

# ERCIM “Alain Bensoussan” Fellowship Scientific Report

Fellow: Kyriakos Kritikos  
Visited Location : CNR, Pisa, Italy  
Duration of Visit: 9 months

## **I - Scientific activity**

During his visit at the HIIS laboratory of ISTI-CNR, Kyriakos Kritikos collaborated with the laboratory's members, especially with Dr. Paternò, and conducted research that focused mainly on the design of interactive applications based on services. To this end, Dr. Kritikos explored the area of interactive application design through the studying of research papers under the guidance of Dr. Paternò and the participation in informative discussions with the laboratory's members. Based on this research, Dr. Kritikos and Dr. Paternò have proposed a novel design process of interactive applications that takes into account both the UI and functionality aspects and the implications that these aspects have on each other. Moreover, they have realized the functional part of the design process by proposing a novel model-driven approach (MDA) that is able to produce a concrete service model from an HCI task model, modelling the user's view of the interactive application, and a domain ontology capturing the application domain's main entities and their relationships. The concrete service model produced from this approach describes the way existing services can be combined in order to realize the functionality of the interactive application. The results of this research have already been published in the AVI 2010 and EICS 2010 conferences.

Moreover, Dr. Kritikos and Dr. Paternò extended their approach to better support interactive application designers by organizing the knowledge of system tasks (i.e. which system functionality has been realized by which services) and the way the task information is mapped to domain ontology entities, so as to optimize the time needed for discovering services related to a particular task and the accuracy of the service discovery results produced, and by being able to produce robust service models in which the services are combined in such a way that their composition is guaranteed to bring the appropriate desired results. Their work was submitted in the journal of the ACM Transactions on the Web and is currently under review.

Apart from the above mentioned work, Dr. Kritikos was involved in the ServFace European project, where he participated in tele-conferences and in the revision of some project deliverables.

Currently, Dr. Kritikos and Dr. Paternò are integrating the system implementing their work in an existing Service Front-End Environment called MARIAE that has been developed by Dr. Paternò's laboratory. In addition, they plan to continue their cooperation by working on automatically producing task models for interactive applications by exploiting the history of the users interaction with these applications, common sense knowledge in the form of common user goals, and automated goal planning approaches. Finally, their cooperation will also be continued through the preparation and submission of common research proposals for 7th European Research Programme.

## **II- Publication(s) during your fellowship**

Kyriakos Kritikos and Fabio Paternò, “Task-Driven Service Discovery and Selection”, in *AVI 2010: 9<sup>th</sup> International Working Conference on Advanced Visual Interfaces*. Rome, Italy: ACM-SIGCHI, May 25-29, 2010.

*Abstract:* Services are becoming more and more widely used. When designing interactive applications based on services one important issue is how to identify those services most relevant for the application functionalities. The proposed approach takes as input a task model, which includes the user's view of the interactive system, and an ontology capturing the application domain, and automatically discovers a set of ordered service descriptions for each system task of the model. The discovered descriptions can be used in order to invoke a particular service operation that fulfils a task's required functionality. In this way, the whole application functionality can be realized by a set of service operations without writing a single line of code. As a result, the application development time is significantly reduced and it is possible to complete the development of interactive front-ends by integrating our solution in existing model-based HCI approaches.

Kyriakos Kritikos and Fabio Paternò, “Service Discovery Supported by Task Models”, in *EICS 2010: ACM SIGCHI Symposium on Engineering Interactive Computing Systems*. Berlin, Germany: ACM-SIGCHI, June 19-23, 2010.

*Abstract:* We propose an approach that takes as input a task model, which includes the user's view of the interactive system, and automatically discovers a set of categorized and ranked service descriptions for each system task of the model. In this way, a set of service operations can be used to implement an application's part or whole functionality so that its development time is significantly reduced.

Kyriakos Kritikos, Fabio Paternò, and Dimitris Plexousakis. Exploiting Task and Domain Knowledge in the Service Discovery Process. *ACM Transactions on the Web*, 2010 (under review).

## **III -Attended Seminars, Workshops, and Conferences**

Giornate dell' ISTI (Seminar on the research work conducted by the ISTI's research laboratories), 1-2/12/2009, CNR, Pisa, Italy

Seminar on *Selecting a Language for Dynamically Adaptable Services in Embedded Systems*, 05/02/2010, ISTI-CNR, Pisa, Italy

Seminar on *Unsupervised and Semi-Supervised Image Clustering by Multi-resolution Probabilistic Learning*, 16/02/2010, ISTI-CNR, Pisa, Italy

S-Cube Workshop on *Data and Process Mining*, 04/03/2010, CNR, Pisa, Italy

AVI 2010 Conference, 25-29/05/2010, Sapienza Università di Roma, Rome, Italy