ERCIM "ALAIN BENSOUSSAN"
FELLOWSHIP PROGRAMME

ERCIM
European Research Consortium
for Informatics and Mathematics

Scientific Report

First name / Family name	Syed Muhammad Ali / Shah
Nationality	Pakistani
Name of the *Host Organisation*	SICS Swedish ICT AB
First Name / family name of the *Scientific Coordinator*	Jakob Axelsson
Period of the fellowship	01/09/2014 to 01/09/15

I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

During the fellowship, the fellow has worked on the scientific activities related to different areas of software engineering (software testing, agile software development, decision support systems and software engineering start-ups). At SICS-Swedish ICT AB, the fellow took part in three of main projects such as TOCSYC (testing of critical system characteristics), ORION (Decision-Support for Component-Based Software Engineering of Cyber-Physical Systems) and Agile Productivity Measures and Metrics.

II – PUBLICATION(S) DURING YOUR FELLOWSHIP

Title	Measuring productivity in agile software development process: a scoping study
Author	Syed Muhammad Ali Shah, Efi Papatheocharous, Jaana Nyfjord
Abstract	An agile software development process is often claimed to increase productivity. However, productivity measurement in agile software development is little researched. Measures are not explicitly defined nor commonly agreed upon. In this paper, we highlight the agile productivity measures reported in literature by means of a research method called scoping study. We were able to identify 12 papers reporting the productivity measures in agile software development processes. We found that finding, understanding and putting into use agile productivity definitions is not an easy task. From the perspective of common roles in agile software development process and existing knowledge workers' productivity dimensions, we also emphasize that none of the productivity measures satisfy these fully. We recommend that future

	effort should be focused on defining agile productivity in measurable, practicable and meaningful form.
Reference	Syed Muhammad Ali Shah, Efi Papatheocharous, and Jaana Nyfjord. 2015. Measuring productivity in agile software development process: a scoping study. In *Proceedings of the 2015 International Conference on Software and System Process* (ICSSP 2015). ACM, New York, NY, USA, 102-106. DOI=10.1145/2785592.2785618 http://doi.acm.org/10.1145/2785592.2785618
Status	Published

Title	Decision support for choosing architectural assets in the development of software-intensive systems: The GRADE taxonomy"
Author	Efi Papatheocharous, Kai Petersen, Antonio Cicchetti, Séverine Sentilles, Syed Muhammad Ali Shah, Tony Gorschek
Abstract	Engineering software-intensive systems is a complex process that typically involves making many critical decisions. A continuous challenge during system design, analysis and development is deciding on the reference architecture that could reduce risks and deliver the expected functionality and quality of a product or a service to its users. The lack of evidence in documenting strategies supporting decision-making in the selection of architectural assets in systems and software engineering creates an impediment in learning, improving and also reducing the risks involved. In order to fill this gap, ten experienced researchers in the field of decision support for the selection of architectural assets in engineering software-intensive systems conducted a workshop to reduce traceability of strategies and define a dedicated taxonomy. The result was the GRADE taxonomy, whose key elements can be used to support decision-making as exemplified through a real case instantiation for validation purposes. The overall aim is to support future work of researchers and practitioners in decision-making in the context of architectural assets in the development of software-intensive systems. The taxonomy may be used in three ways: (i) identify new opportunities in structuring decisions; (ii) support the review of alternatives and enable informed decisions; and (iii) evaluate decisions by describing in a retrospective fashion decisions, factors impacting the decision and the outcome.
Reference	Efi Papatheocharous, Kai Petersen, Antonio Cicchetti, Séverine Sentilles, Syed Muhammad Ali Shah, Tony Gorschek, "*Decision support for choosing architectural assets in the development of software-intensive systems: The GRADE taxonomy*", 1st International Workshop on Software Architecture Asset Decision-Making (SAADM) co-located with the 9th European Conference on Software Architecture (ECSA 2015) in Cavtat/Dubrovnik, Croatia, September 8, 2015
Status	Accepted, Presented

Title	Testability and Software Performance: A Systematic Literature Review
Author	Mohammad Mahdi Hassan, Wasif Afzal, Birgitta Lindstrom, Syed Muhammad Ali Shah, Sten F. Andler, Martin Blom
Abstract	Software testability refers to the characteristics of an artifact that impact ease to fulfill test objectives. In most of the research on software testability, functional correctness of the software has been the focus while the evidence regarding testability and non-functional properties such as performance is sporadic. The objective of this study is to present the current state-of-the-art related to issues of importance, types and domains of software under test, and software testability techniques in use concerning testability and software performance. We have conducted a systematic literature review (SLR) on the topic by following the recommended guidelines. We find that observability, controllability and testing effort are the main testability issues while timeliness and response time are the main performance issues in focus. The primary studies in the area use diverse types of software under test within different domains. Various testability techniques are applied in the context of software performance such as formal, architecture-based, design for testability and built-in test techniques. We conclude that time constraints (timeliness and response time) is the primary focus in terms of software performance which is also reflected in the use of real- time systems as being a dominant

	domain. However, the use of diverse testability techniques across a variety of domains and types of software suggest a potentially much wider applicability.
Reference	
Status	Under Review: APSEC 2015

III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

TOCSYC Industrial day and workshop- November 11-13,2014
SICS Open House Exhibition (Stockholm, SWEDEN) – March 19, 2015
ICSSP 2015 (http://www.icsp-conferences.org/icssp2015/index.html)

IV – RESEARCH EXCHANGE PROGRAMME (REP)

Dr Syed has spent a week (24 to 30 May, 2015) of his research exchange programme in Norwegian University of Science and Technology at Department of Computer and Information Science with Professor Pekka Abrahamson. The research exchange programme turned to be very productive, as Dr. Syed managed to create a network of Start-up research that has now seven different European partners mainly from (Sweden, Norway, Italy, Spain and Finland). Dr Syed is now leading that network on the topic of Software Start-up evolution and he is also very much involved in other activities of network.