

SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA15210 (European Network for Collaboration on Kidney Exchange Programmes)

STSM title: Research visit to Corvinus University and Hungarian Academy of Sciences

STSM start and end date: 2019-03-25 to 2019-03-31

Grantee name: Alexandru Popa

PURPOSE OF THE STSM:

As described in the research plan, from the Romanian side the visit involved myself as Associate Professor in the Computer Science Department at the University of Bucharest. Péter Biró was our host, and we had discussions also with his colleagues at the Hungarian Academy of Science and Corvinus University. The *main goal* of the visit was to submit to the Central European Journal of Operations Research a paper that we started during our previous STSMs.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMs

We achieved our proposed goal and we finalized the paper that we had in progress. The paper is entitled "IP Solutions for International Kidney Exchange Programmes" and was submitted to a special issue of the Central European Journal of Operations Research. A shorter version of the paper was presented to an OR conference VOCAL 2018.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

We formulated basic and advanced IP-s for the international kidney exchange problem, where countries can have different constraints and goals. In this STSM we formulated two types of IPs, for the simulations. Furthermore, we discussed the plan for extensive simulations. We conducted some initial tests using a kidney exchange simulation for a simple three-country setting and we also specified the settings that we will study in further simulations.

When studying the benefits of the countries in a cooperation we check the realistic cases when the upper bounds on the length of the exchanges cycles are different in the countries (e.g. 2 in France, 3 in Spain, or 3 in the UK and 4 in the Netherlands). We also study the case when one country (e.g. Spain) has altruistic donors and the other (e.g. France) do not. Finally, we study the robustness of these results when the sizes or the compositions of the pools are different in the cooperating countries.

This research topic is directly related to the goal of WG3, in particular to the two goals described in the COST Action proposal: “(ii) propose generic mathematical models for transnational markets; and (iii) propose methodologies to tackle the optimisation problem.”. Our results may well also have practical relevance when solving the international KEPs that are being created across Europe and in our region in particular.

FUTURE COLLABORATIONS (if applicable)

Since our collaboration, that started with an STSM in March 2018, is extremely fruitful we plan to continue to work on this topic. We plan to investigate the kidney exchange problem when the objective is the transplant quality. More specifically, we want to understand the connection between the number of transplants when we want to maximize the expected survival time.