Research title:

Law and Ethics by Design in the Vision of the Zero Transportation Externalities

Primary Investigator:

Name: **Prof. Tal Zarsky**

Faculty: **Faculty of Law**

Academic Institute: **University of Haifa**

This project strived to unravel and explore the values, interests and regulatory measures in the area of smart transportation. Striking a delicate balance between potentially conflicting interests must be accomplished through both legal and ethical lenses, which will be translated into a practical method that the numerous players participating in the smart transportation ecosystem should apply. We started the research project with the idea that there is an optimal point of balance based on the balancing framework of the "three zeros" (zero casualties, zero delays, and zero environmental harm) that must be sought (and thus, at least theoretically, exists). We focused on several stages of product development in the realm of smart transportation to put our hypotheses and notions to the test.

During our research, we uncovered additional initial challenges, such as developing a common vocabulary among legal professionals, engineers, and ethicists. In addition, we acknowledged the need to identify the selected values that should be the keystone for decision makers and engineers. As part of the research project, we investigated the interaction between ethics and regulation in the field of smart transportation at various stages of the product development process (as viewed through the engineering profession). Furthermore, in this study we focused on ranking values in the field, particularly in land transportation. We also included maritime and air transport in our research, though not to the same extent, and future research in this area must and would be expanded. The research team included participants from a variety of different fields of research, and featured the following practitioners, academics, and former regulators

Prof. Tal Zarsky (team leader), Prof. Yoram Shiftan (joint team leader), Prof. Amnon Reichman, Dr. Nathan Pinhas, Dr. Gila Albert, Dr. Sharon Cop, Dr. Baruch Karp, Dr. Dalit Ken-Dror Feldman, Dr. Karni Chagal Feferkorn, Dr. Baruch Karp, Mr. Yigal Maor, Mr. Shlomo Breiman, Adv. Amit Ashkenazi and Ms. Shirley Raz Raban. The team's great diversity led to a fruitful dialogue between different fields of research, and even demonstrated the difficulties in combining the fields – for example, by illustrating the lack of uniformity of language and terms.

The overall project was made up of a cluster of studies, participants of which collaborated to develop the framework for achieving the research outputs and goals in light of the "three zeros." We explored whether and how ethical and legal requirements are now being combined in the field of smart mobility in infrastructure projects during the "requirements and definitions" phase. For example, the need to define terms, such as distinguishing between autonomous and automated vehicles, became clear early on. We also examined the methodology and principles for making administrative and technical decisions and their adaptation to the world of smart transportation.

Using Schwartz's Theory of "Basic Values", we investigated whether there is a variation in ranking the primary principles in the field of smart transportation among several experts in various disciplines, including regulators, and academics. While encountering language gaps and different ways of comprehending terms, we noticed that the classification of values of regulators and academics, in the field of smart transportation and in the vision of the three zeros, is not fundamentally different.

During the product's development, we also investigated whether the expectation of zero casualties is even possible, given the methodology that dominates the field of technological products in general and automobiles in particular. We identified several problems in the planning and development stages of smart vehicles that led to a substantial diversion from the "three zeros" ideal outcome. We further noted that the law should address and regulate these processes, especially given the rising dominance of the MVP (Minimal Viable Product) production model that is popular in other knowledge-intensive industries.

Finally, we examined the consequences of introducing smart transportation in the areas of sea, air, and land, focusing on current research in the area of land. In doing so we discovered that the field is relatively regulated by comprehensive legislation, which can reduce some of the challenges in land transportation. Transportation in the air and sea domains is heavily regulated regarding all participants. There are threshold limitations for the introduction of vessels to arena, and for their operation. This detailed framework coordinates the different users of the domain and serves as a robust baseline to mitigate between different interests and values. It also provides a more robust baseline for the adaption of rules of behavior to the introduction of new technologies. Therefore, it appears that this area is better prepared for adapting regulatory frameworks to technological changes. Finally, in the maritime smart transportation domain, we began investigating what happens when a port becomes a "smart harbor" and will continue this inquiry in the future.