

Report on the outcomes of a Short-Term Scientific Mission¹

Action number: **CA16228**

Grantee name: **Maria Polukarov**

Details of the STSM

Title: **Strategic voting in multi-winner elections**

Start and end date: 11/01/ 2022 to 1/02/2022

Description of the work carried out during the STSM

Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section.

(max. 500 words)

As outlined in our STSM grant application and in agreement with our working plan, in this mission we have set an agenda for long-term research of strategic considerations in the context of multi-winner elections and made several steps towards its implementation.

Specifically, we identify approaches to extend the paradigm of iterative voting to these scenarios and to analyse the stability and quality of outcomes in this context. The work in this direction breaks down into 4 blocks, that correspond to the following research questions: (1) what is a strategic move in the multi-winner election context under a specific rule? (2) does a sequence of strategic moves converge to a stable outcome – i.e., iterative voting equilibrium – under a specific rule? (3) what is the quality of the outcome of a convergent voting dynamic? (4) for divergent dynamics, what heuristics (i.e., restrictions on voting strategic behaviour) would lead to stable outcomes? For some common multi-winner rules, we have obtained the answers to (1) and partial answers to (2), while (3) and (4) will be tackled at later stages.

In addition, we've done work towards introducing strategic considerations into elections with primaries. In this context, to the best of our knowledge, strategic voting behaviour has not previously been explored even for single-winner elections. To this end, we define models and analytical frameworks for the study of two-stage voting games (termed voting games with primaries) where

¹ This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

each stage corresponds to either a single- or multi-winner election and consider their equilibrium states. Importantly, the iterative voting paradigm can also be embedded into these settings. Furthermore, we also extend the analysis of distortion in elections with primaries to the multi-winner case.

Finally, we consider a related (but more general) setting, termed team games, in which several populations of agents each need to form a team that will then compete with teams from other populations. The team formation can be approached from the multi-winner voting or, alternatively, cooperative games perspective, while team interaction, in turn, can be modelled as a single-winner election or a non-cooperative game. Such scenarios are common to a wide range of application domains, with elections with primaries being a special case. Other examples include start-ups, research grants, sports competitions and others.

Description of the STSM main achievements and planned follow-up activities

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

(max. 500 words)

As mentioned above, this mission has set the agenda for long-term research in three interrelated directions of (1) multi-winner iterative voting, (2) voting games with primaries and (3) team games. We have also identified a few models and analytical frameworks towards implementing this agenda. We believe that this work will result in a number of student projects (both in the host and the grantee's home institutions) and scientific papers. One student project on team games is already on the way, and we are planning on publishing at least two papers within this agenda.