2.2	Revised Interoperability Requirements Analysis Document	2	2	Siemens	R	RE	M20			Yes	
D3.1	Aligned Clinical Protocol and Assessment Report	1	3	OPBG	R	RE	M5	14/07/2010	Submitted	Yes	
D3.2	Data Model Mapping Report	1	3	MAAT	R	RE	M10	30/12/2010	Submitted	Yes	
D4.1	Grid and Databases Connection Report	1	4	MAAT	R	RE	M10	30/12/2010	Submitted	Yes	
D4.2	Simulation and Collaboration Platform Interim Release and	1	4	MAAT	P	RE	M20			Yes	

	Report										
D4.3	Simulation and Collaboration Platform Final Release and Report	2	4	MAAT	P	PU	M30			Yes	
D5.1	Health-e-Child Heart Models Clinical Validation Report	1	5	JHU	R	RE	M10	30/12/2010	Submitted	Yes	
D5.2	Left Heart Model Extension and Delivery Report	1	5	SCR	R	RE	M20			Yes	
D5.3	Left Heart Models Clinical Validation Report	2	5	SCR	R	RE	M30			Yes	
D6.1	Dissemination Strategy Plan and Preliminary Materials	1	1	Lynkeus	R	PU	M10	30/12/2010	Submitted	Yes	
D6.2	Updated dissemination materials	2	1	Lynkeus	R	PU	M20			Yes	
D6.3	Use and Dissemination	1	1	Lynkeus	R	RE	M30				

	of Foreground (Final Report)									Yes	

4.2. Milestones

The Project Period P1 comprises 2 milestones M1 and M2 as indicated in Table 10.

Milestone M1 was passed at project month M5. As documented in Deliverable D3.1 “Aligned Clinical Protocol and Assessment Report” the partners agreed upon clinical protocols and initial validation procedures for the anatomical modelling and haemodynamics simulations. The validation procedures will be refined once first experimental results are available and being discussed with the clinical partners.

Milestone M2 was scheduled for the end of Reporting Period P1 (M10). This milestone comprises the following planned check points:

- **JHU is connected to Health-e-Child grid with database interoperability described in D4.1**: As described in D4.1, the SeC central services are hosted at MAAT France (Archamps - France) providing JHU remote access to the simulation and data base infrastructure. The JHU Gateway (formerly deployed by and for HeC) has been kept as is, as a means to further utilizing the SeC simulation platform, i.e. offering a high quality of services access point. Adjusting original plans, the technical partners, in particular MAAT and SIEMENS, decided to externalize the US Grid node resources to facilitate its expansion, while not impacting on JHU’s IT department. Consequently, the US Grid node resources will be subcontracted from an appropriate Cloud provider. Different offers have been obtained, evaluated and documented in D4.1. The externally-hosted Grid node is planned to be set-up at the beginning or Reporting Period P2, providing the US partners with a higher-performance access to the SeC infrastructure.
- **The data model mapping described in D3.2:** The data formats of the different data sources at P6 OPBG, P8 JHU and existing HeC data have been analyzed and compared in detail. Accordingly, semantic mappings between data structures were specified and are currently being implemented. The mapping and integration of the data from different sites and sources is described in Deliverable D3.2 “Data Model Mapping Report”.
- **Validation of Health-e-Child LV and RV models as described in D5.1:** Together with clinical partner P8 JHU, the existing HeC heart models were validated on MRI data from Tetralogy of Fallot (TOF) cases. Results have been documented in D5.1 “Health-e-Child Heart Models Clinical Validation Report” and will be submitted to the 45th Annual Meeting of the Association of European Paediatric Cardiology, Granada, Spain 18-21 May, 2010.

Except for the ongoing installation of the US Grid node based on externally-hosted server resources that became necessary to avoid impacts on JHU’s IT infrastructure, these milestones are considered to be passed as planned for.

Table 10: Milestones

Milestone no.	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I dd/mm/yyyy	Achieved Yes/No	Actual / Forecast achievement date dd/mm/yyyy	Comments
M1	Aligned Clinical Protocols and Assessments	WP3	OPBG	M5	Yes	M5	

M2	Grid Connection, Interoperable Databases, Health-e-Child Validation	WP2, WP3, WP4, WP5	MAAT	M10	Almost complete	M10	
M3	First Version of Simulation and Collaboration Platform	WP2, WP4, WP5	Siemens	M20	No	M20	
M4	Simulation and Validation results for Left Heart Models	WP4, WP5	Siemens	M30	No	M30	

5. Explanation of the use of the resources

The use of resources is explained for each beneficiary in the following tables.

Table 11: Personnel, subcontracting and other major cost items for Beneficiary 1 Siemens for the period

Work Package	Item description	Amount in € with 2 decimals	Explanations
WP1-6	Personnel direct costs	13914,00	Partial salaries of 2 full-time employees.
	Subcontracting	0,00	
	Remaining direct costs	0,00	
	Indirect costs	9003,00	Indirect costs also cover the work of two PhD students involved in the project.
TOTAL COSTS		22917,00	

Table 12: Personnel, subcontracting and other major cost items for Beneficiary 2 Lynkeus for the period

Work Package	Item description	Amount in € with 2 decimals	Explanations
WP1	Personnel direct costs	15.592,25	Two Senior Managers and one Junior Manager were involved in the rump-up of the project.
WP6	Personnel direct costs	14.590,85	Two Senior Managers, one Junior and the IT Manager were involved in Dissemnination activities.
WP6	Major cost item: ICT2010 participation	1.064,78	Travel and accommodation costs for presentation of SeC and networking at ICT2010 event in Brussels- 27-29 September 2010
	Indirect costs	13.124,11	
TOTAL COSTS		44.371,99	

Table 13: Personnel, subcontracting and other major cost items for Beneficiary 4 Maat for the period

Work Package	Item description	Amount in € with 2 decimals	Explanations
WP2, 3, 4	Personnel direct costs	49806.81	10MM of 2 dedicated experts in the requirements analysis and simulation platform initial developments
WP4	Remaining direct costs	1322.65	Hardware costs for grid computing resources and development laptops
WP2, 3, 4	Indirect costs	30677.68	
TOTAL COSTS		80484.49	

Table 14: Personnel, subcontracting and other major cost items for Beneficiary 5 TUM for the period

Work Package	Item description	Amount in € with 2 decimals	Explanations
WP5	Personnel direct costs	3.309,80	Kristof Ralovich, Salary October 2010. Additional, unfunded work was carried out by Kristof Ralovich during his stay at Siemens Corporate Research, Princeton.
	Subcontracting	0,00	
	Remaining direct costs	0,00	
	Indirect costs	1.985,88	60 % of direct costs
TOTAL COSTS		5.295,68	

Table 15: Personnel, subcontracting and other major cost items for Beneficiary 6 OPBG for the period

Work Package	Item description	Amount in € with 2 decimals	Explanations
WP3	Personnel direct costs	45.675,00	Salaries of 2 postdoctoral students (Euro 29.675) and salaries of OPBG unfunded personnel
	Subcontracting	0,00	
WP3	Major cost item 'Data Collection'	308,98	P.C. for data collection
WP3	Major cost item 'Meetings'	240,97	Meetings: Monaco and Genova
	Remaining direct costs		
WP3	Indirect costs	9.425,00	Overheads (20%)
TOTAL COSTS		55.649,95	

Table 16: Personnel, subcontracting and other major cost items for Beneficiary 7 SCR for the period

Work Package	Item description	Amount in € with 2 decimals	Explanations
WP1-6	Personnel direct costs	40280,65	RTD and Management personnel costs
	Subcontracting	0,00	
	Remaining direct costs	0,00	
	Indirect costs	27305,06	
TOTAL COSTS		67585,01	

Table 17: Personnel, subcontracting and other major cost items for Beneficiary 8 JHU for the period

Work Package	Item description	Amount in € with 2 decimals	Explanations
	Personnel direct costs	0,00	JHU is does not receive any EC funding contributions.
	Subcontracting	0,00	
WP3, 4, 5	Major cost items	0,00	Development and submission of John Hopkins IRB and US Food and Drug Administration application to access COAST data. Approval granted by both. Acquisition of COAST of database Identification and acquisition of Tetralogy of Fallot MRI studies for model validation. De-identifying Tetralogy MRI studies (23) and shipment to SCR. Acquistion and de-identification of COAST MRI (51) studies.
	Remaining direct costs	0,00	
	Indirect costs	0,00	
TOTAL COST		0,00	

Table 18: Personnel, subcontracting and other major cost items for Beneficiary 10 ACCF for the period

Work Package	Item description	Amount in € with 2 decimals	Explanations
	Personnel direct costs	0,00	
	Subcontracting	0,00	
	Remaining direct costs	1163,29	For server set up at John's Hopkins
	Indirect costs	232,66	
TOTAL COSTS		1395,95	

Table 19: Personnel, subcontracting and other major cost items for Beneficiary 11 PSE for the period

Work Package	Item description	Amount in € with 2 decimals	Explanations
WP4	Personnel direct costs	9651,06	Personnel costs for Java and C++ implementations for collaboration platform development.
	Subcontracting	0,00	
	Remaining direct costs	0,00	
	Indirect costs	8492,94	
TOTAL COSTS		18144,00	

6. References

[Grbic et al., 2010] Sasa Grbic, Razvan Ioan Ionasec, D. Vitanovski, Ingmar Voigt, B. Georgescu, , N. Navab, D. Comaniciu. Complete Valvular Heart Apparatus Model from 4D Cardiac CT. Medical Image Computing and Computer Assisted Intervention (MICCAI), Beijing, China, September 20-24 2010.

[Ionasec et al., 2010a] Ionasec, Razvan Ioan; Voigt, Ingmar; Georgescu, Bogdan; Wang, Yang; Houle, Helene; Fernando-Vega, Higuera; Navab, Nassir; Comaniciu, Dorin. Patient-Specific Modeling and Quantification of the Aortic and Mitral Valves From 4-D Cardiac CT and TEE. IEEE Transactions on Medical Imaging 9 (2010), Nr. 29, S. 1636-1651.

[Ionasec et al., 2010b] Razvan Ionasec, Michael Suehling, Dorin Comaniciu. Sim-e-Child: Grid-Enabled Platform for Simulations in Paediatric Cardiology Toward the Personalized Virtual Child Heart. VPH NoE 2010 (to appear).

[Mihalef et al., 2010a] Mihalef, V., Ionasec, IR., Sharma, P., Georgescu, B., Huber, M., Comaniciu, D.. Patient-Specific Modelling of Whole Heart Anatomy, Dynamics and Hemodynamics from 4D cardiac CT Images. Virtual Physiological Human Conference 2010, Brussels 2010

[Mihalef et al., 2010b] Viorel Mihalef, Razvan Ioan Ionasec, Puneet Sharma, Bogdan Georgescu, Michael Suehling, Dorin Comaniciu. Patient-Specific Modelling of Whole Heart Anatomy, Dynamics and Hemodynamics from 4D cardiac CT Images.

[Veronesi et al., 2009] D. Veronesi, F., et al.: A study of functional anatomy of aortic-mitral valve coupling using 3D matrix transesophageal echocardiography. Circ Cardiovasc Imaging 2(1) (2009), 24-31.

[Vitanovski et al., 2010] D. Vitanovski, Razvan Ioan Ionasec, A. Tsymbal, B. Georgescu, M. Huber, Joachim Hornegger, D. Comaniciu. Cross-modality Assessment and Planning for Pulmonary Trunk Treatment using CT and MRI imaging. Medical Image Computing and Computer Assisted Intervention (MICCAI), Beijing, China, September 20-24 2010.

[Zheng et al., 2007] Zheng, Y., et al.: Fast automatic heart chamber segmentation from 3D CT data using marginal space learning and steerable features. In: ICCV. (2007).

[Zheng et al., 2010] Y. Zheng, M. John, R. Liao, J. Boese, U. Kirschstein, B. Georgescu, S. K. Zhou, J. Kempfert, T. Walther, G. Brockmann, and D. Comaniciu. Automatic Aorta Segmentation and Valve Landmark Detection in C-Arm CT: Application to Aortic Valve Implantation. Proc. Int'l Conf. Medical Image Computing and Computer Assisted Intervention, 2010.

7. Financial statements – Form C and Summary financial report

Version of 2/10/2009

FP7 - Grant Agreement - Annex VI - Collaborative Project

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

Project nr	248421	Funding scheme	Collaborative Project
Project Acronym	Sim-e-child		
Period from / To	01/01/10 / 31/10/10	Is this an adjustment to a previous statement ?	No

Legal Name	Siemens Aktiengesellschaft	Participant Identity Code	999987260
Organisation short Name	Siemens	Beneficiary nr	01

Funding % for RTD activities (A)	50%	If flat rate for indirect costs, specify %	%

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

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	TOTAL (A+B+C+D)
Personnel costs	10524		3390		13914
Subcontracting					
Other direct costs					
Indirect costs	6824		2179		9003
Lump sum/flat rate/scale of unit declared					
Total	17348		5569		22917
Maximum EC contribution	8674		5569		14243
Requested EC contribution					14243

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 ? 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:

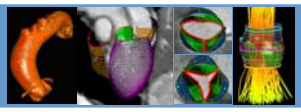
- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;

- 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 within 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
	Date & signature



Version of 2/10/2008

FP7 - Grant Agreement - Annex VI - Collaborative Project

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

Project nr	248421	Funding scheme	Collaborative Project
Project Acronym	Sim-e-child		
Period from	01/01/10	Is this an adjustment to a previous statement ?	No
To	31/10/10		

Legal Name	Lynkeus srl	Participant Identity	996421734
Organisation short Name	Lynkeus	Beneficiary nr	2

Funding % for RTD activities (A)	75	If flat rate for indirect costs, specify %	

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

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	TOTAL (A+B+C+D)
Personnel costs			30.183,10		30.183,10
Subcontracting					
Other direct costs			1.064,78		1.064,78
Indirect costs			13.124,11		13.124,11
Lump sum/flat rate/scale of unit declared					
Total			44.371,99		44.371,99
Maximum EC contribution			44.371,99		44.371,99
Requested EC contribution					36.828,75

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/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 within 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
LYNKEUS srl Via Livenza, 6 - 00198 Roma Tel. +39.06.844.080.1 - Fax +39.06.853.44.831 E-Mail: lynkeus@lynkeus.com Cap. Soc. € 50.000 - Reg. Imp. di Roma n° 129668/2000 R.E.A. 946979 - P.I. e C.F. 06072001008	Edwin Morley-Fletcher Date & signature E. Morley-Fletcher 23.12.10

Version of 17/12/2010

FP7 - Grant Agreement - Annex VI - Collaborative Project

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

Project nr	248421	Funding scheme	Collaborative Project
Project Acronym	Sim-e-child		
Period from	01/01/10	Is this an adjustment to a previous statement ?	No
To	31/10/10		

Legal Name	MAAT France	Participant Identity Code	998399661
Organisation short Name	MAAT	Beneficiary nr	04

Funding % for RTD activities (A)	75	If flat rate for indirect costs, specify %	60%

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

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	TOTAL (A+B+C+D)
Personnel costs	49806.81	0	0	0	49806.81
Subcontracting	0	0	0	0	0
Other direct costs	1322.65	0	0	0	1322.65
Indirect costs	30677.68	0	0	0	30677.68
Lump sum/flat rate/scale of unit declared	0	0	0	0	0
Total	80484.49	0	0	0	80484.49
Maximum EC contribution	60363.36	0	0	0	60363.36
Requested EC contribution					60363.36

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 ? 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	NA	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	NA	Cost of the certificate (in €)	0

6- Beneficiary's declaration on its honour

We declare on our honour that:

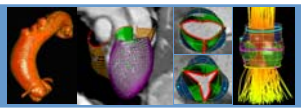
- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;

- 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 within 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
MAAT FRANCE SARL maat IMMEUBLE ALLIANCE Entrée A 74160 ARCHAMPS	David MANSET
	Date & signature 17/12/2010



Version of 2/10/2008

FP7 - Grant Agreement - Annex VI - Collaborative Project

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

Project nr	248421	Funding scheme	Collaborative Project
Project Acronym	Sim-e-child		
Period from	01/01/10	Is this an adjustment to a previous statement ?	No
To	31/10/10		

Legal Name	TECHNISCHE UNIVERSITAET MUENCHEN	Participant Identity Code	999977463
Organisation short Name	TUM	Beneficiary nr	05

Funding % for RTD activities (A)	75%	If flat rate for indirect costs, specify %	60%

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

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	TOTAL (A+B+C+D)
Personnel costs	3309.80				3309.80
Subcontracting					
Other direct costs					
Indirect costs	1985.88				1985.88
Lump sum/flat rate/scale of unit declared					
Total	5295.68				5295.68
Maximum EC contribution	3971.76				3971.76
Requested EC contribution					3971.76

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 ? 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 within 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
	Angelica Bauer, Prof. Navab
	Date & signature

D1.4.1 Periodic Report 1 Sim-e-Child (SeC) FP7-ICT-2009-4 (248421)

FP7 - Grant Agreement - Annex VI - Collaborative Project

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

Project nr	nnnnnn	Funding scheme	Collaborative Project
Project Acronym	xxxxxxxxxxxxxxxxxxxx		
Period from	dd/mm/aa	Is this an adjustment to a previous statement ?	Yes/No
To	dd/mm/aa		
Legal Name		Participant Identity Code	nn
Organisation short Name		Beneficiary nr	nn
Funding % for RTD activities (A)	75 %	If flat rate for indirect costs, specify %	20 %

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	44675		1000		45675
Subcontracting					
Other direct costs	550				550
Indirect costs	9225		200		9425
Lump sums/flat-rate/scale of unit declared					
Total	54450		1200		55650
Maximum EC contribution	39450		1200		40650
Requested EC contribution					40650

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 ? Yes/No: 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/No: 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 ? Yes/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/No

Name of the auditor		Cost of the certificate (in €), if charged under this project	NO

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/No

Name of the auditor		Cost of the certificate (in €)	NO

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 within 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
	Date & signature

Form C P6 OPBG

Version of 2/10/2008

FP7 - Grant Agreement - Annex VI - Collaborative Project

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

Project nr	248421	Funding scheme	Collaborative Project
Project Acronym	Sim-e-child		
Period from	01/01/10	Is this an adjustment to a previous statement ?	No
To	31/10/10		
Legal Name	Siemens Corporate Research	Participant Identity Code	996233845
Organisation short Name	SCR	Beneficiary nr	07
Funding % for RTD activities (A)	50%	If flat rate for indirect costs, specify %	

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

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	TOTAL (A+B+C+D)
Personnel costs	37296,77		2983,89		40280,65
Subcontracting					
Other direct costs					
Indirect costs	25281,70		2022,63		27305,06
Lump sum/flat rate/scale of unit declared					
Total	62578,48		5006,53		67585,01
Maximum EC contribution	**31289,24**		**5006,53**		**36295,76**
Requested EC contribution					**36295,76**

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 ? 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:

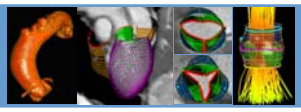
- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;

- 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 within 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
	Date & signature



Version of 2/10/2008

FP7 - Grant Agreement - Annex VI - Collaborative Project

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

Project nr	248421	Funding scheme	Collaborative Project
Project Acronym	Sim-e-child		
Period from	01/01/10	Is this an adjustment to a previous statement ?	No
To	31/10/10		

Legal Name	Johns Hopkins University	Participant Identity Code	998267741
Organisation short Name	JHU	Beneficiary nr	08

Funding % for RTD activities (A)	75%	If flat rate for indirect costs, specify %	NA

1- Declaration of eligible costs/lump sum/flat 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
Subcontracting	0		0		0
Other direct costs	0		0		0
Indirect costs	0		0		0
Lump sum/flat rate/scale of unit declared					
Total	0		0		0
Maximum EC contribution	0		0		0
Requested EC contribution					0

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 ? 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:

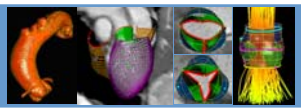
- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;

- 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 within 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
	Date & signature



Version of 2/10/2008

FP7 - Grant Agreement - Annex VI - Collaborative Project

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

Project nr	248421	Funding scheme	Collaborative Project
Project Acronym	Sim-e-child		
Period from	01/01/10	Is this an adjustment to a previous statement ?	No
To	31/10/10		

Legal Name	AMERICAN COLLEGE OF CARDIOLOGY FOUNDATION CORPORATION	Participant Identity Code	996180010
Organisation short Name	ACCF	Beneficiary nr	10

Funding % for RTD activities (A)	50%	If flat rate for indirect costs, specify %	20%

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

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	TOTAL (A+B+C+D)
Personnel costs					
Subcontracting					
Other direct costs	1163.29				1163.29
Indirect costs	232.66				232.66
Lump sum/flat rate/scale of unit declared					
Total	1395.95				1395.95
Maximum EC contribution	697.98				697.98
Requested EC contribution					697.98

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 ? 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:

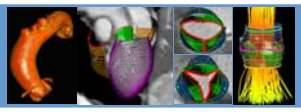
- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;

- 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 within 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
	Date & signature



Version of 2/10/2008

FP7 - Grant Agreement - Annex VI - Collaborative Project

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

Project nr	248421	Funding scheme	Collaborative Project
Project Acronym	Sim-e-child		
Period from	01/01/10	Is this an adjustment to a previous statement ?	No
To	31/10/10		

Legal Name	Siemens Program and System Engineering SRL	Participant Identity Code	999762220
Organisation short Name	PSE	Beneficiary nr	11

Funding % for RTD activities (A)	50%	If flat rate for indirect costs, specify %	--

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

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	TOTAL (A+B+C+D)
Personnel costs	9651.06		0		9651.06
Subcontracting	0		0		0
Other direct costs	0		0		0
Indirect costs	8492.94		0		8492.94
Lump sum/flat rate/scale of unit declared					
Total	18144		0		18144
Maximum EC contribution	9072		0		9072
Requested EC contribution					9072

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 ? 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:

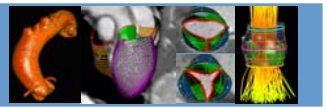
- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;

- 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 within 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
	Date & signature



FP7 - Grant Agreement - Annex VI - Collaborative Project

Summary Financial Report - Collaborative Project- to be filled in by the coordinator

Project acronym	Sim-e-Child	Project nr	248421	Reporting period from	01.01.2010	to:	31.10.2010	Page	1/1

Funding scheme	CP

Beneficiary n°	If 3rd Party, linked to beneficiary	Adjustment (Yes/No)	Organisation Short Name	Type of activity: RTD (A) Total	RTD (A) Max EC Contribution	Demonstration (B) Total	Demonstration (B) Max EC Contribution	Management (C) Total	Management (C) Max EC Contribution	Other (D) Total	Other (D) Max EC Contribution	Total (A)+(B)+(C)+(D) Total	Total (A)+(B)+(C)+(D) Max EC Contribution	Receipts	Interest
1			Siemens	17,348.00	8,674.00			5,569.00	5,569.00			22,917.00	14,243.00		
2			Lynkeus	0.00	0.00			44,371.99	44,371.99			44,371.99	36,828.75		
3															
4			Maat	80,484.49	60,363.36			0.00	0.00			80,484.49	60,363.36		
5			TUM	5,295.68	3,971.76			0.00	0.00			5,295.68	3,971.76		
6			OPBG	54,450.00	39,450.00			1,200.00	1,200.00			55,650.00	40,650.00		
7			SCR	62,578.48	31,289.24			5,006.53	5,006.53			67,585.01	36,295.76		
8			JHU	0.00	0.00			0.00	0.00			0.00	0.00		
9															
10			ACCF	1,395.95	697.98			0.00	0.00			1,395.95	697.98		
11			PSE	18,144.00	9,072.00			0.00	0.00			18,144.00	9,072.00		
12															
13															
14															
15															
16															
17															
18															
19															
20															
21															
22															
23															
24															
25															
TOTAL				239,696.60	153,518.34			56,147.52	56,147.52			295,844.12	202,122.61		

Requested EC contribution for the reporting period (in €)	202,122.61