Collaborative Embedded Systems

CrESt

GEFÖRDERT VOM
Bundesministerium
für Bildung
und Forschung

CrESt Newsletter 1 /2018

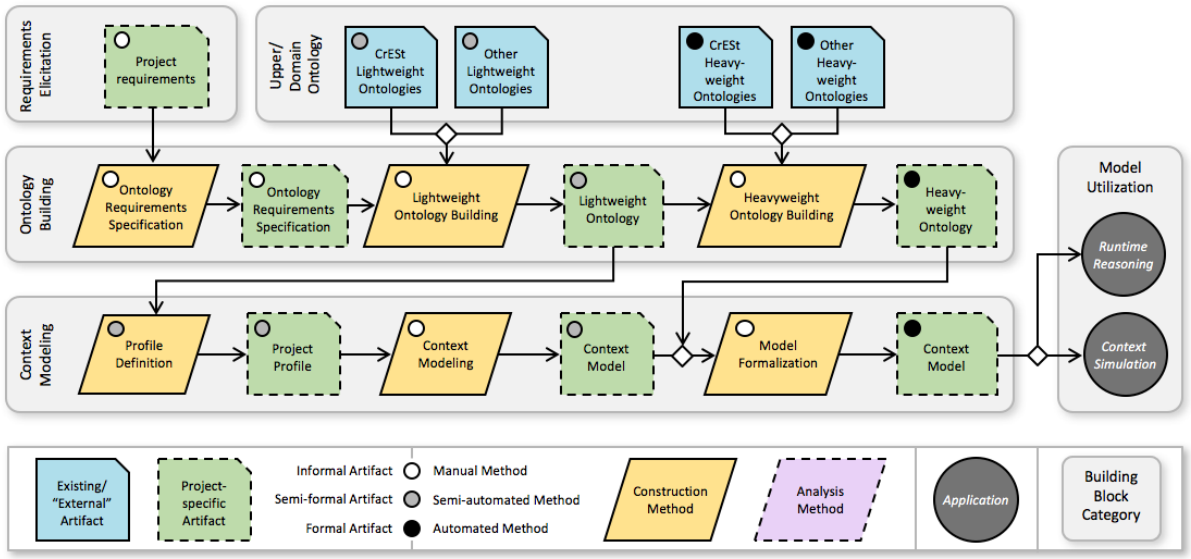
Welcome to the first edition of the CrESt newsletter. This newsletter reports about latest results and activities in and around the project. All editions of this newsletter will also be available online on the CrESt website under https://crest.in.tum.de/meldungen.html. We are looking forward to your comments and suggestions. Enjoy reading!

Rethinking Work - Discussion about the impact of robotics on current society and work: Panel debate held at showroom industry 4.0 in Adlershof on Oct 7th 2017, organized by Friedrich-Naumann-Stiftung für die Freiheit and InSystems Automation GmbH. Invited speakers were Prof. Dr. Schlingloff from Humboldt University, Florian Swyter as Member of the state parliament of Berlin and Ricarda Wagner from Bundesverband Digitale Wirtschaft (BVDW) e.V. All were discussing the impact of digitalization and robotics on current society and work in front of an audience of 30 people. Henry Stubert (President of InSystems Automation) gave an introduction of proANT technology and spoke about research plans in CrESt project. Collaborative embedded systems are a chance to improve transport robots in many ways (for instance, decentralization of order management, knowledge transfer among individual systems etc.) and will play an important role in future smart factory. Of course, these inventions will concern the quality of labor, too, and raises questions like: What jobs will be left for workers in smart factories? After discussion, the audience was given a life performance of proANT AGV 436 to demonstrate main features of the system. Journalist Volker Neef from Teltower Stadtblatt joined the event and wrote about it for his readership.

http://www.insystems.de/zukunft-der-arbeit/

http://www.stadtblatt-online.de/orte/berlin/arbeiten-4-0-technologie-und-gesellschaft-im-wandel/

Application of the SPES_XT Process Building Block Framework. The engineering challenge EC5 is concerned with uncertainty in the context of collaborative embedded systems. Multiple lifecycle phases and domains are being addressed by the involved partners. To reach a common ground for such diverse contributions and to facilitate the identification of interfaces and synergies, the team leveraged the SPES_XT Process Building Block Framework. Using this framework, the planned contributions were dissected yielding orchestrations of atomic methods and artifacts (that is, building blocks). Out of a need for increased expressiveness, the original framework notation was extended to allow for modeling the origin and degree of formalization of artifact as well the degree of automation of a method. The figure below depicts the extended notation and an exemplary orchestration of building blocks. The shown approach, developed at Helmut-Schmidt-Universität, Hamburg, aims to yield formal context models that allow collaborative embedded systems to capture and communicate context uncertainty at runtime.



All contributions in EC5 were modeled using this framework and jointly analyzed in a workshop to identify potential synergies. The result of this analysis are the engineering areas depicted as grey boxes in the figure. Overlaps regarding methods as well as artifacts were identified in the areas Upper/Domain Ontologies, Ontology Building, and Context Modeling. This motivated a subsequent workshop to develop ontology building blocks that lay the foundation for a common ontological basis. Interfaces to the engineering challenge EC4 (dynamic context) were explicitly considered to improve the integration between the two engineering challenges. Further consolidation work is ongoing and will help implement a common pool of methods and artifacts that provide the ingredients to a diverse set of contributions for various domains and lifecycle phases.

Semester Project on Collaborative Driving at Humboldt University. This winter semester, the specification, verification and testing group at HU Berlin, in collaboration with Assystem Germany GmbH and Fraunhofer FOKUS, organizes a "semester project" on highly automated driving. The purpose of such a project is to experience "systems development in the large", i.e., building a system in a team where the complexity of the problem would exceed the capabilities of each individual participant. In this project, 19 students will be building the hardware and software for a scenario derived from the CrESt platooning use case. Three model cars will be equipped with extensive sensors, precise motors, powerful processor boards and communication links, to enable a collaborative adaptive cruise control with line assist function for driving autonomously in a platoon.

CrESt Science Workshop The first CrESt Science Workshop held with great success from Nov. 16th to 18th at Humboldt University in Adlershof. 18 Ph.D. students and 4 professors gathered for three days to discuss emerging ideas and topics for theses. As a follow-up activity, it was decided to collect a set of tutorial chapters, depicting the state of the art in selected foundational areas, and written jointly by Ph.D. students from different groups. The social event included a boat trip on the river Spree, passing by the Regierungsviertel and the BMBF at dusk, and a visit to the Tränenpalast commemorating the German division. All participants agreed that the workshop was a big success and that there should be a continuation next year.

Results from MQ3 (Tools and Tool Platform) Presented at "Grand Challenges in Modeling": The RWTH Team is glad to announce that the challenges to mastering modern model based software engineering processes which have been worked out in MQ3 will be presented at the workshop "Grand Challenges in Modeling" (see http://www.edusymp.org/Grand2017/). The workshop is part of the conference "Software Technologies: Applications and Foundations (STAF) 2017" which represents the central European forum for model based development (see http://www.informatik.uni-marburg.de/staf2017/).

CrESt Researchers Engaged in Ongoing Standardization at the Object Management Group The Object Management Group (OMG) is currently in the process of standardizing the modeling of uncertainty in system/software engineering. The first major step in such a "Technology Adoption Process" is the development of a "Request for Proposal" (RFP), which specifies the requirements that the standard will have to satisfy. This document is developed collaboratively by interested parties from industry and academia. Fortunately, the preparation period of the RFP overlapped with the CrESt requirements elicitation phase (AP1). Hence, it was a welcome opportunity for researchers from EC5, which is concerned with the development of methods for modelling and analyzing uncertainty, to contribute to the RFP for uncertainty modeling. In particular, early project results, i.e. requirements regarding uncertainty in the context, influenced the specification. The resulting RFP was officially signed-off at the most recent OMG meeting in California, USA and carries the name "Precise Semantics for Uncertainty Modeling". This milestone kicks-off the next phase of the "Technology Adoption Process" in which a proposal for an actual standard is being developed. Researchers from Helmut-Schmidt-University and University of Duisburg-Essen, who are also involved in EC5, will be active contributors in the "Submission Team" that evolved from the RFP working group. This opportunity holds the potential for a far-reaching dissemination of results developed in EC5, specifically domain-independent ontologies for uncertainty in the context of collaborative embedded systems.

Crest Workshop EITEC @ CPS Week: CrESt organizes a workshop at next year's CPS week held in Porto, Portugal from April 10 – 13, 2018. It will be the 4th workshop of the EITEC series which aims at bringing together researchers and practitioners from various domains relevant to CPS dedicated to mastering

the challenges in engineering of CPS today and in the future. The workshop will be a venue to share results and new ideas, discuss upcoming research directions, and to catalyze a joint industry-academia platform that bridges the gap between scientific results and transfer into practice. This edition of the series will cooperate with the ICSE workshop SEsCPS'18. Deadline for submission is February 11th, 2018. See http://eitec.informatik.tu-muenchen.de/index.html for further details.

Resources. Further information on the CrESt project is available on the project website under https://crest.in.tum.de/.

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