Testing Cyber-Physical Systems under Uncertainty: Systematic, Extensible, and Configurable Model-based and Search-based Testing Methodologies

D 6.1 - Report on Dissemination and Communication plan

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Document Version History

Version No.	Date	Change	Author(s)
0.1	10.11.2015	Initial document outline	Oslo Medtech
0.2	14.12.2015	Pre-final draft, incorporating input from all consortium	Oslo Medtech
0.3	14.12.2015	Internal peer review.	Simula
1.0	31.12.2015	Final document preparation and submission.	Oslo Medtech

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Executive Summary

The objective of this deliverable is to define the dissemination and communication strategy and as well present record of every activity performed during the first year of the project; e-newsletter, brochures, events attended and promoted, community building activities, publications of technical and specialized articles in high impact journals. U-Test is promoted through various channels. This includes communication of project concepts and results to a wider audience beyond academically and commercially interested stakeholders. This report plans in detail dissemination, communication and awareness activities that aim to:

1. Inform the research community of the state-of-the-art developments taking place in the project and how the project may affect its research field
2. Foster community building and to realize impact on industry and research in Europe and worldwide
3. Inform user groups and the public of the state-of-the-art developments taking place in the project and its socio-economic impacts

This deliverable reports dissemination and communication activities took place during the first reporting period.

1 Introduction

1.1 Purpose and Scope

The objective of this deliverable is to report the dissemination and communication activities of the consortium which aims at carrying out the modelling and testing results from U-Test to the end user community, academia and industry which develops and deploys cyber-physical systems in real life applications.

1.2 Approach

This deliverable is prepared within Task 6.2, which aims to promote the U-Test project through various channels. This includes communication of project concepts and results to a wider audience beyond academically and commercially interested stakeholders. It also targets community building and cross-fertilization activities that besides the normal channels of publications, conference papers, workshop organization, will also focus on elaborating and presenting the selected case studies, and how research results impact them. The project has planned and executed below list of activities during first year of the project.

- U-Test identity and online presence: U-Test website and social networking accounts.
- U-Test news updates periodically posted on project and consortium partner's websites.
- Liaisons and contributions to standards and specification bodies.
- Participation in and contributions to scientific workshops.
- Participation in public awareness events

1.3 Structure of the Deliverable

Chapter 1 of this deliverable provides an introduction to the report.

In chapter 2, the basic methods for creating this dissemination and communication plan are described. The dissemination and communication activities performed during first project period and plan for year two is presented as well.

Chapter 3 compiles the project dissemination activities and scientific publications targeted at academic community.

1.4 Relationship to other U-Test Deliverables

This deliverable presents dissemination and communication activities during the first reporting period and rely on progress made in all other work packages of the project. This report will be updated at the end of second and third reporting periods of the project.

2 Public awareness and communication

2.1 Project website

The project website and online social networking accounts have been established to communicate and disseminate project results and are listed in Table 1.

The project website (www.u-test.eu) has been set up at the start of the project and maintained by project coordinator Oslo Medtech and project technical management lead partner Simula Research Laboratory. The website enables end users and interest groups to look at the board objectives of the project and some of the publicity. IP-protected information can be disclosed in this open section, if the partners decide to do this. Website contents relating to the achievements and progress are updated on regular basis.

The project's website first point of access describes the goals of the project in a simple free language, further it lists main challenges and issues U-Test project is addressing in cyber-physical-system's domain using keywords: "Understanding Uncertainty", "Modelling Uncertainty", "Discovering Uncertainty", and "Testing Uncertainty".

Communication channel	Access
Project website	www.u-test.eu
Cordis project page	http://cordis.europa.eu/project/rcn/194326_en.html
Twitter	https://twitter.com/utesth2020
LinkedIn	https://www.linkedin.com/company/u-test-eu

Table 1: Channels established to disseminate and communicate U-Test project

The website's home page as well gives an update on latest news items. The U-Test news page is the most updating section of the website and regularly publishes the dissemination and communication activities of the consortium members. The publication page lists all the scientific publication done with U-Test consortium members within the scope of the project and provides access the public deliverables of the project.

Towards the end of year one of the project, social networking channels are established, these include projects own twitter and LinkedIn accounts. Project communication manager has the overall responsibility for running the social networking channels, but all partners are expected to contribute with contents.

The consortium will prepare at least one post annually, based on the publishable summary of the periodic reports. All partners will contribute with further posts and audio-visual material based on project outcomes and activities.

The U-Test project logo (used on cover page) is used consistently in all dissemination and communication activities in order to consolidate the U-Test online presence.

The U-Test public website is available at link: www.u-test.eu

2.2 Participation in public awareness events

Appreciating the importance of outreach activities, U-Test partners will participate and organise several public awareness events. The purpose of these events will be to raise the awareness of the public on the impact of Cyber-Physical Systems (CPSs) on society as next generation of highly connected embedded systems and contributions of U-Test towards making these systems trustworthy, robust, efficient, and safe. The public awareness events will be combined with general assembly meetings of the project at venues/countries where these meeting will take place. The tentative planned event for 2016 are summarised in Table 2. First such meeting took place in Oslo, Norway on 27 October 2015. The agenda focused on the target end users community as presented in Section 3.2.

Host	When	Target
Oslo Medtech	Q3 2016	CPS community with targeted focus on healthcare
Fraunhofer, FOKUS	Q2 2016	CPS community
Ikerlan and ULMA	Q3 2016	CPS community with target focus on Logistics
FPX and NMT	Q4 2016	CPS community with target focus on healthcare and location based/aware services

Table 2: Aware and communication events planned for 2016

The participation of IKERLAN further offers a good opportunity to present the U-Test's results to a broader industrial audience. State-of-the-practice informative symposiums, with a Spanish national scope, are IKERLAN's main goals in order to boost the project's results in more industrial domains and companies. IKERLAN will disseminate the project results within the Mondragon industrial corporation and other social media. Results will be presented in industrial workshops and working groups within the Mondragon group.

2.3 First public awareness and communication event

2.3.1 Invitation

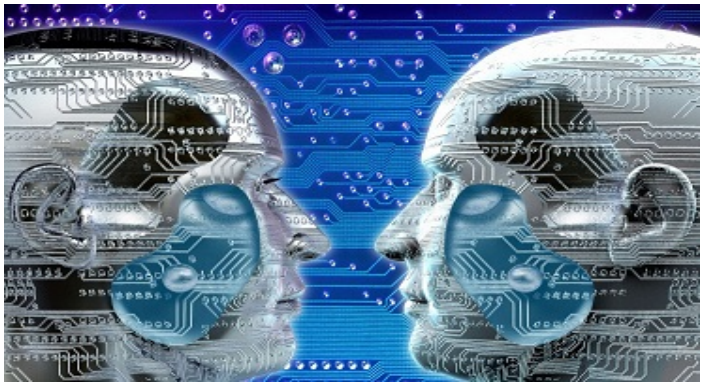
Improving home health care with dependable, interconnected, intelligent systems

U-Test - a novel method in testing and verification of CPS systems

H2020:2015-2017 Research and Innovation Actions

ICT1 Smart Cyber-Physical Systems "Science of CPS-Integration"

Co-simulation/modelling of all of system levels including circuits, communication networks, firmware, operating system, system architecture and software layers



Time:
Tuesday October 27th 2015, 15:30 – 17:00

Place: Simula Research Laboratory, Martin Linges vei 25, 1364 Fornebu

Background and introduction

When a Municipality install an ambient assisted living system (i.e. a safety package of care for elderly people living at home) such processes often rises questions as; is it well tested? Will it give the required service as promised? Do the supplier have a documented testing performed prior to installing?

When sensors, control modules and actuators in a home care setup are communicating through a network and interacting with i.e. an alarm central, we can term this a Cyber-Physical System (CPS). As our daily life are dependent on such CPSs, dealing with uncertainty is of essential.

2.3.2 Program

15:00 **Coffee and networking**

15:30 **Welcome, presentation of Oslo Medtech and Simula**
Egil Utheim, Advisor, Oslo Medtech,
Are Magnus Bruaset, Director of the Simula School of Research and Innovation, and Head of the Software Engineering Department

15:50 **Introduction to modeling and analysis in real time Cyber Physical Systems**
Bran Selic, Zeligsoft, Research Scientis Simula

16:05 **Welfare Technology – Proof of Concept in real life situations. Perspectives on test and verification before, under and after installation**
Øivind Røise, Designer Agency of Health, Oslo Municipality

16:20 **U-Test – towards a reliable, robust, and safe system**
Shaukat Ali Senior Research Scientist *Simula*

16:35 **Model-Based Testing with the UML Testing Profile**
Martin Schneider, Researcher at Fraunhofer FOKUS

16:50 **Tools to implement model based testing in your project**
Fabien Peureux, Scientific consultant Smarttesting Solutions & Services

2.3.3 About the speakers

	Bran Selic has pioneered the applications of object technology and model-driven development methods in the real-time domain. Bran has been involved with the definition and standardization of the Unified Modelling Language (UML) standard since 1996 including "Real-Time Object-Oriented Modelling,"
	Øivind Røise is a Norwegian Designer that is responsible for Service design programs for Agency of Health, Oslo Municipality. Editor of Strategy for Innovation procurements. Management of the Health Agency's Research and Development portfolio.
	Shaukat Ali has been affiliated to Simula Research Lab since 2007. He has been involved in many industrial and research projects related to Model-based Testing (MBT) and Empirical Software Engineering since 2003. Shaukat is technical lead in U-Test project.
	Martin Schneider is researcher at Fraunhofer FOKUS in the System Quality Center (SQC) with a special focus on advanced testing methods and techniques. Currently, he is working on model-based testing techniques for security aspects based on different fuzzing techniques, security test patterns, and security testing metrics.

	Fabien Peureux works as assistant professor at the Sciences and Technology Faculty of the University of Franche-Comté, and as scientific consultant for EGM and Smartesting Solutions & Services. His main expertise is focused on the implementation and automation of Model-Based Testing techniques.

2.3.4 Summary of the event

First U-Test Dissemination event of U-Test was organized by Oslo Med Tech. In total, 33 (**R&D:** 20, **Healthcare**: 8, **Industry**: 5) participants from Norwegian CPS community participated in the event.

Figure 1: Participants of first dissemination event

There were several presentations from the participants at a low level of complexity focusing upon the current shortcomings in today's systems and pointing out to what U-Test will bring during and after project end.

3 Academic dissemination publication

3.1 Public project deliverables

All public deliverables that are software prototypes will be developed as open source software, allowing the academic community continuous access to the tools. Public deliverables that are reports (excluding those with U-Test partners specific business sensitive information) will as well be available for downloading from the U-Test Web site.

3.2 Academic and industrial disseminations and publications

The consortium aims to participate and disseminate the project's research and innovation results in scientific journals, bulletins, conferences, and workshops related to the research partners core activity areas. Table 3 lists the venues targeted for disseminating the outcomes of the first period of the project.

Partner	Type	Title	Event	When	Brief Description
SRL	IEEE - Conference (Research)	U-Test: Evolving, Modelling and Testing Realistic Uncertain Behaviours of Cyber-Physical Systems	International Conference on Software Testing (ICST) 2015	April 13 - 16 2015	Presentation of the paper describing the overall objectives of U-Test project together with initial results on U-Taxonomy. The presentation was given in the Testing in Practice Track of the conference to make the U-Test project known to the worldwide testing industry. Participation to this conference was planned in the DoA.
SRL	LNCS - Workshop	Testing Cyber-Physical Systems under Realistic and Unknown Uncertainty by Combining Model and Search-Based Approaches	Challenges and New Approaches for Dependable and Cyber-Physical System Engineering (De-CPS) 2015	June 23 2015	As a part of initiative to find possible synergies and collaboration among the other EU projects on Cyber-Physical Systems, U-Test was represented at the De-CPS 2015 workshop. This participation involved the following aspects :1) Presenting the U-Test project, 2) Current status of the results, 3) Reporting on the standardisation activities in which U-Test is involved, 4) Participation in the panel discussion to find synergies and possible collaborations among the H2020 projects accepted under the same call as U-Test.
SRL	ETSI - Conference (Industry)	Systematic Model-based and Search-Based Testing of Cyber-Physical Systems	ETSI User Conference on Advanced Automated Testing (UCAAT 2015)	October 22-23 2015	Keynote on describing the challenges being addressed in the U-Test project. UCAAT has audience from a wide variety of testing community from both industry and academia. Participation to this conference was planned in the DoA.
SRL	OMG - Meeting	Modeling Cyber-Physical Systems in practice Challenges, current status of results, future directions	Object Management Group's Technical Meeting	June 15- 16 2015	Presentation to the System Modeling Assessment & Roadmap Workgroup at the OMG. There were two main aims: 1) To introduce U-Taxonomy to the workgroup to find the possibilities of standardizing U-Taxonomy in the next version of SysML, 2) Introducing the U-Test project to the OMG community. This was planned in the DoA.
SRL	Poster/ Banner	U-Test Poster	Transatlantic PhD program SUURPh at Simula	June 16 2015	Presentation to a number of national and international institutions, such as Norwegian Ministry of Education and Research, University of Oslo, and University of California, San Diego (UCSD).
SRL	Workshop	Testing Cyber-Physical Systems	Certus's User Partner Workshop	March 6 2015	Presentation of U-Test to Certus's Industrial Partners that include Cisco, Kongsberg Maritime, Esito, Norwegian Toll and Customs, and ABB Robotics as planned in the DoA.
SRL	Presentation	Facing Uncertainty in Complex CPS Design	Internal Seminar	November 20 2015	A presentation on the overall objectives of the U-Test project was given to an internal seminar of CEA-LIST, France. The presentation also included part of the U-Taxonomy. More than 30 people from CEA-LIST attended the presentation.
SRL	Poster/ Banner	U-Test Poster	6th International Summer School on Domain-Specific Modeling	August 24 – 28 2015	The U-Test poster was presented to the audience of the Summer School on Domain-Specific Modeling.
TUW	IEEE - Conference (Research)	iCOMOT - Toolset for Managing IoT Cloud Systems	16th IEEE International Conference on Mobile Data Management	June 15 – 18 2015	Demonstration of how CPS/IoT elements in an CPS/IoT infrastructure can be emulated, deployed, configured and monitored.
TUW	Tutorial	Principles for Engineering Elastic IoT Cloud Systems	the 9th Summer School on Service Oriented Computing	29 June – 4 July 2015	Present techniques to engineer IoT units
TUW	Conference Panel	Service Engineering Analytics for IoT	13 International Conference on Service Oriented Computing (ICSOC 2015)	Nov 16 – 19 2015	Discuss research challenges for IoT and service computing due to uncertainties

TUW	IEEE - Conference (Research)	Governing Elastic IoT Cloud Systems under Uncertainty	7th International Conference on Cloud Computing Technology and Science (CloudCom 2015),	30-Nov-15 3 Dec 2015	Present CPS uncertainties at the infrastructure and how to govern the infrastructure under uncertainties
TUW	Journal	SDG-Pro: a programming framework for software-defined IoT cloud gateways	Journal of Internet Services and Applications	August 2015	Present techniques to develop IoT units and gateways in/for CPS infrastructures and applications

Table 3: Academic dissemination events

Following publications were made within the scope of the U-Test during first year in project:

Hong-Linh Truong, Georgiana Copil, Schahram Dustdar, Duc-Hung Le, Daniel Moldovan, Stefan Nastic, **"iCOMOT – A Toolset for Managing IoT Cloud Systems"**, 16th IEEE International Conference on Mobile Data Management, 15-18 June, 2015, Pittsburg, USA.
pdf link: http://dsg.tuwien.ac.at/staff/truong/publications/2015/truong-mdm2015.pdf

Stefan Nastic, Georgiana Copil, **Hong-Linh Truong**, and Schahram Dustdar, **Governing Elastic IoT Cloud Systems under Uncertainty**, (c)IEEE "7th International Conference on Cloud Computing Technology and Science (CloudCom 2015), Vancouver, Canada, 30 November – 3 December, 2015 – pdf link: bit.ly/1MaP1LE

Zhang, Man, Shaukat Ali, Tao Yue, Dipesh Pradhan, Bran Selic, Oscar Okariz, and Roland Norgren. An Uncertainty Taxonomy to Support Model-Based Uncertainty Testing of Cyber-Physical Systems. Simula Research Laboratory, Technical Report 2015-3, 2015. Link: https://www.simula.no/file/u-modeltrfinalpdf/download

Shaukat Ali and Tao Yue, U-Test: Evolving, Modelling and Testing Realistic Uncertain Behaviours of Cyber-Physical Systems, Testing in Practise Track, 8th IEEE International Conference on Software Testing, Verification and Validation (ICST 2015), 2015. pdf
link: https://www.simula.no/file/preprintpdf/download?token=i3p2Axiq

4 References

DoA, Description of Action. Annex to Contract with the European Commission, number 645463 – Research and Innovation.