

SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

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

Action number: CA15210

STSM title: Stable-matching IP models and recourse in KEPs.

STSM start and end date: 9/12/2018 to 14/12/2018

Grantee name: Ana Viana

PURPOSE OF THE STSM:

This STSM is twofold:

- to discuss Integer Programmes to find stable exchanges in the kidney exchange problem. Work within this line started after the visit of Dr. Péter Biró to INESC TEC, Porto, in 2017. Preliminary results have been presented in one conference. It is now necessary to validate the models discussed and extend them to the case of ties (in the ranking score).
- to discuss models that consider possible of failure of planned transplants. Research in this line can be particularly important for establishing transnational collaboration, where we believe the addressing of failures is of crucial importance. It is more critical to have the least possible failures in cycles and chains with pairs from different countries, in order not to jeopardize collaboration between different countries. This line is related to recourse policies adopted in some countries like UK, Spain, and Czech Republic.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMs

During this visit we had the opportunity of discussing three new IP formulations developed by the team in INESC TEC and Dr. Biró. The formulations, that provide maximal stable and strongly stable matches on the number of transplants, were extended during the visit to consider the possibility ties. Although none of these formulations is compact, the team discussed some possibilities for obtaining such type of formulation. This topic was concluded by defining the structure of a paper to be submitted to a scientific journal.

We also discussed new ways of addressing failure in KEP's upon a presentation of a student of Dr. Biró on the subject, and the possibility of collaborating in this area. Joint management of the KEP with the deceased donors waiting list was also discussed.

Finally, the grantee gave a plenary talk on KEP ("Optimization challenges in Kidney Exchange Programs: past, present and future") at the VOCAL Optimization Conference (<http://vocal.p-graph.org/>) in Esztergom.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

I would select the following topics as main results of this visit:

1. Closure on IP formulations for finding maximal stable matches in a KEP, considering both strict preferences and ties;
2. Definition of a clear plan on the computational analysis to perform in order to validate the formulations and assess their efficiency;
3. Discussion of potential research collaboration on addressing failure in KEPs.

FUTURE COLLABORATIONS (if applicable)

It is expected that Márton Gyetvai, PhD student at Corvinus University, visits INESC TEC for a period still to be defined, for joint research on the topic of this Action.