Project no.:   **FP7-ICT-STREP-214755**

Project full title: **Quantitative System Properties in Model-Driven Design**

Project Acronym: **QUASIMODO**

Deliverable no.:   **D5.3**

Title of the deliverable: **Dissemination and Use Plan**

Contractual Date of Delivery to the CEC:	**Month 12**
Actual Date of Delivery to the CEC:	**Month 12 (February 1, 2009)**
Organisation name of lead contractor for this deliverable:	**ESI**
Author(s):	**Jan Tretmans**
Participants(s):	**All**
Work package contributing to the deliverable:	**WP5**
Nature:	**R**
Version:	**1.4**
Total number of pages:	**8**
Start date of project:	1st January 2008 **Duration:** 36 month

Abstract:

To promote the exploitation and use of the project results Quasimodo invests in activities for communication, dissemination, and use of project results. Different activities are organized in this respect. This deliverable provides an initial list of initiatives and opportunities for dissemination and use of Quasimodo results. This includes conferences, symposia, (summer) schools, local and international workshops, and courses in which Quasimodo is involved and where Quasimodo results are presented, related projects, programmes, and networks where partners from the Quasimodo consortium are involved and where there are opportunities for cross-fertilization, and the initial ideas of the industrial partners about potential exploitation of the Quasimodo results in their organization.

Keyword list: Quasimodo, dissemination, use of results, exploitation

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Abbreviations

AAU	Aalborg University, DK
CFV	Centre Fédéré en Vérification, B
CNRS	National Center for Scientific Research, FR
ESI	Embedded Systems Institute, NL
ESI/RU	Radboud University Nijmegen, NL
ESI/UT	University of Twente, NL
RWTH	RWTH Aachen University, D
SU	Saarland University, D

1   Introduction

The Quasimodo project will develop methods, techniques, and tools for handling quantitative properties in model-driven development of real-time embedded systems. To promote the exploitation and use of the project results Quasimodo also invests in activities for communication, dissemination, and use of project results. Different activities are organized in this respect. In the first place, a Quasimodo web site with information regarding the project, its organization, current status, results, publications, events, related projects, and activities has been created [1]. Secondly, the consortium members are involved in the organization of various symposia, conferences, (summer) schools, and workshops where results and topics related to the project are presented for a wider scientific and industrial audience. Publication of Quasimodo results in the relevant international journals and conferences, both scientific and professional, is another way of dissemination. Moreover, the members of the consortium will give key note and invited presentations, tutorials, and summer school lectures. Quasimodo will actively promote interaction and cross-fertilization with related projects and networks, in particular with those in which Quasimodo partners participate. The academic partners will use the Quasimodo results in their regular academic courses, the research institutes will use them in courses and training programmes for industry in the area of embedded system engineering, and the industrial partners in the Quasimodo project will attempt to exploit the project results directly in their daily business. As a last dissemination activity, the project will make a joint effort in writing a "Handbook on Quantitative Model-Driven Development for Embedded Systems" to be published at the end of the project.

This deliverable provides an initial list of initiatives and opportunities for dissemination and use of Quasimodo results. The next section contains conferences, symposia, (summer) schools, local and international workshops, and courses in which Quasimodo is involved and where Quasimodo results are presented. Section 3 mentions related projects, programmes, and networks where partners of the Quasimodo consortium are involved, and where there are opportunities for cross-fertilization. The last section expresses the initial ideas of the industrial partners about potential use of the Quasimodo results in their organization. An update of this deliverable is planned for December 2009.

2   Dissemination

Quasimodo has been, and will be involved in the organization of several conferences, local and international workshops, (summer) schools, events, and courses related to Quasimodo work:

First Project Year:

1. SU: A summer School 'Fun with Automata' dedicated to 3rd year Bachelor students, September 2008
2. AAU: DaNES Simulink/Labview Course, April 7-10, 2008, Sønderborg, Denmark (25 participants).
3. AAU: DaNES Tools Days, April 23-24, 2008, Aalborg, Denmark (30 participants).
4. AAU: DaNES Mini Projects, May 22-23, 2008, DTU, Denmark.
5. AAU: Testnet Konference, October 30, 2008, Aalborg, Denmark.
6. CNRS: Summer school MOVEP 2008 (see http://www.univ-orleans.fr/evenements/movep2008/) about specifying, modeling, and verifying parallel and concurrent processes for control of real-time applications, reactive, and critical systems (Franck Cassez (CNRS), François Laroussinie (CNRS): steering committee, and Patricia Bouyer (CNRS), Ed Brinksma (ESI), Kim Larsen (AAU), and Jean-Francois Raskin (CFV): program committee. Nicolas Markey (CNRS): tutorial on timed systems).
7. CFV: Automata and Verification workshop, Mons-Hainaut University, 25-26 August 2008.
8. ESI/UT, CHESS: Dutch IPA Spring Days on Integrated Formal Methods, May 2008.
9. ESI/UT/RU: Basic Course IPA (Dutch Institute for Programming research and Algorithmics) for PhD students on Formal Methods, August 23-27, 2008.
10. ESI/RU: Course on model checking with UPPAAL for Dutch high-school students, 2008.
11. ESI: The ESI Symposium, presenting all ESI projects including Quasimodo, Dec. 4, 2008.
12. ESI: Co-organization of Bits&Chips Embedded Systems, Oct. 9, 2008.

13. ESI: Co-organization of "De Nederlandse Testdag" (The Dutch Testing Day), Nov. 27, 2008.
14. ESI: Co-organization of INCOSE 2008 (18th Annual Int. Symposium of the Int. Council on Systems Engineering), June 15-19, 2008.
15. ESI: The 2nd Int. Joint Workshop on Embedded Software and System Engineering Design Challenges, Daegu, Korea, May 19-23, 2008.
16. ESI: Organization of the Embedded Systems track on the Artemisia/ITEA Symposium, Oct. 22, 2008.
17. CHESS: Coordinating the bi-annual Industry Day through our participation in the board of the Formal Techniques Industry Association (ForTIA), a subgroup of Formal Methods Europe, at FM2008 at Abo Akademi University at Turku, Finland on 28 May 2008 (see http://www.fm2008.abo.fi). A similar event will take place at FM2009 in Eindhoven, The Netherlands.

Second and Third Project Year:

18. ESI/UT: Dagstuhl Workshop on Quantitative and Qualitative Analysis of Network Protocols in 2009.
19. ESI/UT: PDMC (Parallel and Distributed Model Checking) in 2009.
20. ESI/UT: ICGT (International Conference on Graph Transformations) in 2010.
21. ESI/RU: FORMATS'09 (7th Int. Conf. on Formal Modelling and Analysis of Timed Systems), Budapest, September 13-16, 2009.
22. ESI: Organization of a special DATE session on MBSE (Model Based Software Engineering), 2009.
23. ESI: A post-academic, industry-oriented Competence Development Program is organized, leading to a Master's in Embedded Systems Engineering, in which parts of the Quasimodo results will be used.
24. ESI: Organization of FM 2009 (Int. Conference of Formal Methods), Nov. 2009.
25. Hydac: A couple of internal seminars and workshops will be organized to disseminate the Quasimodo results to software engineers, at the end of the Quasimodo project.
26. CHESS: Organize an internal workshop (possible jointly with Quasimodo partners) on modelling and analysis of the two case studies using the Quasimodo tools and techniques (in 2009) and organize a public event (possibly a summer school) for the benefit of other SME companies in The Netherlands through our involvement in DevLab and FHI (in 2010). Furthermore, CHESS offers several BSc, MSc and PhD student research projects to work on related projects in our company (throughout the project). Currently we facilitate students from Free University of Amsterdam, University of Twente and the Radboud University Nijmegen. Furthermore, CHESS participates regularly in industry fairs and outreach meetings where we are in the position to present some of the Quasimodo results or the products based on those results.
27. A Quasimodo workshop is planned to be held during the FM week, November 2009, in Eindhoven.
28. A final Quasimodo symposium is planned for the autumn of 2010.
29. Handbook on Quantitative Model-Driven Development for Embedded Systems (Deliverable D5.12).

The Quasimodo results have been, and will be presented at conferences, symposiums, and (summer) schools:

1. AAU: Invited talk at Workshop of CDC, Tallin, Estonia, January 21-22, 2008 (Kim Larsen).
2. AAU: Invited talk at SSV08, Sidney, Australia, Feb 25-27, 2008 (Kim Larsen).
3. AAU: Inivited lecture at WODES 2008, Göteborg, Sweden, May 28-30, 2008 (Kim Larsen).
4. ESI: Lectures at EJCP (Ecole Jeunes Chercheurs en Programmation), Rennes, May 29.June 6, 2008 (Jan Tretmans).
5. AAU: Invited lecture at Pan-European conference on Systematic Testing, Berlin June 4-5, 2008 (Kim Larsen, Brian Nielsen).
6. RWTH: Lectures on Probabilistic Model Checking, at the Nanjing University (June 12-14, 2008) and at the Tshinghua University in Beijing (June 28-July 2, 2008).
7. ESI: Lectures at the TAROT Summer School, Bath, June 22-27, 2008 (Jan Tretmans).
8. ESI: Lectures at the Artist2 Summer School in China, Shanghai, July 12-18, 2008 (Ed Brinksma).
9. AAU: Invited lectures at Marktorberdorff summer school, August 5-17, 2008 (Kim Larsen).
10. AAU, ESI: Lectures at the ARTIST2 summer school in Europe, Grenoble, France, September 8-12, 2008 (Kim Larsen, Ed Brinksma).

Apart from scientific and technical articles in journals and on conferences, Quasimodo has published, and plans to publish professional articles and books:

1. AAU: The regular CISS magazine (in Danish) is published 1-2 times a year and distributed in more than 3.000 copies. The targeted audience is future industrial collaborators and political decision makers.
2. ESI/RU: A short introduction on model checking (in Dutch) was completed that is used in courses for high school students [2].
3. RWTH: A monograph on "Principles of Model Checking" was published by Christel Baier and Joost-Pieter Katoen (MIT Press), which covers quite some material on quantitative verification.
4. SU: Preliminary plans exist for a book on "Modelling and Evaluation of Distributed Embedded Systems".

Some of the Quasimodo results will be exploited via spin-off activities:

1. AAU: Currently the UPPAAL classic tool as of January 2007 is marketed by the Swedish registered company UP4AAL.
2. AAU: The activities on testing are exploited by the company TK Validate in a product V+ for testing web-services and graphical interfaces.
3. ESI/UT: An STW (Dutch Technology Foundation) valorization grant proposal to support a start-up SME on model-based testing has been submitted (Mariëlle Stoelinga).
4. ESI participates in the spin-off stimulation program of the Eindhoven University of Technology, through which all ESI PhD students are offered a course on entrepreneurship.

The results of Quasimodo will be used in regular courses and teaching by the Quasimodo participants:

1. SU: Master level courses on "Modelling and Analysis of Embedded Systems".
2. CFV/ULB: An advanced course on "Verification".
3. AAU: The CS curriculum offers various courses where the tools exploited and developed within Quasimodo (UPPAAL and its various branches) play a central role:
   - TOV (Test and Verification) aimed at last semester CS students;
   - Embedded Systems Validation (PhD course);
   - MTV (Model-Driven Test and Verification) aimed at third year EE students.
4. CNRS: Researchers from CNRS are involved in the Parisian Master of Research in Computer Science; see http://mpri.master.univ-paris7.fr/english/index.html. Teachers from CNRS are involved in the lectures on "Foundations of Verification for Timed and Concurrent Systems"
5. ESI/RU: Several experiments with the application of model checking are conducted in courses, for instance, in a first year course on operating systems; see http://www.cs.ru.nl/ita/publications/papers/fvaan/MCinEdu.
6. ESI/RU: Master level courses on "Analysis of Embedded Systems" and "Testing Techniques" will directly benefit from Quasimodo results.
7. ESI/UT: Within the Embedded Systems track of the Computer Science curriculum a course has been started on "Design of Embedded Systems (MDDP)" where Quasimodo results will be used.
8. RWTH: A seminar on "Quantitative Verification" is planned, and new Quasimodo results will be incorporated in the optional master course "Advanced Model Checking".

3   Relations to Other Projects and Cross-Fertilization

The Quasimodo partners participate in several other projects, programmes, and networks, which are related in content to Quasimodo. These involve both research projects and application-oriented industrial projects. These projects may serve as knowledge providers as well as knowledge consumers for Quasimodo. In particular, the industrial projects provide valuable platforms, on the one hand for the exploitation of Quasimodo results, and on the other for hand feedback and reality check of Quasimodo techniques and tools.

Research Projects:

1. SU: DFG-funded Sonderforschungsbereich SFB-TR 14-AVACS.
2. AAU: Danish research project MoDES.

3. ESI/UT: UT is project leader of the European project EC-MOAN on the modelling and analysis of molecular mechanisms in the E-coli bacteria, where hybrid techniques will be used, so cross fertilization with Quasimodo is envisaged.
4. ESI/UT: LIST (Laboratory for Integration of Small Tools), where the integration of tools is studied, some of which will be developed in Quasimodo.
5. ESI/RU: There is strong cross-fertilization with the theory-oriented projects FRAAI and ARTS funded by NWO (Dutch National Science Foundation).
6. CNRS: The French project (ANR) DOTS (Distributed Open and Timed Systems; see http://www.lsv.ens-cachan.fr/anr-dots/?l=en, about the design and verification of complex systems. In DOTS, researchers from LSV cooperate LaBRI, IRISA, IRCCyN, and LAMSADE.
7. RWTH: There is a strong cross-fertilization with the research training group Algosyn (Algorithmic Synthesis for Reactive Systems), and with the cluster of excellence UMIC.
8. AAU, ESI: EU Artemis, EU FP7 NoE Artist2 and ArtistDesign, and STREP Multiform.
9. ESI: EU FP7 Genesys.

Industrial Projects:

10. AAU: Collaborations with a number of companies within DaNES (Danish Network for embedded Systems) on topics quite affine with those of Quasimodo including model-driven and component-based design; see www.danes.aau.dk.
11. RWTH: In the ESA Project COMPASS (COrrectness, Modeling, and Performance of Aerospace Systems) it is envisioned that Quasimodo results can be effectively exploited. Other parties involved in this project are Thales Alenia Space, and Fondazione Bruno Kessler.
12. AAU: Interaction and integration of the UPPAAL tool suite with Simulink is considered.
13. ESI/UT: A collaborative project with NEM Hengelo has been started to explore the use of timed automata for controller design.
14. ESI/RU: A couple of collaborative industrial research projects aiming at the application of model checking, of which currently the most important and promising one is a collaboration with OCE in the context of the ESI Octopus project. In this project UPPAAL applied in the design of the data path of adaptive copiers and printers. The goal is to integrate model checking in the design process at OCE.
15. ESI: Several Dutch industrial-academic collaborative projects are executed by ESI, in an "industry-as-laboratory" setting, in which there are several opportunities for transfer of Quasimodo results and obtaining feedback: Boderc, Tangram, Ideals, Trader, Darwin, Falcon, Condor, Poseidon, Octopus, and Alwen; see www.esi.nl/projects for an overview of ESI projects and their descriptions. From the Ideals project, a cooperation with ASML, a case study was put forward for timed and stochastic model checking of a packet-switch router, which is currently considered within Quasimodo. Other possibilities for joint activities, among others, are the project Trader, where Simulink is used for modelling and simulation of digital television designs, and model-based testing activities in the project Poseidon.
16. CHESS: Chess is involved (either directly or indirectly through FHI DevLab) in five significant Dutch based joint academic / industry research programmes where there may be opportunities to use the results achieved in Quasimodo. They are: Viewcorrect (will conclude in 2008), Alwen (ambient living with embedded networks; see also previous item), Storm (sensor technology on radio modules), Pleister (package label electronics including sensing talkative enhanced radio) and NanoWireless (nanowires on wireless sensor modules). The last four projects have started in 2008 and will continue for several years. CHESS wants to play an active role in disseminating results into these projects and towards the associated partners and network.

4   Application in Own Products or Processes

1. Hydac: It is intended that the Quasimodo work will be applied in the Quasimodo case study, and in the development of safety transducers.
2. CHESS: The work of the academic partners on the two case studies proposed by CHESS is expected to have direct impact on real products that are currently under development in our company. Our primary focus is on the design and analysis of a novel wireless sensor network protocol based on epidemic style communication. Current design, analysis and verification & validation techniques are not sufficiently expressive and powerful to guarantee correct

implementation. This is extremely important since we target implementations in silicon in 2010 to achieve low-cost and high volume implementations. Hence "first time right" is a necessity. We therefore need current and future Quasimodo tools and techniques to address and attack these issues. Our secondary focus is on the design of complex motion control applications whereby modeling and analysis of operating mode changes is complex in relation to safety requirements imposed on those systems. As a case study we use a self-balancing scooter (people mover) as the challenge. This will not necessarily become a CHESS product, but the modeling and analysis strategy and the tools proposed by Quasimodo will help us to develop systems of similar scope and complexity. The long-term objective of Chess is to embed the Quasimodo tools into our in-company design flow for the development of mission critical embedded systems. Furthermore, we plan to enlarge the application scope of these tools from the two case studies to our high performance computing (image processing) and machine-2-machine business lines whenever possible.

3. TERMA: The result of Quasimodo will be used by TERMA in upcoming Space missions where highly reliable on board software is to be developed. Presently, certain methodologies and tools are used in this market; these will be assessed against the result coming out of Quasimodo where a specific on board software case acts as the test bench.

Bibliography

[1]   http://www.quasimodo.aau.dk/

[2]   http://www.ita.cs.ru.nl/publications/papers/fvaan/watismodelchecking.pdf.