ERCIM "Alain Bensoussan" Fellowship Scientific Report

Fellow: Inah Omoronyia
Visited Location : Norwegian University of Science and Tech., (NTNU)
Duration of Visit:12 months (6/01/09 – 06/01/10

I - Scientific activity

My 12 months at NTNU involved empirical research in the general area of requirements engineering and modelling under the supervision of Prof. Guttorm Sindre. My scope of work included requirements development and management. My research in requirements development is motivated by the basis that substantial amount of the documents available for requirements analysis are written in text. Text has the advantage of unconstrained expression. In the contrary, there is need for a common understanding of concepts used to express the requirements and relations between them. Lack of common understanding makes requirement specifications expressed as text, prone to ambiguous representations and inconsistencies. During my fellowship at NTNU, I investigated the template based textual requirements specification language as one way to bridge the gap between unconstrained expression and reducing ambiguities and inconsistencies, when representing requirements as free text.

My research on requirement management focused on traceability between different artefacts of a software development procès and their associated requirements. The core challenge of traceability is with non-trivial projects where traces have to be identified and recorded among numerous, heterogeneous entity instances (document, models, code,…). It is challenging to create meaningful relationships in such a complex context. Furthermore, traces are in a constant state of flux since they may change whenever requirements or other development artefacts change. I investigated an event-based approach to automatically harvest trace links. This approach is based on the navigation and influences of different entities on requirement artefacts across a collaboration space. One of the usefulness of this approach was the ease in identifying single point of failure and experience instances within requirements traceability networks.

I was specifically involved with the CESAR EU Project on cost-efficient methods and processes for safety relevant embedded systems. Within the context of CESAR, I was responsible for leading an investigation into a guided natural language and structured text requirements specification language suitable for safety critical systems.

Other core activities I was engaged in include:

(a) Capturing and representing domain knowledge useful for good quality requirements elicitation.
(b) Investigate automated requirements traceability approaches
(c) Ontology based goal oriented requirements engineering

II- Publication(s) during your fellowship

Please insert the title(s), author(s) and abstract(s) of the published paper(s). You may also mention the paper(s) which were prepared during your fellowship period and are under reviewing.

(1) **Working papers**

(a) Omoronyia, I., Sindre, G., Stålhane T., Biffl, B., Moser, T. and Sunindyo, W., A Domain Ontology Building Process for Guiding Requirements Elicitation. Submitted to the 16th International Working Conference on Requirements Engineering: Foundation for Software Quality.

(b) Omoronyia, I., Sindre, G., Biffl, B. and Stålhane T., Understanding requirements traceability networks, extended abstract submitted as a chapter to scientific book : software requirements and architectures. Editors: Paris Avgeriou, John Grundy, Jon G. Hall, Patricia Lago, and Ivan Mistrík, Publishers : Springer

(c) Omoronyia, I., Ferguson, J., Roper, M. and Wood, M.. A Review of Awareness in Distributed Collaborative Software Engineering. Submitted to *Software: Practice and Experience*.

(d) Omoronyia, I., Sindre G. and Stålhane T., Exploring a Bayesian and Linear approach to requirements traceability. Submitted to *Information and Software Technology*

(2) **Journal**

(a) Omoronyia, I., Ferguson, J., Roper, M. and Wood, M., *Sharing awareness during distributed collaborative software development*, Special Issue of Journal for Computer Supported Cooperative Work (JCSCW) on Software Development As Cooperative Work, Springer, October 2009.

(3) **Refereed conferences and workshops**

(a) Omoronyia, I., Sindre G. and Stålhane T., Uncovering information centres in requirements traceability networks. Proceedings 12th Australian Workshop on Requirements Engineering, Sydney, Australia, October 2009

(b) Omoronyia, I., Sindre G., Ferguson, J., Roper, M. and Wood, M., *Use case to source code traceability: The developer navigation view point*, Proceedings 17th IEEE International Requirements Engineering Conference, Georgia, USA, August 2009

III -Attended Seminars, Workshops, and Conferences

Please identify the name(s), date(s) and place(s) of the events in which you participated during your fellowship period.

1. 12th Australian Workshop on Requirements Engineering, Sydney, Australia, 2nd october 2009
2. 17th IEEE International Requirements Engineering Conference, Georgia, USA, 31 August - 4 September 2009

IV – Research Exchange Programme (12 month scheme)

Please identify the name(s), date(s) and place(s) of your Research Exchanges during your fellowship period and detail them.

(1) **Exchange visit** 15/12/2009 – 21/12/2009

Institute of Software Technology and Interactive Systems
Quality Software Engineering (QSE) Research
Vienna University of Technology, Austria

Core responsibilities:

(a) Understanding requirements traceability networks for non-trivial projects.
(b) Automated requirements traceability.
Advisor: Prof. Stefan Biffl

(2) **Exchange visit** 25/10/2009 – 31/10/2009

Requirements and Usability Engineering department
Fraunhofer Institute for Experimental Software Engineering
Fraunhofer-Platz 1, Germany

Core responsibilities:

(a) Investigate a requirements specification language and meta-model for enhancing requirement engineering.
(b) Ontology guided translation of informal/semi formal textual requirements to formal specifications.
Advisor: Joerg Doerr