Title of the PhD Project	Chrono-urbanism: how effective land use models helps to improve ecosystem services
Acronym	Chrono-system
Research Fields of the Project	Ecosystem Management, Spatial Planning, Urban Design
Keywords	Land modelling, artificial intelligence, decision support
Host Institution, Department and Campus Location	Izmir Institute of Technology Department of City and Regional Planning Gülbahçe Campus, İzmir, Türkiye
PhD Awarding Institution and Graduate Programme	Izmir Institute of Technology Graduate School PhD in City and Regional Planning
Name and Affiliation of Main Supervisor	Prof. Dr. Koray VELİBEYOĞLU Izmir Institute of Technology Department of City and Regional Planning
Name and Affiliation of Co-Supervisors	Assist. Prof. Dr. Nicel SAYGIN, Izmir Institute of Technology
Research Environment and Infrastructure	The selected candidate will have access to the research infrastructure available at Izmir Institute of Technology.

Scientific Context of the Project	Space-time relations has changed the conception of urban land use modelling due to the impact of globalization and changing lifestyle of urban residents. Therefore, easy access to basic urban utilities has enormous effects on the quality of life. Most of the land use models assumes human centered and economic rational as given. Similarly, ecosystem-based models calculate the human impacts on natural environment. Then, both models can be considered as 'anthropocentric'. However, from the view of none-human agents the known models cannot focused on the chrono-urbanistic thinking. This research will firstly review the chrono-urbanistic thinking and combine with existing land-use models. Secondly, the research will examine the possible use of artificial intelligence multi-agent systems to explore the space-time relations of natural ecosystems. Thirdly, nature-centric models will be searched regarding optimisation of ecosystem services. The results of this exploratory study try to shed light on the evaluation of ecosystem services in the frame of nature-centric chrono-urbanistic model.
Brief Workplan	The main aim of the research is to modelling ecosystems services by using chrono-urbanistic thinking that recently flourished in urban planning and design. To this end, real time monitoring by using AI-assisted multi-agent models is important. To overcome the problems in natural environment can be assessed by using new conception of space-time matrix and novel agile decision-making procedures responsively. A tentative work plan is given as follows: 1. Conceptualizing the changing space-time considerations in land use modelling 2. Incorporating AI tools into the multi-agent model 3. Detection and sensing technologies for land management 4. Model testing od chrono-urbanistic land use management for ecosystem services
Innovative Aspects of the Project	AI tools, real-time data processing and management, land use models and decision-making framework
Training Opportunities of the Project	The doctoral candidate will have a chance for training on subjects such as data management, AI urbanism, ecosystem services, decision making tools in renown government and private organizations as well as academic institutions. The training

	program will be custom designed for the selected candidate according to his/her needs and interests.
Interdisciplinary Aspects	This research involves topics on ecosystem planning, computer science, administrative sciences.
Intersectoral Mobility ☒ **Short Visit** ☐ **Secondment**	Ministry of Urbanization of Environment, General Directorate of GIS
Intersectoral Mobility ☒ **Short Visit** ☐ **Secondment**	Izmir Development Agency (green growth department)
International Academic Secondment	TU Delft

Main Supervisor

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