Laser ranging – Evolution towards active sensor networking for debris observation

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Satellite Laser Ranging (SLR) of orbital targets is a well-established technology in the scientific community (geodesy, space radar/optical imagery) with precision ranging to operational satellites equipped with retroreflectors as well as to the Moon. Recently, the use of this technology was pioneered also for the tracking of defunct objects (debris), e.g. in order to identify its attitude motion from range residual analysis.

After introducing more sensitive receivers, more powerful transmission systems and improvement of track initialisation techniques, it became possible to receive and process echoes from uncooperative targets. However, in order to assure the success of these 52 observations, an accurate a-priori pointing information is required and tight constraints on the observation's conditions must be met. These challenges are the motivation drivers for establishing a "proof-of-concept" for fully automatized SLR stations, the Distributed Laser Ranging Network (DLTN), integrating the upgraded ESA's IZN-1 station.

The activity whose main goals are the upgrade of ESA's IZN-1 to track debris and the development of an online sensor network platform for near-real time requesting, scheduling, analysing, displaying and providing space safety data products for the end users has started in summer 2022 and it will finish at the end of 2024, performing an observations validation campaign in the first semester of 2024. This presentation is provided to introduce the project to the community and describe the activities intended to be done.