Chapter 14: Concluding Remarks

This paper has summarized several research projects undertaken by Dynacon Enterprises Ltd. for the Verification Research Program of External Affairs and International Trade Canada.

Many peaceful space operations for the next twenty-year period have been reviewed. Of the current nonweapon spacecraft, very few are "ambiguous." In fact, within the definition used here (see Section 2.1), there are few current space weapons. (Ground-based direct ascent weapons were excluded from discussion.) A number of proposed future space operations could, however, be misconstrued as, or used to camouflage, space weapon development.

Under the SDI program, the USA is researching several technologies that could be applied to space weapons operations. Similar research is undoubtedly being undertaken in the USSR, though less is known about this. At least one of these technologies, the "Brilliant Pebbles" concept, would give the USA an extremely effective ASat capability. The extremely high maneuverability of these kinetic-kill microspacecraft allows each one access to all of orbital space from any initial altitude. Under current plans, this system could be deployed within four years.

Ambiguities in space operations can arise in several ways. First, there is a commonality of critical capabilities and characteristics between weapons spacecraft and ostensibly peaceful spacecraft. Second, a spacecraft that is advertised as a weapon has applications beyond its advertised strategic purpose. The aforementioned "Brilliant Pebbles," an SDI concept, is intended as an ABM defense weapon; however, it also appears to have some potential in the ASat field.

A number of ambiguous operations have been identified in terms of their observability by space monitoring. Specific space activities have been noted that, when observed, could be interpreted as weapon-related. Since such ambiguities exist even with conventional remote monitoring, the need for more direct verification is clear: to regulate weapons in space, it must be possible to tell whether a "satellite" is, or contains, a "weapon."

Considerable effort has been devoted to the development of an appropriate strategy for the assessment of the harm that one satellite can do to another, towards the goal of regulating weapons in space. A total of 29 harm modes have been identified and their parameters and characteristics explained. A quantitative "index" of harm can be calculated (with respect to a nominal target) for any satellite. Both the mathematical tools and the software to implement the method have been completed, and a detailed verification strategy worked out.