Activity Report for PADECOT–5 Months

I. WP1: Coordination and initialization of the project

A. Task 1.1: Researchers information on the state-of-the art in traffic modeling and control, by group meetings and discussions with researcher from the hosting group and individual reading.

The researcher performed several activities in order to be up-to-date with the traffic control and modeling developments. Moreover, several "transfer of knowledge to the researcher" activities were performed. Specific activities include (see also Section III):

1) Participation to the group meetings of the hosting lab, which are held once per month and attendance of presentations.
2) Individual meetings or email communications with the researchers (including visiting researchers) of the hosting group at least once per week. Note that the discussions are not concentrated only to the research topic but also to administrative issues, project management, funds management, field tests, proposal writing, and progress reporting.
3) Read several articles every week on control of PDE systems and control of traffic flow. In particular, on the relative literature on traffic flow control employing PDE models, such as the Aw-Rascle-Zhang and the Moskowitz/Conservation Law models.
4) Participation to conferences (and presentations attendance), which are related both to control and traffic.
5) Meetings with researchers (including researchers from traffic authorities) outside the hosting group (in conferences, meetings, and teleconferences as well as via email communications).
6) Handling submitted papers on traffic control in a SI in TR-C, in which the researcher is a guest editor.
7) Organization and participation to social hour events, in which the hosting group members participate.
8) Performing papers reviews.
9) Attendance of relevant webinars.
10) Organize visits of researchers outside the host institution to deliver a seminar in the host institution.
11) The researcher actively participate in the funds management of the project (see also Section III for specific events organization and participation).
12) The researcher collaborates with researchers from the hosting group on the project's research topic (see Section I-C and Section IV for collaborators and submitted papers, respectively).
13) The researcher meets several researchers (in conferences and meetings) and obtains knowledge not only on the research topic, but also for proposal writing and grant applications (e.g., via meetings with ERC Starting Grant panel members and awardees) as well as on events organization (e.g., workshop organization within a conference).
14) Meet researchers outside the field that is related to the project's topic in order to define new research directions and to search for new practical applications.

B. Task 1.2: Information of the hosting group on the researchers methods on control of systems modeled by Partial Differential Equations (PDEs), the goals of the project, the methodology that will be employed, and the relevant background, via meetings and presentations to the group.

The researcher performed several activities in order to transfer knowledge to the hosting group. Specific activities include (see also Section III):

1) Participation to the group meetings of the hosting lab, which are held once per month and deliver presentations.

2) Individual meetings or email communication with the researchers (including visiting researchers and undergraduate students) of the hosting group at least once per week. Discussions concentrate more on the research topic and the potentials of collaboration.
3) Participation to conferences (and deliver presentations), which are related to traffic control.
4) Meetings with researchers (including researchers from traffic authorities) outside the hosting group (in conferences, meetings, and teleconferences as well as via email communications).
5) Organization and participation to social hour events, in which the hosting group members participate.
6) Discuss with researchers outside the host institution via organizing visits of researchers to deliver a seminar in the host institution.
7) Deliver guest lectures on control systems in undergraduate classes.
8) Actively email the mailing list of the hosting group for events, jobs, newsletters, conferences and workshops, MSCA, research results, and publications.
9) Deliver seminars in the hosting institution.
10) The researcher collaborates with researchers from the hosting group on the project's research topic (see Section I-C and Section IV for collaborators and submitted papers).

C. Task 1.3: Identification of PhD students and postdocs that fit best the project and will primarily work on it.

The researcher had several meetings and discussions in identifying potential PhD, postdocs, MS, and undergraduate collaborators within the hosting group for the project's research topic. Unfortunately, by the onset of WP2, the potential collaborators have either already graduated or left the hosting group (e.g., because of finding a job) or committed to work on different projects (not related to PADECOT).

Yet, there are researchers from the hosting group as well as researchers (including postdoctoral researchers as well as graduate and undergraduate students) from other universities (e.g., previous collaborators of the researcher or new collaborators with whose the researcher connected via a conference or a meeting participation) with whose the researcher collaborates (or mentors, in case of graduate or undergraduate students) on the project's research topic.

1) The supervisor Prof. Markos Papageorgiou (see Section IV for details on the submitted papers so far).
2) Prof. Iasson Karafyllis from National Technical University of Athens and collaborator of the hosting group (see Section IV for details on the submitted papers so far).
3) Prof. Claudio Roncoli from Aalto University and previous member of the hosting group (see Section IV for details on the submitted papers so far).
4) Postdoctoral researcher Pierre-Olivier Lamare from Inria, Sophia-Antipolis, France (for the control of the Aw-Rascle-Zhang model for WP3, WP4, and WP5).
5) Postdoctoral researcher Shuxia Tang from University of Waterloo, Canada (for the control of the Moskowitz model in WP2, WP4, and WP5).
6) Undergraduate student Konstantinos Skyvalakis, member of the hosting group (for the numerical implementation and testing, included in WP5, of the control algorithms in WP2, WP3 as well as on the theoretical developments of WP2–WP4).
7) Prof. Anargiros Delis from the hosting institution, collaborator of the hosting group (for the numerical implementation and testing of control algorithms within WP5).
8) Prof. Eduardo Montijano from the University of Zaragoza (for WP2 and WP5). He also may identify an undergraduate student to work on WP5.
9) Prof. Miroslav Krstic from the University of California, San Diego (see Section IV for details on the submitted papers so far). Also, there is the possibility of mentoring some of his students for WP2–WP5.
10) MS student Sofia Papadopoulou, member of the hosting group (for WP5).
11) Prof. Xiushan Cai from Zhejiang Normal University, China (for WP2 and WP4).

II. WP6: Communication, dissemination, and exploitation

A. Task 6.1: The dissemination plan includes, among others, paper publications, conference/seminar presentations, workshop/symposium organization, and webpage creation

Several dissemination activities are performed by the researcher, in particular:

1) Webpage creation (see here) with regular updates.
2) Invited seminar presentations (see, for instance, here and see also Section III).
3) Conference talks (see Section III).
4) Papers submission (see Section IV).
5) Participation to conferences, workshops, and meetings (see Section III).

B. Task 6.2: The exploitation plan includes, among other things, definition of new research directions, industry application, proposal writing, and advertisement of the results

The researcher advertised the results via:

1) Newspaper interview (see here and Section III).
2) Newsletter announcement (see here and Section III).

The researcher has already started applying the exploitation plan via:

1) Meeting ERC Starting Grant panel members and awardees in order to obtain knowledge on the ERC Starting Grant proposal preparation and application.
2) Meet researchers and obtain knowledge on other funding sources and proposal applications (e.g., from other Curie actions and Greek government funding schemes).
3) Meet researchers outside the field that is related to the project's topic in order to define new research directions and to search for new practical applications of the researcher's methods, relevant to traffic (e.g., researchers working on production systems in pharmaceutical companies).

C. Task 6.3: The communication and public engagement plans include video creation and dissemination, newspaper/radio interviews, as well as specific outreach activities

The researcher involved in several activities:

1) Newspaper interview (see here and Section III).
2) Newsletter announcement (see here and Section III).
3) Outreach activities for public engagement (see Section III).
4) Participation to conferences, workshops, and meetings (see Section III).

III. Specific Events

1) Dr. Bekiaris-Liberis organized and participated to a social hour for the members of the hosting group on 30/05/2017.
2) Dr. Bekiaris-Liberis interviewed by Dr. Georgia Sermamoglou-Soulmaidi on 26/04/2017 at 7pm. Among other things, in the interview, the significance of the EU's funding programmes for the reintegration of Greek scientists, currently residing abroad, was highlighted and justified. The interview will appear in the Athens Magazine.
3) Interview of Dr. Bekiaris-Liberis by the local newspaper "HANIOTIKA NEA" on May 13, 2017 (see here).
4) Announcement about PADECOT in the Information Bulletin (No. 201, March-April-May 2017) of the Union of Greek Transportation Engineers (see here).
5) 13/06/2017: Dr. Bekiaris-Liberis delivers a presentation on "Highway traffic state estimation in the presence of connected vehicles," to Matthew Hall, Technical leader in the field of traffic engineering at VicRoads, the state traffic authority of Victoria, Australia.

6) Dr. Bekiaris-Liberis delivered a seminar on "Partial differential equation model-based control of traffic flow," at the Dynamic Systems & Simulation Laboratory, Department of Production Engineering & Management, Technical University of Crete, Greece, on May 30, 2017.
7) Dr. Bekiaris-Liberis delivered a seminar on "Control of transport PDE-ODE cascades," in the department of Electrical & Computer Engineering, Technical University of Crete, Greece on June 20, 2017 (see here).
8) Dr. Bekiaris-Liberis participated in the IFAC World Congress, in Toulouse, France, on July 10–14, 2017.
9) Dr. Bekiaris-Liberis delivered a seminar on "Control of transport PDE-ODE cascades," in the department of Computer Science, University of Zaragoza, Spain, on July 17, 2017.
10) Prof. Kyriakos Vamvoudakis, department of Aerospace & Ocean Engineering, Virginia Tech, delivered a seminar on "Data-Driven and Resilient Algorithms for Autonomous Cyber-Physical-Systems," at Technical University of Crete, Greece on July 25, 2017 (see here).
11) Dr. Bekiaris-Liberis participated and delivered a talk on "Traffic state estimation per lane in highways with connected vehicles" in the 2017 Meeting of the EURO Working Group in Transportation, in Budapest, Hungary, on September 04–06, 2017.
12) Dr. Bekiaris-Liberis participated and delivered the poster presentation "PADECOT: Marie Sklodowska-Curie Individual Fellowship Grant" in the 2017 European Researcher's Night, in Heraklion/Crete, Greece on September 29, 2017.

IV. Submitted Papers

1) N. Bekiaris-Liberis and M. Krstic, "Compensation of actuator dynamics governed by quasilinear hyperbolic PDEs," *Automatica*, under review, 2017.
2) I. Karafyllis, N. Bekiaris-Liberis, and M. Papageorgiou, "Analysis and control of a non-standard hyperbolic PDE traffic flow model," *Mathematical Control and Related Fields*, under review, 2017.
3) N. Bekiaris-Liberis, C. Roncoli, and M. Papageorgiou, "Highway traffic state estimation per lane in the presence of connected vehicles," *Transportation Research Part B*, under review, 2017.
4) N. Bekiaris-Liberis and M. Krstic, "Compensation of transport actuator dynamics with input-dependent moving controlled boundary," *IEEE Transactions on Automatic Control*, under review, 2017.