PLANETARY DEFENSE IS NOT ONLY ABOUT SCIENCE. E. Simó-Soler[1] and E. Peña-Asensio[2,3], [1]Universitat de València (UV), Valencia, Spain (elisa.simo@uv.es), [2]Universitat Autònoma de Barcelona (UAB), Bellatera, Catalonia, Spain, [3]Institute of Space Sciences (IEEC-CSIC) (eloy.pena@uab.cat).

Introduction: The term planetary defense commonly refers to actions dedicated to preventing the collision of a near-Earth object (NEO) with the Earth. This includes both asteroid and comet observation programs and potentially hazardous object (PHOs) deflection and disruption missions. In the 1990s, the Spaceguard Survey was created after an interaction between NASA and the U.S. Congress to protect our planet from a cosmic impact threat [1]. In early 2016, the Planetary Science Division of the Science Mission Directorate of NASA established the Planetary Defense Coordination Office (PDCO) [2], an organization that maintains a strong science focus. Efforts devoted to this issue have followed this trend, exemplified by the DART and HERA missions [3,4]. Scientific-technical preparedness is practically the only line of approach to planetary defense by the research community and public institutions.

Beyond science: However, the impact threat poses a much broader scenario and directly appeals to other fields of knowledge that historically have not been concerned about cosmic issues. The challenges to be addressed go beyond the mere development of mitigation capabilities.

One of the first political-legal implications could be the emergence of migratory phenomena because of the impact threat and the formulation of impact refugees' legal figure to protect displaced persons (regardless of the PHO's fate) [5]. An asteroid collision could generate territory devastation inviting us to reflect on the configuration of States without territory and its recognition by the international community in the absence of physical state institutions or the appearance of governments in exile [5]. Private companies could be intervened by the State to ensure the necessary resources both for the preparation of action plans and for post-event recovery. Due to the different mitigation techniques, it could arise geopolitical and nuclear conflicts since the development of explosive devices could be understood as a threat to national security by other states [6], in addition to being questioned for possible mission failure by fragmenting the object increasing the effective area of impact and impeding further attempts of deflection. Although there is no obligation to protect other States, given that transnational and public-private cooperation will presumably be necessary for the defence strategy, it would be desirable to discuss the suitability of possible compensations to the "saviour" actors and the reparation the third parties' damage [7]. The absence of a decision-making system in an extreme scenario could lead to the formation of technocracies or oligopolies of power [8]. It would be essential to generate a system for decision making as democratic as possible considering the situation of most vulnerable groups and the representation of multiple voices in the final protective mission.

As can be seen, several questions associated with planetary defense arise when the social dimension is explored, highlighting fundamental issues that go beyond the scientific-technical field but are intimately related.

Expanding horizons: Planetary defense is not a purely technical issue but a polyhedric one, having social, political, phycological, economic and legal facets. For that reason, we propose a change of paradigm from a unidimensional analysis of the planetary defense to a transdisciplinary approach that integrate both techno-scientific developments and a social perspective from a multi-axis framework. However, the interaction of different disciplines does not necessarily imply comprehensive and critical thinking. Transdisciplinary research cannot be produced by the sum of the diverse problematised issues, but by the intersection between them [9]. It would be crucial to adopt an intersectional vision that includes both contributions from other disciplines to a holistic view of planetary defence and the detection of multiple discrimination situations that may affect the population in such context.

Reviewing planetary defence from a social perspective opens a window of opportunity for a wide prospective analysis that allows both an effective, safe, and pacific mitigation mission, and to anticipate pre- and post-impact humanitarian crises. In a potentially apocalyptic scenario, empathetic approaches that consider the underrepresented group become particularly relevant since in extreme situations the vulnerability of certain communities and marginalized people grows exponentially. The inclusion of non-hegemonic voices is not only a question of equity policies (which it is in part) but also of success in guaranteeing human rights.

Conclusion: The planetary defense should be addressed from diverse complementary disciplines, applying intersectional methodology and solidarity awareness to be truly protective. We cannot forget that planetary defense is not just about science; it is ultimately about human rights compliance.

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