Abstract Template ESCC 2020

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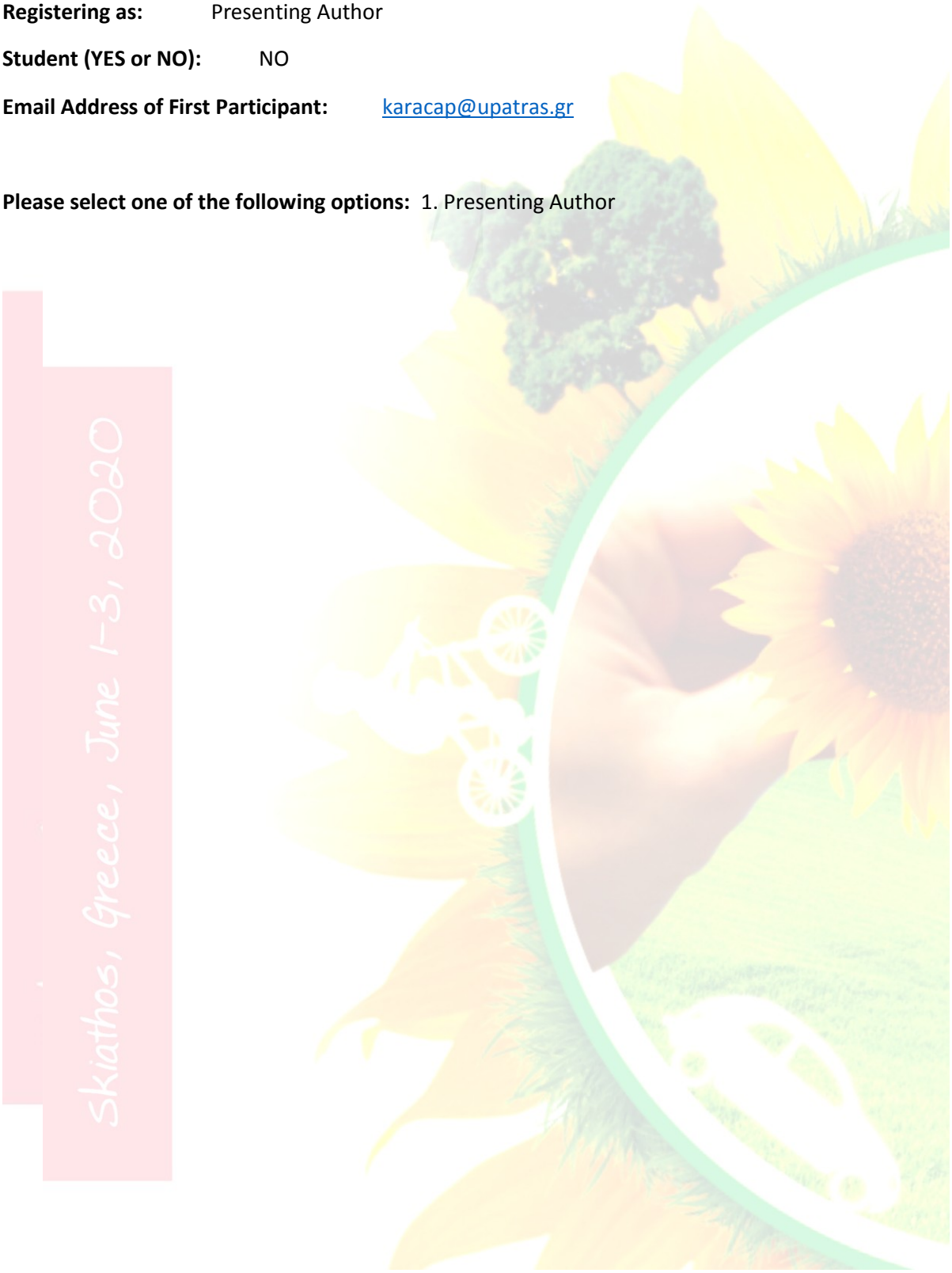

Presentation Title: A novel approach for handling diverse energy consumption issues in large passenger and cruise ships

Keywords: Energy management, agent-based simulation, machine learning, decision making, visualization.

Abstract (min 300 words – max 500 words)

This paper reports on the development of an innovative approach for handling diverse energy consumption and energy saving issues in large passenger and cruise ships. The proposed approach builds on an agent-based simulation model, which takes into account the size, characteristics (e.g. age, special needs etc.) and behavior of the different categories of passengers onboard, as well as the types of all energy consuming facilities and devices of a ship. In addition, the simulation model exploits spatial data corresponding to a detailed layout of the decks of a specific ship, thus offering customized visualizations. The model also caters for alternative ship operation modes, corresponding to cases where the ship cruises during the day or night, or is stopped at a port.

A novelty of our approach concerns the exploitation of the outputs obtained by carrying out multiple simulation runs by prominent Machine Learning algorithms to extract meaningful patterns between the composition of passengers and the corresponding energy demands in a ship. In this way, our approach is able to predict alternative energy consumption scenarios and trigger insights concerning the overall reduction of energy consumption in a ship. In addition, it handles the underlying uncertainty and offers highly informative visualizations of the energy consumption. The proposed agent-based simulation model has been implemented with the use of the AnyLogic simulation software (https://www.anylogic.com/).

The work described in this paper is carried out in the context of the ECLiPSe project, which aims at leveraging existing technological solutions to develop an integrated energy consumption and energy saving management system for the needs of large passenger and cruise ships. A major task of the project concerns the development of sophisticated algorithms for the analysis and synthesis of the associated multifaceted data, which may considerably enhance the quality of the related decision making issues during the operation of a vessel.

Select one of the following Topics: 3. Decision Making