ImAFUSA Framework – An Innovative Air Mobility (IAM) Impact and Capacity Assessment Framework and Toolset

Margarida Santos [(1)] - Sofia Kalakou [(1)] - Fernando Ferreira [(1)] - Sotirios Xydis [(2)] - Anna Palaiologk [(3)] - Raffaello Mariani [(4)] - Antonio Torija Martinez [(5)] - Irene Dedoussi [(6)] - Panagiotis Eleftherakis [(2)] - George Anagnostopoulos [(2)]

[(1)] Bru-iscte, Lisbon, Portugal - [(2)] Iccs, Athens, Greece - [(3)] Future Needs, Nicosia, Cyprus - [(4)] Kth, Stockholm, Sweden - [(5)] Usal, Salford, United Kingdom - [(6)] Tu Delft, Delft, Netherlands

Keywords: ImAFUSA Framework; Innovative Air Mobility (IAM); Social Acceptance; Urban Mobility.

Abstract The populational growth and consequent expansion of urbanization represent an increased pressure on urban transportation systems. Therefore, current mobility systems face several constraints arising from these phenomena, such as traffic congestion, environmental pressures and, overall, an intensified demand for mobility. In this context, Innovative Air Mobility (IAM) has the potential to offer solutions to cope with these challenges, being a feasible and environmentally friendly option to complement the existing transportation modes in urban areas. Notwithstanding, social acceptance is a key aspect to take into consideration since public trust and support (or their absence) will transversally impact the integration of these services into urban mobility. Moreover, while IAM technologies and technical aspects have been regularly addressed, the societal aspects, which are going to ensure the viability of the ecosystem, are still lacking to be properly developed. In addition, coordinating IAM services with existing mobility planning activities is vital for their successful employment. To this end, it is required to implement planning frameworks and tools to manage air and ground activities. Nevertheless, current frameworks have proven to be insufficient to address these aspects broadly and in-depth, which raises the necessity for the conception of an integrated framework that adds new dimensions and offers more comprehensive insights concerning these novel types of services. In this context, the ImAFUSA Framework was developed. This is an IAM impact and capacity assessment framework and toolset for enhanced trade-off between airspace capacity levels of IAM and social acceptance, which will support local authorities and other IAM stakeholders with smart and sustainable planning, and decision-making processes to guarantee beneficial and socially acceptable IAM deployment. More specifically, the framework focuses on the socio-economic, environmental, perceived safety, security and spatial impacts of IAM, simplifies the identification of IAM services that are socially acceptable and facilitates the determination of the airspace capacity for IAM operations, both inside and outside U-space. In turn, the toolset can support the development of socially acceptable applications in U-space (air and ground integration), providing eight validated tools that quantify visual pollution, noise, perceived safety, citizen acceptance, affordability, welfare, accessibility and trade-off between U-space capacity and impacts through simulations, and two tools that quantify citizens' willingness to pay, air quality impacts, and impact trade-off with simulations. Overall, this toolset aids local authorities and other policymakers to assess the impacts of IAM before its implementation inside or outside U-space

and to monitor these impacts.