actual national export control mechanisms of member states will be much more difficult to achieve, in particular among Eastern European member-states. The overall effectiveness of such a multilateral mechanism will hence be limited, and will almost certainly have to be supplemented by formal measures dealing with particular weapons systems of pressing proliferation concern.

The third, and related, set of supply-side measures applies to the problem of controlling the export and end-use of dual-use technologies. These cannot be restricted in the same way as purely military goods, primarily because of their importance for the civilian economy and economic development, and secondarily because of the political difficulties involved. Hence, any successor to CoCom will likely cover only a much narrow "super-core" list of dual-use technologies. The shift from military-led to civilian-led technological innovation (discussed above) also creates enormous problems for end-user certification, since the exact same instrument can be used for both purposes. One example of this would be American attempts to monitor the end-use of a Cray supercomputer exported to India: the official purpose of the computer was for national meterological modelling and weather forecasting, and an American embassy official was charged with checking on this. It does not take a sophisticated knowledge of computing processes to realize, however, that it is virtually impossible to verify the "end-use" of supercomputing power without actually operating the computer and controlling all access to it. Another example is the alleged similarity between the Indian space launch and military missile programs, which suggest that technologies have been "leaking" from one realm to the other.[48]

The implications of this for controlling conventional proliferation are four-fold. First, as civilian technologies (in communications, computing, electronics) become the leading-edge of innovation, the costs involved in effective verification of their end-use rapidly become prohibitive. The problems in simply tracking and measuring the trade in these technologies are enormous, given their component nature (ie: software, materials), and the expansion of "closed container" trade between ports.[49] Second, since the possible applications of these technologies are vast, the line between civilian and military uses increasingly blurry, and the number of potential suppliers large, national or multilateral control and verification mechanisms will almost topple of their own weight. How, for example, could one control the military uses of a possible global commercial mobile communications system (such as Motorola's *Iridium*), the global positioning system, or the high resolution satellite imagery available from commercial sources (from France and Russia in particular)? Third, there is no strong political constituency pushing for transparency, let alone control, in the transfers of these technologies, and

---

[48] I am indebted to Brad Roberts for the supercomputer example. On India's missiles program see Gary Milhollin, "India's Missiles - With a Little Help from our Friends," *Bulletin of the Atomic Scientists*, 45:9 (November 1989), 31-35.

[49] On some of the issues raised in this paragraph see Ian Anthony, "Current Trends and Developments in the Arms Trade."