Public

FP7-ICT-2013- 10 (611146) **CONTREX**

Design of embedded mixed-criticality CONTRol systems under consideration of EXtra-functional properties

Project Duration 2013-10-01 – 2016-09-30 Type IP

	WP no.	Deliverable no.	Lead participant
	WP6	**D6.4.1**	**ECSI**

CONTREX Forum Report (Initial)

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Issued by	**ECSI**
Document Number/Rev.	**CONTREX/ECSI/D/D6.4.1/1.0**
Classification	**CONTREX Public**
Submission Date	**2014-06-23**
Due Date	**2013-06-30**

Project co-funded by the European Commission within the Seventh Framework Programme (2007-2013)

History of Changes

ED.	REV.	DATE	PAGES	REASON FOR CHANGES
AM	0.1	2014-06-10	10	Initial version
AM	0.2	2014-06-18	12	Updated version
AM	0.3	2014-06-19	14	MCC Cluster information added
AM	0.4	2014-06-19	16	Added new projects and related events
KG	0.5	2014-06-19	19	Provided feedback and minor modifications
AM	0.6	2014-06-20	19	Extension of project descriptions
SR	1.0	2014-06-20	19	Final review before submission

Contents

1 Introduction

This document presents the objectives of the CONTREX Forum as well as first steps undertaken by the consortium to implement the Forum: identification of related projects, industrial partners interested in extra-functional modelling solutions and standards, as well as relation to the Mixed-Criticality Cluster established by the European Commission.
Next steps are also devised in this document.

It is an initial document that will be refined with the progress of the forum set-up and operation.

2 CONTREX Forum Rationale and Objectives

To strengthen the adoption of project results by other industrial beneficiaries not being part of the consortium, CONTREX invented the idea of organization of a special Forum to communicate with the key industrial and university players.

The Forum will enable a privileged communication between the project and invited industrial and research representatives to

- continuously update the partners of the Forum about major achievements and available results (even partial, under development)
- enable parties to provide feedback and suggestions to the preliminary results
- help them to adopt the relevant project results.

This Forum's will provide early access to CONTREX results (presentations, demonstrations, draft deliverables, etc.) in order to strengthen the adoption and deployment of the CONTREX methodology and tools even beyond the consortium. It will enable external partners to provide input and feedback related to their industrial domain based on intermediate findings and standard proposals.

In addition to the above, the Forum will be a privileged way to communicate with other related R&D and industrial projects.

3 Initial Activities to Establish the Forum

3.1 Identification of related industrial activities and projects

3.1.1 OpenES

Open ESL Technologies for Next Generation Embedded Systems

Abstract:

In order to improve European electronics system design productivity (faster time-to-market), design quality (less design errors and less re-designs) to stay competitive, the OpenES consortium joins forces to provide missing links in system-level design and to develop common open solutions based on four pillars:

- Fill gaps in design flows with new interoperable tools and/or improve existing tools/flows ensuring the semantic continuity of the design flow.
- Specifically focus on integral support of both functional and extra-functional requirements from specification to verification, jointly with the use cases defined at system level.
- Raise reuse capabilities from IP to HW/SW subsystem in order to eliminate integration effort by supporting reuse of pre-integrated and pre-verified subsystems.
- Enhance interoperability of models and tools by upgrading and extending existing young open standards (SystemC TLM, SystemC-AMS, IP-XACT)

The common open and extensible solutions developed in the project will provide an appropriate design framework and interfaces built on standards wherever possible. Extensions on standards will be initiated where necessary. Due to this openness each partner can achieve an advanced complete system level design flow enhancing it according to specific requirements from a given application domain. Thanks to OpenES, this enhancement can be done by linking in dedicated tools or partial flows without the need to use company specific proprietary approaches, formats and interfaces anymore.

By this, a general significantly improved capability of system design and a new quality of cooperation between IC/IP-provider and system integrator are enabled. The broad relevance and functional capability of this common approach will be demonstrated by case studies from various key domains for the European industry: wireless/software defined radio, multimedia/set-top-box, automotive/traffic and security, and industrial/power control.

Main objectives in relation to CONTREX:

- Extra-functional properties specification
- SystemC/TLM, system modeling
- Standardisation of extra-functional annotations in SystemC/TLM and interfacing with domain specific extra-functional simulators

Partners:

- Design Houses: CISC (Austria), Thales (France)
- Semiconductor Companies: NXP (Netherlands), ST (France)
- EDA vendors: DoceaPower (F), Magillem Design Services (F), Vector Fabrics (NL)
- IP and Subsystem providers: Synopsys (NL)
- Research Institutes: CEA-LIST (F)
- Universities: UJF-Verimag (F), TU Eindhoven (NL)
- Association: ECSI (France)

Web: http://www.openes-project.org/

Joint Actions:

The first common action undertaken by OpenES and CONTREX was the organization of The Workshop at DAC Conference on System to Silicon Performance Modeling and Analysis. (cf. Deliverable D6.3.2 for more details on the event).

A first set of technical background material (presentations, publications, public deliverables, public reports) have been exchanged between OFFIS and STM (France) in order to assess the technical overlap and to plan join standardization activities through the Accellera Systems Initiative.

3.1.2 VERDI

Verification for Heterogenous Reliable Design and Integration

Abstract:

Systems of Systems (SoS) are heterogeneous whereby the functionality more and more rely on the interaction and interoperability between the analogue/mixed-signal (AMS), digital electronics, software and other physical domains. To achieve the required reliability, robustness and quality of SoS, mastering the heterogeneous behaviour across domains is the most essential part during the development process. The traditional barriers between different design disciplines such as system design, verification and prototype validation should be removed, by introducing an integral system verification and validation methodology.

Verdi aims at improving the design efficiency and quality by developing methods and tools to address the design challenges related to heterogeneous integration. It will link simulation-based, “pre-tape-out” system analysis and verification with system validation and analysis of the physical prototype using measurement equipment

Main objectives in relation to CONTREX:

- Defining an unified system-level verification methodology for heterogeneous SoS
- Specifying a Reuse strategy for verification IP, across and inside companies for different product generations

- Defining a path from verification IP to validation IP, to bridge the gap between verification and validation
- Standardisation: SystemC/UVM and UVM-AMS

Partners: Fraunhofer IIS/EAS (leader), NXP Semiconductors, STMicroelectronics, Infineon, Continental, Magillem Design Systems, Université Pierre et Marie Curie

Web: https://wiki.eas.iis.fraunhofer.de/verdi/index.php

Joint Actions:

- Discussion/meeting between coordinators to be organized
- Invitation to CONTREX Forum workshop

3.1.3 ACOSE

Atelier pour le CO-développement logiciel/matériel des Systèmes Embarqués

Abstract:

The ACOSE project will develop a rigorous system development framework allowing the designed system to be represented at different levels of detail, from application software to its implementation on one or several platforms. ACOSE will address hardline issues such as complexity, separation of communication and computation, quality of service, correctness, model-based and component-based design, legacy integration, optimal power usage and industrial concerns such as integrated reporting. Such environment will allow SoC and system integrators putting in place a real strategy for product life cycle management.

The outcome of ACOSE will be an integrated HW/SW development flow based on the emerging IP-XACT standard (IEEE 1685-2009), that provides requirements management for product life cycle management and critical systems certification. Developed by a consortium sampling the whole value chain of complex embedded systems, the ACOSE Workshop will drive dramatic development costs reduction for embedded system while improving significantly quality and time-to-market for French leaders in key embedded industries.

Main objectives in relation to CONTREX:

- Requirement tracability
- Flow Management

Partners: CEA, Magillem Design Services

Web: http://www.systematic-paris-region.org/fr/projets/acose

Joint Actions:

- Review of project deliverables
- Contacts with former coordinators of the project

3.1.4 H-Inception

Heterogeneous Inception

Abstract:

New types of emerging applications require microelectronics which closely interact with the surrounding environment in different physical domains (optical, mechanical, acoustical, biological, etc.). The main challenge is to correctly specify, dimension and verify these multi-domain microelectronics assisted systems, to avoid unnecessary errors and redesigns which hamper product quality and thus time to market. Heterogeneous INCEPTION ("H-INCEPTION") aims at developing and deploying a novel unified design methodology and tools to address the system-level design and verification need for these systems. This will be deployed inside the European Industry with an ecosystem, delivering all design technology ingredients, from design and verification methodology to the essential modeling languages and simulation engines. H-INCEPTION will enable the industrial partners to create multi-domain virtual prototypes by introducing abstract modeling techniques and fast system simulation concepts. A rich consortium from 5 countries composed of semiconductor and fabless companies, equipment suppliers, EDA vendors, research institutes and universities cover different fields and applications domains such as automotive, wireless, avionics and biomedical will all contribute to the creation and validation of this unified design methodology and ecosystem.

Main objectives in relation to CONTREX:

- Heterogeneous Specification and assembly

Partners: Brio Apps AlphaSIP, STMicroelectronics**,** Continental Automotive, Magillem, Coventor**,** Atrenta, INL, UPMC**,** UC**,** Fraunhofer

Web: https://www-soc.lip6.fr/trac/hinception

Joint Actions:

- Discussion/meeting between coordinators to be organized
- Invitation to CONTREX Forum workshop

3.1.5 HiCool

Abstract:

Advanced solutions for designing of low-power complex integrated circuits.

Main objectives in relation to CONTREX:

- System-level power modelling

Partners: DeFacto Technologies, Docea Power, Grenoble INP, STMicroelectronics

Web:
http://www.minalogic.org/TPL_CODE/TPL_PROJET/PAR_TPL_IDENTIFIANT/3609/99-embedded-electronics-nanoelectronics-technology.htm#.U6IVhSiF8e8

Joint Actions:

- Discussion/meeting between coordinators to be organized
- Invitation to CONTREX Forum workshop

3.1.6 ArrowHead

Abstract:

Our society is facing both energy and competitiveness challenges. These challenges are tightly linked and require new dynamic interactions between energy producers and energy consumers, between machines, between systems, between people and systems, etc. Cooperative automation is the key for these dynamic interactions and is enabled by the technology developed around the Internet of Things and Service Oriented Architectures.

The objective of the Arrowhead project is to address the technical and applicative challenges associated to cooperative automation:

- Provide a technical framework adapted in terms of functions and performances
- Propose solutions for integration with legacy systems
- Implement and evaluate the cooperative automation through real experimentations in applicative domains: electro-mobility, smart buildings, infrastructures and smart cities, industrial production, energy production and energy virtual market
- Point out the accessible innovations thanks to new services
- Lead the way to further standardization work

The strategy adopted in the project has four major dimensions:

- An innovation strategy based on business and technology gap analysis paired with a market implementation strategy based on end users priorities and long term technology strategies
- Application pilots where technology demonstrations in real working environments will be made
- A technology framework enabling collaborative automation and closing innovation critical technology gaps
- An innovation coordination methodology for complex innovation “orchestration”

Main objectives in relation to CONTREX:

- Multi-layer architecture

- Power management

Partners: more than 80 partners in industry and academia. The following CONTREX partners are also in the ArrowHead consortium: STMicroelectronics (Italy), Eurotech (Italy), Politecnico di Torino (Italy)

Web: http://www.arrowhead.eu/

Joint Actions:

- Discussion/meeting between coordinators to be organized
- Invitation to CONTREX Forum workshop

3.1.7 BENEFIC

Best ENergy EFficiency solutions for heterogeneous multI-core Communicating systems

Abstract:

A lot has already been done on power efficiency but much more is needed to address the very important challenge related to energy. Important breakthroughs can be achieved only if the whole energy chain of a system is addressed. To that respect BENEFIC will continue to work on energy saving but also on energy production and distribution. The main objective of the project will be in providing a holistic approach integrating new sources of energy harvesting, innovative approaches of distributing energy closer to places where it is used. The new methods developed in this project will allow a better prediction and management strategies of power consumption at the architecture definition level.

Nowadays, a new category of "nomad smart devices" are invading our daily life, that are always connected and requiring more cores that work at higher frequencies and below a tight power consumption budget. In spite of a lot of efforts in silicon technologies and battery capacity, it is not sufficient to compensate or better to overtake the greediness of the new features of such devices in energy. Decreasing CMOS feature size will not be enough to reach future 3GPP bit rate and following this trend a power gap that is estimated at > 13x by 2020 must to be closed.

In the same way and depending on form factor of our "nomad smart devices", the acceptable power dissipation is limited by the thermal aspects in order to insure the comfort of the end-user. A simplistic analysis gives a maximum sustainable power dissipation of 4W for a smart-phone until near 15W for a >7'' display devices.

BENEFIC is organized around five applications domains which are Professional Communication, Telecom, Health Care, Space, and Advanced Energy Efficiency. These application domains fit the various markets addressed by the partners, and will be supported by specific demonstrators in each application domains illustrating the impact of BENEFIC on energy efficiency.

Main objectives in relation to CONTREX:

- Power management related to energy harvesting

Partners: NXP, ST, Thales, Ericsson, Recore Systems, CEA, TIMA, U Nice/Sopia Antipolis, TU Delft, Synopsys, Atrenta, IT, IPCB, TUE, IMEC, Beyond Vision

Web: http://benefic.tudelft.nl/

Joint Actions:

- Discussion/meeting between coordinators to be organized
- Invitation to CONTREX Forum workshop

3.1.8 EMC2

Embedded multi-core systems for mixed criticality applications in dynamic and changeable real-time environments

Abstract:

EMC2 is an ATREMIS Joint Undertaking project in the Innovation Pilot Programme 'Computing platforms for embedded systems' (AIPP5).

Embedded systems are the key innovation driver to improve almost all mechatronic products with cheaper and even new functionalities. They support today's information society as inter-system communication enabler. A major industrial challenge arises from the need to face cost efficient integration of different applications with different levels of safety and security on a single computing platform in an open context.

The objective of EMC2 is to establish Multi-Core technology in all relevant Embedded Systems domains.

EMC2 is a project of 97 partners of embedded industry and research from 19 European countries and Israel with an effort of about 800 person years and a total budget of about 100 million Euro.

EMC2 is structured into 12 Work Packages, 6 Technology Work Packages and 6 Living Labs

Main objectives in relation to CONTREX:

- Design methodology and tools for embedded multi-core mixed-criticality systems
- Executable application models for mixed-criticality systems

Partners: 97 partners of embedded industry and research from 19 European countries and Israel. The following CONTREX partners are also in the EMC2 consortium: OFFIS (Germany), Politecnico di Torino (Italy), KTH (Sweden)

Web: http://www.emc2-project.eu/

Joint Actions:

- Alignment on common dissemination actions

3.1.9 CRYSTAL

CRitical sYSTem engineering AcceLeration

Abstract:

The ARTEMIS Joint Undertaking project CRYSTAL has identified needs and takes up the challenge to establish and push forward an Interoperability Specification (IOS) as a European standard for safety-critical systems. The CRYSTAL IOS will allow loosely coupled tools to share and interlink their data based on standardized and open web technologies that enables common interoperability among various life cycle domains. This reduces the complexity of the entire integration process significantly. Compared to many other research projects, CRYSTAL is strongly industry-oriented and will provide ready-to-use integrated tool chains having a mature technology-readiness-level (up to TRL 7). In order to reach this goal, CRYSTAL is driven by real-world industrial use cases from the automotive, aerospace, rail and health sector and builds on the results of successful predecessor projects like CEASAR, SAFE, iFEST, MBAT on European and national level.

Main objectives in relation to CONTREX:

- Interoperability Specification (IOS)
- Reference Technology Platform (RTP) as a European standard for safety-critical systems.

Partners:

The CRYSTAL Consortium is composed of 68 participants from 10 European countries. They range from industrial partners, SME's to academic partners and cover the application domains aersopace, automotive, rail and health. The following CONTREX partners are also in the CRYSTAL consortium: OFFIS (Germany), GMV (Spain)

Web: http://www.crystal-artemis.eu/

Joint Actions:

- Discussion/meeting between coordinators to be organized
- Invitation to CONTREX Forum workshop

3.2 Mixed-Criticality Project Cluster

Modern embedded applications already integrate a multitude of functionalities with potentially different criticality levels into a single system and this trend is expected to grow in the near future. Further, Europe is facing a once in a lifetime challenge with the advent of multicore and the potential to integrate in a single platform systems with different levels of dependability and security, known as mixed-criticality systems integration. Without appropriate preconditions, the integration of mixed-criticality subsystems based on multi- and many-core processors can lead to a significant and potentially unacceptable increase of engineering and certification costs.

The MCC Cluster: The EU FP7 projects CONTREX, DREAMS and PROXIMA collaborate in an European Mixed-Criticality Cluster (MCC) and closely work together in terms of identification of future challenges in the design and development of mixed-criticality multicore systems, join dissemination activities, and where possible exploring techniques to attach those challenges.

In addition to the MCC there are several ongoing research initiatives studying mixed-criticality integration in multicore processors including the MultiPARTES, parMERASA and P-SOCRATES project.

Some of the key challenges to be tackled include the combination of software virtualization and hardware segregation and the extension of partitioning mechanisms jointly addressing significant extra-functional requirements (e.g., time, energy and power budgets, adaptivity, reliability, safety, security, volume, weight, etc.) along with development and certification methodology.

- Timing: the foundations for enabling integrated mixed-criticality multicores systems are mechanisms for temporal and spatial partitioning, which establish fault containment and the absence of unintended side effects between functions
- Certification: Certification is key to enable exploitation of results in certain application domains such as railways or energy
- Extra-functional properties: The specific properties that must be satisfied by embedded systems include timeliness, energy efficiency of battery-operated devices, dependable operation in safety-relevant scenarios, short time-to-market and low cost in addition to increasing requirements with respect to functionality.
- Development methods: State-of-the-art model-based design methods still lack of explicit support for modelling mixed-criticality of applications. Support for spatial and temporal segregation properties at the resource allocation or platform view and for the

static or dynamic application to computation, memory and communication resource mapping is required.

In a following, a short description of the other projects is given.

Based on the strong foundation in European and national initiatives, DREAMS will establish a European reference architecture for mixed-criticality systems by consolidating and extending platform technologies and development methods. DREAMS will leverage multi-core platforms for a hierarchical system perspective of mixed-criticality applications combining the chip- and cluster-level. DREAMS will deliver architectural concepts, meta-models, virtualization technologies, model-driven development methods, tools, adaptation strategies and validation, verification and certification methods for the seamless integration of mixed-criticality to establish security, safety, real-time performance as well as data, energy and system integrity. The objective of DREAMS is a cross-domain architecture supporting multiple application domains (e.g., avionics, wind power, healthcare).

Continuing the PROARTIS STREP FP7 Project probabilistic approach to reduce timing verification and validation cost of MCS, PROXIMA pursues the development of probabilistically time analyzable (PTA) techniques and tools for multicore/manycore platforms. PROXIMA will selectively introduce randomization in the timing behavior of certain hardware and software resources as a way to facilitate the use probabilities to predict the overall timing behavior of the software and its likelihood of timing failure. To that end (1) PROXIMA will develop a tool chain including a multicore PTA-compliant processor implemented on FPGA and commercial Operating System and Timing analysis tool; (2) will develop four case studies, one in the main industrial scenarios studied in the project (Avionics, Space, Railway and Automotive) on the PTA-conformant platform; and (3) PROXIMA will also study the applicability of PTA Techniques to analyzing the timing behavior of COTS multicore processors.

Already at this early point in the project (M9) the MCC has established a close collaboration and exchange in between CONTREX, DREAMS, and PROXIMA through a joined participation at the DATE exhibition and joined participations in and organizations of workshops. A detailed description can be found in the D6.3.2 Dissemination Report.

Joint activities within the MCC Cluster:

- Joint participation at the Cyber-Physical Systems: Uplifting Europe's innovation capacity, organized by the DREAMS project and the European Commission

  http://www.amiando.com/cps-conference.html?page=973503

  CONTREX project presentation at the workshop: Mixed Criticality Systems – platforms for the future, Kim Grüttner

- Joint participation at the HiPEAC 2014 conference in Vienna

  http://www.hipeac.net/conference/vienna

1. Project overview poster presentation at HiPEAC'14 EU project poster session
2. CONTREX project presentation at the MultiPARTES - Multi-cores Partitioning for Trusted Embedded Systems - 2nd International workshop on the Integration of mixed-criticality subsystems on multi-core and manycore processors

   http://www.hipeac.net/node/6460
   https://alfresco.dit.upm.es/multipartes/eventsInfo/HiPEAC2014.html

- DATE'14

1) Joint European Project Cluster booth on Mixed-Criticality Systems at DATE'14 Exhibition
2) Presentation of joint publication

   Salvador Trujillo, Roman Obermaisser, Kim Grüttner, Francisco J. Cazorla, Jon Perez. **European Project Cluster on Mixed-Criticality Systems**, In *3PMCES workshop - Performance, Power and Predictability of Many-Core Embedded Systems*, Dresden, March 2014.

   http://www.ecsi.org/workshop2014/date/3pmces-proceedings

- DSD'14 organization of special session: Mixed-Criticality Systems Design, Implementation and Analysis

  https://contrex.offis.de/home/images/meetings/dsd2014/CfP_DSD_MCSDIA_extended.pdf

  Here we have invited the members of our industrial advisory board as reviewers:

  - Jean-Loup Terraillon, ESA, The Netherlands
  - Andreas von Schwerin, Siemens AG, Germany
  - Knut Hufeld, Infineon Technologies AG, Germany

  and the coordinators of the other MCC projects:

  - Roman Obermaisser, University of Siegen, Germany (DREAMS)

- Francisco J. Cazorla, Supercomputing Center and IIIA-CSIC, Spain (PROXIMA)
- Knut Hufeld, Infineon Technologies AG, Germany (EMC2)

The following papers from EMC2, DREAMS and PROXIMA have been submitted and will be presented:

Daniel Muench, Michael Paulitsch, Michael Honold, Wolfgang Schlecker and Andreas Herkersdorf: **Iterative FPGA Implementation Easing Safety Certification for Mixed-Criticality Embedded Real-Time Systems**

Jon Perez, David Gonzalez, Carlos Fernando Nicolas, Ton Trapman and Jose Miguel Garate: **A safety certification strategy for IEC-61508 compliant industrial mixed-criticality systems based on multicore partitioning**

Leonidas Kosmidis, Eduardo Quiñones, Jaume Abella, Tullio Vardanega, Ian Broster and Francisco J Cazorla: **Probabilistic Timing Analysis and Its Impact on Processor Architecture**

Roman Obermisser, Zaher Owda, Mohammed Abuteir, Hamidreza Ahmadian and Donatus Weber: **End-to-End Real-Time Communication in Mixed-Criticality Systems Based on Networked Multicore Chips**

The special session will be moderated by Eugenio Villar (U Cantabria) and Kim Grüttner (OFFIS).

3.3 First Activities to Identify Relevant Partners

Besides the project identification, the CONTREX consortium organized two open international workshops with a twofold objective: to present the project approach and incite interest from the community, and to identify partner working on or interested in the solutions addressed by CONTREX.

The first of two events: 3PMCES Workshop at DATE 2014 (cf. D6.3.2 Dissemination Report (Initial) for more details) enabled to identify several partners (Aalto University, Barcelona Supercomputing Center and IIIA-CSIC, CEA LIST, DTU, Fujitsu Laboratories, Glasgow Caledonian University, GN ReSound ApS, Kontron, LIP6, Mälardalen University, McGill University, Newcastle University, OFFIS, SICS, Tampere University of Technology, Technical University of Denmark, Technische Universität München, Universitat Politècnica de Catalunya, Universität Siegen, University of Cantabria, University of Erlangen-Nuremberg, University of Grenoble, University of Hertfordshire, University of Southampton, University of Tokyo, University of Twente, University Oldenburg) and projects (OpenES, CRAFTERS, PAPP, RELY, …) working on adjacent problems.

Second workshop: The DAC'14 Workshop on System to Silicon Performance Modeling and Analysis, was instrumental to identify large number of industry partners seeking coherent solution for performance and other extra-functional properties modelling and management. These companies/parties are:
Advanced Micro Devices, Ain Shams University, Ajou University, Altera, AMD, Arizona State University, ARM, ARM Norway AS, Axis Communications , Boston University, Broadcom Corporation, BroadPak, Cadence Design Systems, Carnegie Mellon University, CEA, CERN, CJSC Babilon-Mobile, C-LAB, Concordia University, CSR, DelfMEMS, Department of Defense, Ericsson AB, ETH Zurich, Fraunhofer IIS, George Mason University, Huawei Technologies, IISc, IIT Kanpur, Imec, Intel, ITRI, KAIST, Marvell, National Taiwan University, New York University, Northeastern University, Oracle, Pacific Northwest National Laboratory, Panasonic, Politecnico di Milano, Qualcomm Technologies Inc, Rambus, Raytheon, Samsung Electronics, Sapienza University of Rome, Siemens, STMicroelectronics, Synopsys, THALES, The University of Hong Kong, The University of Texas at Austin, Tokyo Institute of Technology, UCLA, Universidade Federal do Rio Grande do Sul, University of Calgary, University of Frankfurt, University of Illinois at Urbana-Champaign, University of Wisconsin Madison, Utah State University, Virginia Tech., ZTE Corporation.

With these two events we identified several Industry and University partners interested in the subject of system performance specification, modelling and analysis. This will create a basis for next activities of the Forum.

4 Next Steps

Based on the identification of active projects in the domain of CONTREX as well as of number of companies and university/research centres expressing interest and needs in extra-functional properties specification, analysis and design flows able to handle them, the CONTREX consortium plans three next steps to establish the CONTREX Forum:

1. Direct contacts with related projects

A more in-depth discussion and exchange of information about the scope of work, expected results and cooperation possibilities will be carried out with selected R&D projects (presented in Section 3).

This activity started already with the OpenES project, where exchange of presentations and initial face-to-face discussions were established between the project coordinators.

2. Organization of a workshops (by invitation) to present CONTREX objectives, advances and expected results.

In order to focus discussion and exchange of information between CONTREX and the whole community (projects, industrials, and academia) there is a need for more thorough presentation of CONTREX approach and final/partial/expected results, as well as direct discussion with relevant parties. For this purpose CONTREX will organize Forum workshops.

The first technical Forum workshop is the Mixed-Criticality Cluster workshop organized on 2nd of July in Brussels, Belgium. This workshop mainly aims to technically understand the work planned/already done in the projects combined in the MCC in order to identify possible joined dissemination as well as exploitation activities.

At the technical level CONTREX is looking forward to receive feedback on the proposed meta-model for distributed embedded mixed-critical systems.

3. Exchange of draft deliverables for external review and feedback

To improve the scope, quality and applicability of CONTREX results, the project consortium plans to exchange preliminary technical documents with selected external partners to ask them for review and feedback comments.