



ABCDE



## Scientific Report

First name / Family name

Liudmila Rozanova

Nationality

Russia

Name of the *Host Organisation*

CNR – Istituto di Informatica e  
Telematica, Pisa, Italy

First Name / family name  
of the *Scientific Coordinator*

Marco Conti

Period of the fellowship

01/12/2011 to 30/11/2012



## I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

During my research grant period I have been working at the research group of Professor Marco Conti on the “Recognition” research project that brings together several European institutes to develop a new approach for embedding self-awareness in ICT systems. This approach is based on designing functional models of the core cognitive processes that allow humans to assert relevance and create knowledge from information. These models will be translated to the ICT domain by development of embeddable algorithms, forming a flexible basis for self-awareness.

My participation in the project consisted of determination and mathematical formalization of psychological models describing human cognitive behaviour that can be embedded in information and communication technology.

To achieve these goals, I have been working on following tasks:

- selection and formalization of psychological models, describing human cognitive behaviour as the basis for underlying mathematical model;
- designing new algorithms of data dissemination in opportunistic networks;
- developing mathematical models describing data transmission in mobile networks;
- verification of algorithms and models by testing and computer simulation.

I have been developing a semantic data dissemination algorithm in opportunistic networks based using the merging process of semantic networks, which act as a flexible filter to sort and analyse information transferred.

In this algorithm the semantic information associated with data items could be a powerful tool in a data dissemination scheme in order to assert the relevance and relationship of already owned information and a newly discovered knowledge.

Within this framework, I managed to apply epidemic models, comparing data dissemination with disease spreading. I built a data dissemination



model using differential equations from epidemic models and theory of scale-free networks.

Future research directions encompass the definition of an even more formal mathematical description of this solution, a more insightful study via simulation of the performances and properties of the algorithm and its application to different scenarios, where other factors, like social relationships among users, should be taken into account.

## II – PUBLICATION(S) DURING YOUR FELLOWSHIP

M. Conti, M. Mordacchini, A. Passarella, L. Rozanova A SEMANTIC-BASED ALGORITHM FOR DATA DISSEMINATION IN OPPORTUNISTIC NETWORKS submitted for publication to *7th International Workshop on Self-Organizing Systems Palma de Mallorca, 9-10th of May, 2013.*

Abstract.

The opportunistic data dissemination problem for mobile devices is an open topic that have attracted many investigations so far. Anyway, at the best of our knowledge, none of these approaches takes into account the semantic side of the data shared in an opportunistic network. In this paper, we present an algorithm that, starting from the semantic data annotation given by the users themselves, builds a semantic network representation of the information. Exploiting this description, we detail how two different semantic networks can interact upon contact, in order to spread and receive useful information. In order to provide a performance evaluation of such a solution, we show a preliminary set of results obtained in a simulated scenario.

## III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

I presented results of my work on the following research seminars:

- 8<sup>th</sup> of February, 2012, Recognition project meetings, IIT-CNR, Pisa, Italy;
- 25<sup>th</sup> of October, 2012, ERCIM Scientific Symposium, INRIA, Sophia-



Antipolis, France;

- 30<sup>th</sup> of October, 2012, Computer Science Department, University of Neuchâtel, Neuchâtel, Switzerland;
- 5<sup>th</sup> of November, 2012, ARLES Research group, INRIA- Rocquencourt, Paris, France.

#### **IV – RESEARCH EXCHANGE PROGRAMME (REP)**

For my first research visit under REP programme, I have chosen University of Geneva, the Centre Universitaire d'Informatique. I visited in the research group Prof. Giovanna di Marzo from 21<sup>th</sup> of May to 1<sup>th</sup> of June, 2012.

Together with the members of this team we worked on my research topics and exchanged ideas and results in the common research areas.

My second research visit took place from 29<sup>th</sup> of October to 4<sup>th</sup> of November, 2012 at University of Neuchâtel, Computer science department to the research group of Prof. Pascal Felber.

I have presented my research to department members and collaborated with researchers who were working in the area of data dissemination in wireless networks. Together we discussed our common interests and further research activities.