

## Concept of Operations Study of a Killer Asteroid Destruction Flight Demonstrator Program

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This paper presents a system level concept of operations for a demonstrator flight mission to detect and identify, acquire, and remove the threat posed by an object such as, but not limited to an asteroid or a comet, whose Earth impact would cause widespread destruction. Tasks required to progress the mission need from concept to deployment are established, identified and defined. System level functional requirements are decomposed into the system level hardware, software, and operational requirements. System architecture is presented at the system, segment and element levels. Key trade studies are identified for the Ground, Launch and Space Segment of the mission, as well as for the target.

The flight demonstration program is presented as an international mission with an inception to completion duration of 5 years from the program start date. Preliminary cost data is presented based on extrapolations of past large space programs. The mission includes two flight vehicles: an interceptor armed with a 1 MT nuclear warhead, and a second vehicle used to track the target and the interceptor, to acquire mission critical data and beam it to Earth for further study.

Starting with a list of 4077 known asteroids, 19 potential targets were identified with the equivalent destructive energy of a Torino Scale 10 ( $10^5$  MT), with an equivalent diameter of 1 km or less, a brightness PHA H magnitude of 22 or less, and a Minimum Orbital Impact Distance (MOID) greater than 0.05 AU Potentially Hazardous Asteroid (PHA)

Launch windows and velocities were determined to find two viable candidates for the program time constraints (program start date no later than January 2012).