

Post-Helsinki Conventional Arms Control: The Qualitative Dimension

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The collapse of the Warsaw Pact and the demilitarization of eastern Europe, apprehension over the future political shape of the continent, and the need to assimilate the changes in the European security environment have injected great uncertainty into the conventional arms control process. But despite the successes of recent years, not all of the threats to security that conventional arms control can ameliorate (directly or indirectly) have been addressed. As we think beyond the Conference on Security and Co-operation in Europe (CSCE) follow-up meeting in Helsinki in 1992, and the elaboration of a mandate for conventional arms control under the CSCE umbrella, there is a need to chart an agenda for conventional arms control to meet these new and different threats.

Central to this agenda is likely to be a more direct focus on the qualitative dimension of conventional arms control. Future negotiations will have to come to grips with several issues that revolve around military technology including:

- arms procurement and modernization programmes;
- arms production and defence industrial concerns;
- military research and development (R&D) and testing; and
- the global proliferation of sophisticated conventional weapons and arms production technologies.

Not all of these are equally important, nor will all necessarily be tackled. But hitherto neglected qualitative issues should be among the next frontiers of arms control. In addition to arguing why this will be so, this article will make some practical suggestions for measures that could be adopted or negotiated in the realm of military technology. Put simply, the European and the global security environments are entering a period in which, as the use of force on a large scale becomes less likely, the need for military technological innovation and modernization become less pressing.

There are four linked arguments (military/strategic, technological, economic and political), of differing degrees of importance, for a shift in the focus of conventional arms control towards qualitative issues. Each

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will be elaborated below, but they may be briefly summarized. In military terms, there is no guarantee that balanced numerical ceilings that create stable military relationships in the 1990s will continue to do so, unless the technology possessed on all 'sides' (a somewhat anachronistic term) remain in relative balance, or no new destabilizing systems are deployed. At lower levels of armaments, technological gaps may be of greater military significance, or at least a desire to avoid putting a chill on political relationships by creating these gaps may impel policy makers to negotiate over technological issues. In technological terms, the desirability of shifting scarce R&D resources from the military to the civilian sector (for reasons of global economic competitiveness) creates an incentive to slow the pace of weapons modernization. In addition, most European states (and the successor states to the Soviet Union) will be unable to afford large quantities of more advanced weapons, unless economic or social development goals are sacrificed. In economic terms, the current Conventional Forces in Europe (CFE) agreement generates few direct savings for Western signatories, yet changes in the security environment guarantee public pressure for further reductions in military spending. Given the rising unit costs of new weapons systems, one way to win such savings is through agreements that restrict weapons modernization, and perhaps even military R&D. Finally, in political terms, the delicate (and evolving) balance of civil-military relations in the newly democratizing countries of central Europe (and the fragmented Soviet Union) gives all CSCE members an incentive to negotiate arms controls that curtail the political importance and influence of military establishments. Since further numerical reductions may be difficult to achieve (especially if tensions between some states escalate), qualitative controls are one means by which to achieve this goal.

Only the first of these four arguments deals with the classic (and narrow) 'war prevention' or 'military stability' rationale for arms control. But in a post-cold war world, in which threats to security come from instabilities and crises that may have domestic economic or political roots, the goals of arms control must similarly broaden. As the risk of major war in Europe declines, the potential for localized conflict (especially involving the newly-democratizing but socially unstable countries of eastern/central Europe) is one of the forces impelling further arms control efforts. Efforts to control military technology can be justified for the benefits they may bring *beyond* the strictly military security realm. Whether or not qualitative arms control is considered desirable in part depends on the goals one thinks it is capable of realizing.

Although arms control efforts (and arms control scholars) have usually shied away from any explicit attempts to deal with qualitative issues, this

issue has been recognized in previous arms control efforts.¹ The Anti-Ballistic Missile (ABM) and the Biological Weapons Treaty prohibit development of other weapons. Other treaties, such as the Seabed and the Outer Space Treaty, prohibit deployment, while the Limited Test Ban, the Intermediate Nuclear Forces (INF) and several nuclear-free-zone treaties (Tlatelolco, Rarotonga) prohibit the testing of particular weapons.² The Strategic Arms Limitation Treaty (SALT) I, on the other hand, stands as a noteworthy failure in this regard, as its quantitative limits on the strategic launchers possessed by the United States and the Soviet Union did not create a stable strategic balance. Continued unchecked innovation (improvements in accuracy, disparities in throw-weight, and the advent of multiple warheads) created a fear in the United States that its land-based strategic force was vulnerable to a devastating counter-force first strike, a fear that has been partly addressed in the Strategic Arms Reduction Treaty (START). The final inclusion of limits on armoured-vehicle-launched bridges in the CFE Treaty (and the earlier attempt by the Warsaw Pact to distinguish between offensive and defensive aircraft in the Treaty) also acknowledges that, within the broad numerical limits of the CFE Treaty, what *kinds* of weapon one state possesses may make a difference.³ In an indirect sense, wrangles in CFE over what constituted a tank, and what aircraft should and should not be included, also accepted this logic.

THE END OF ARMS CONTROL AS WE KNOW IT

In the months immediately following the signing of the CFE Treaty, a widely held view among analysts was that 'East-West arms control appears to have reached an end . . . [and] that SNF, CFE II . . . and other European or Soviet-American talks will not produce much'.⁴ Today, however, in the aftermath of the attempted coup in the Soviet Union, the subsequent granting of independence to the Baltic states, civil war in Yugoslavia and the dissolution of the Soviet Union, matters have changed somewhat. The threats posed to European and global security with existing levels of armaments and the need to bring new states (such as Ukraine) into existing agreements have provided greater urgency to the arms control process (as, for example, in current proposals concerning tactical nuclear weapons). There are, however, three sets of objections raised to any moving forward quickly on a conventional arms control agenda after the 1992 Helsinki Follow-On meeting.

The first is that the current political and security environment is too confused for treaties to emerge from it. The second argues that con-

ventional arms control is effectively over because the process of the numerical limitation of forces is near its practical conclusion. Although many states will reduce their levels of armaments below treaty-permissible limits, and some will press for further negotiated reductions, arsenals are approaching the bedrock levels necessary to meet national security concerns. As one Italian diplomat noted, 'It is hard to reduce more than the CFE limits – to go lower would be extremely dangerous to European security'.⁵ A Hungarian diplomat has been even more specific, 'It is impossible to expect the Soviet Union, which will already be reducing 50 per cent of its armour, to do more than that. It's physically impossible'.⁶ According to this view, further marginal gains in security will only come at great cost, and will not significantly reduce tension between states, increase global or regional security, or reduce the risk of accidental war or surprise attack (although some particular measures may contribute to this).⁷

A third variation argues that there may be some room for further conventional arms controls, but that these will have to concentrate on limitations within European sub-regions. Such measures could focus on non-qualitative (or operational) issues, such as greater reductions in CFE-treaty limited items, expanded confidence- and security-building measures (CSBMs), naval arms control, or restrictions on personnel levels.⁸ This is the most serious objection: that the evolutionary dynamic of military technological innovation is either impossible to control or not worth controlling. I will tackle this objection with practical suggestions below, but note must be made of the two contrary (and diametrically opposed) views of weapons development that must be countered. The 'official view' of the process is that 'strategic goals come first; technology follows', and thus that a decline in the threat will automatically slow the weapons development process, making qualitative arms controls moot.⁹ The 'technological imperative view' regards technological innovation as following an autonomous, evolutionary dynamic that cannot be controlled.

Neither stark view is correct. As several authors have pointed out, the process of military innovation is *not* driven by the 'rational' process of matching systems requirements to external threats, but rather by an internally-driven dynamic, fuelled by scientific, armed service, and defence-industry interests.¹⁰ In addition, at least since the Industrial Revolution the process of military technological innovation has been inextricably tied to state policy and financing, as exemplified by the Manhattan project.¹¹ Precisely *because* it is ultimately influenced by state policy, it must be brought under formal arms control agreements to be halted. In an era of declining tension, the 'security dilemma' argument

that the process of military innovation cannot be halted because of the possibility that the other side might 'get there first' is the possibility that qualitative arms control should address.

As noted above, there are four arguments for incorporating qualitative arms controls in subsequent conventional arms control treaties, all of which surface only as the risk of major war recedes. Most of them involve a broader definition of 'security' that goes beyond military confrontations, and in this environment, arms control is only an adjunct to a more comprehensive security policy. But since subjective perceptions of intentions and threats are conditioned by the objective conditions of military balances and arms acquisitions, concrete arms control measures are not an irrelevant means to address these more diffuse (but perhaps more costly) threats to security.

THE MILITARY/STRATEGIC ARGUMENT

The military/strategic arguments for qualitative arms control are actually the least important, as the threat that most directly concerned members of the North Atlantic Treaty Organization (NATO), a Soviet-led attack across the central front is gone. But it warrants some attention, as Europe still bristles with armaments, and the elimination of thousands of obsolete weapons does little to reduce the destructiveness of existing arsenals. More than 150,000 major conventional weapons systems remain in Europe (and 39,000 tanks), and the goal of reducing the devastation of war, should it break out, has not been fully realized. Unchecked modernization programmes could actually increase the lethality of arsenals, and CFE I controls on arms levels do nothing to prevent these arms races. As James Goodby notes:

the alternative to some form of negotiated arms control is, in fact, uncoordinated force cuts and unilaterally determined modernization programs . . . [Obviously] such restructuring will not yield automatic improvements in stability. Worse still, the results of haphazard cuts could be a military relationship between the major powers that is even less stable than the one that exists today.¹²

One longstanding axiom of NATO strategy has been that technological superiority was a 'force multiplier' that could partially compensate for numerical and geographical disadvantages in a European war. The CoCom edifice was based on this desire to preserve NATO's technological lead. Even as CoCom regulations are rewritten to permit exports to east European states, concerns remain about the transfer of sensitive military or advanced civilian technologies to the Soviet Union.¹³

Yet although maintaining a technological edge is still important, unchecked military modernization contains some dangers: if CFE I creates stable conventional military relationships with an approximately equal distribution of technological sophistication and system quality, then to maintain these stable relationships requires that no dramatic changes in the technologies deployed by participants occur. This is especially important if the technologies deployed are 'destabilizing'; that is, if they contribute to crisis instability by appearing to possess first-strike capabilities, or if they trigger reciprocal (and potentially escalating) acquisitions in neighbouring states.

Existing numerical limits on aircraft and tanks may be less important than their future capabilities, and the one-for-one replacement of treaty-limited items permitted in the CFE Treaty does not restrict the introduction of such destabilizing technological innovations. One state or group of states could, for example, introduce systems such as highly accurate and stealthy weapons, or weapons that could decapitate command and control structures. Without future controls on either the rate of modernization or on the permissible technologies to be introduced, the stability created in CFE might be ephemeral, and the existing CFE Treaty inadequate to confront military challenges to European security. This is particularly important at the sub-regional level, where even under CFE I existing local imbalances of forces could be exacerbated by the acquisition of more advanced systems by one state.¹⁴

The most important consequences of unchecked military modernization might also be political, not military. Strictly speaking, Poland may not have military concerns over a Czech acquisition of new tanks, but in an environment of social tension, fragile democratic institutions and potentially explosive cross-border disputes (over minorities, natural resources, or environmental concerns), military imbalances could exacerbate political tensions within and between states by becoming a lightning rod for disaffected social groups (including the military). This may not lead directly to arms races, but it certainly could hinder the project of building a co-operative European security order and tackling more pressing 'security' issues, such as economic reconstruction, the safeguarding of human and minority rights, and co-operation on environmental issues.

THE TECHNOLOGICAL ARGUMENT

In 50 years, the conventional battlefield moved from piston-engine fighters to high-bypass turbofan fighters and stealth aircraft; from unguided rockets to 'smart' missiles; from steel and aluminium materials

to composites, plastics and ceramics; and from primitive radars to real-time battlefield control systems. This historically unprecedented rate of technological innovation required vast sums of state-sponsored military R&D. The Americans and the Soviets account for about three-quarters of world military R&D spending, and other CSSE arms producers, such as Britain, France, Germany, Czechoslovakia, Poland, Sweden and Italy, together account for probably about another ten per cent.¹⁵ There are two reasons why slowing this juggernaut of technological innovation should be one of the goals of future arms control treaties.

The second justification is the European (and potentially Russian) fear of falling behind the USA in military technologies. The cold war and the large European and global market for arms meant that several states were able to maintain military production bases at the technological frontier. Producers such as Britain and France were able to export from 40 to 50 per cent of their weapons production, which allowed them to lower unit costs of weapons and spread the costs of R&D (by contrast, the United States and Soviet Union exported about 15 per cent of their production).¹⁷ This allowed them to equip their forces with sophisticated, domestically-produced weapons, despite their spending only a fraction of the amount on military R&D that the United States or the Soviet Union did. But a sharp decline in NATO procurement is now evident: projections suggest that it will decline to its 1980 level (in constant dollars) by 2000. This represents a drop of between 15 to 30 per cent in western European defence production in less than ten years. Some evidence suggests that military R&D spending, especially in European NATO states, may also be declining.¹⁸ All of this occurs in an environment in which unit costs are increasing, and total procurement and military R&D by European NATO states is already only about 25 to 40 per cent of the American total.

Responses to declining national procurement (and rising unit costs) include the privatization of state firms, rationalized and restructured national defence industries, increased competitive bidding, co-ordinated procurement, and pan-European or international collaborative development and production arrangements.¹⁹ But the savings that may be reaped by these measures are limited and one-off (around 10 per cent from national competition, for example) against the ultimate determinant: disparities in the length of production runs and R&D spending levels.²⁰ Ultimately, this disparity means that the ability of the European NATO members to sustain defence production at the technological frontier will be severely tested. The consequence will be a fear of falling behind the United States in critical defence technologies. These same fears might be voiced by the emerging central and east European states, which could be equally worrisome. Such developments could generate the instabilities

discussed above, if gaps in the technologies deployed by different groups of states emerge that could place these states at a disadvantage in future crises or conflicts. Again, the means through which to address this problem is via controls on the process of modernization of military technology itself.

One major qualification that must be entered, however, is that agreements to restrain the process of military innovation or modernization in the CSCE must be seen in a global context. As the Gulf war demonstrated, the United States and its allies depend upon their military technological superiority to counter threats from the developing world.²¹ This need to maintain a technological edge has spawned a range of controls on the diffusion of advanced weapons, including the Missile Technology Control Regime (MTCR), the Australia Group controls on chemical weapons, the London Nuclear Suppliers Group and the guidelines of the permanent members of the UN Security Council on arms transfers to the Middle East. If these efforts are successful in slowing the rate of diffusion of military technologies to the developing world, then qualitative controls on modernization or procurement within the CSCE are conceivable. But if the rate of diffusion of advanced military technologies exceeds the rate of innovation in the core producer states, the prospects for qualitative controls will be dim.

THE ECONOMIC ARGUMENT

Together the CSCE member-states spent approximately \$847 billion on defence in 1988, of which probably one-third (or more than \$250 billion) went for weapons procurement.²² The past 40 years have, however, witnessed almost geometric increases in the cost of the weapons systems procured. In constant dollars, an M-1 tank costs triple what an M-60 did, a *Tornado* jet is quadruple the cost of a *Hunter*, a *Mirage* F-1 is triple the cost of a *Mystère*, and most other weapons systems have doubled or quadrupled in real unit cost over this time. As Jacques Gansler noted several years ago, the average real increase in unit costs has been about five per cent a year, doubling the cost of equipment in 13 years.²³ With the *Stealth* bomber coming in at almost \$500 million a copy (depending on how many are procured), the process appears to be continuing. But as Saadet Deger and Somnath Sen note:

there is no automatic mechanism by which arms control will guarantee reduction [in spending on procurement]. Since technological sophistication is costly, modernization can continue and costs can escalate *even with* deep cuts in numbers and low ceilings.²⁴

Against this trend, public demands for concrete economic benefits from the end of the cold war (the 'peace dividend') will doubtless increase, as the security threats that justified military expenditures recede. It will be increasingly 'difficult to justify large-scale arms programmes that, as now, involve expenditures that add up to 3-4 per cent of the national output, armed forces that make up 2-3 per cent of the labour force and defence spending that amounts to 8-9 per cent of total central government expenditure'.²⁵ Widening the scope of arms control to ensure that the defence burden is reduced will be high on the future arms control agenda because of public pressure, especially within eastern and central European states facing high demands for economic reconstruction and modern social welfare systems. Although such reductions will undoubtedly be made unilaterally, a treaty-based multilateral process would be more stabilizing and facilitate greater cuts by undermining the rationale for high defence spending.²⁶

Qualitative controls that slowed the pace of modernization could also facilitate the process of defence-industrial conversion in Europe, by undercutting the argument that high production or procurement levels must be maintained in order to keep high technology design and engineering teams intact. As Daniel Nelson notes, 'groups that have benefited socially and economically from their roles in design bureaux, research institutes and key weapons production facilities are loathe to give up their status', and they can be expected to muster any available arguments to maintain their positions. Multilateral controls on modernization will almost certainly undercut one of their primary arguments.²⁷

THE POLITICAL ARGUMENT

Accompanying the economic argument is the political one that lower levels of military spending are crucial to the process of democratization in eastern Europe, which depends on a rapid and radical change in civil-military relations. In an environment in which the military is a possible bastion of conservative or anti-democratic forces, and can make a plausible claim to being the 'custodian of national values', its ability to conjure up an external threat may tilt the balance of domestic political forces in its favour. NATO members-states have a strong incentive to close-off this argument, even though it will run counter to traditional reluctance to surrender military advantages. This argument may be particularly important in a disintegrating Soviet Union, where centralists and conservatives have argued that a strong Union is necessary to combat (even if only hypothetically, or in terms of prestige) a strong American/NATO

presence.²⁸ Despite the defeat of the August 1990 coup attempt, and the subsequent dismemberment of the Union, these forces have not disappeared, and the danger they pose to inter-state and intra-state stability in the region should not be underestimated. Again, in a situation in which NATO enjoys numerical and perhaps technological superiority over the successor states to the Soviet Union, a willingness to countenance qualitative controls would go some way to disarm this fear. Evidently, this political goal goes far beyond the traditional aims of arms control policy.

CONTROLS ON WEAPONS MODERNIZATION AND MILITARY R&D: SPECIFIC AVENUES TO BE EXPLORED IN THE CSCE

As pointed out by Stuart Croft, there are three points at which it makes sense to address issues of controls on military technology: deployment (modernization), development (production and procurement), and research.²⁹ To this list I have added a fourth category – information exchanges – which are properly speaking CSBMs but which might be a useful starting point. I have arranged these four categories of qualitative control measures that CFE II could address roughly according to how radically they depart from existing controls.

ENHANCED INFORMATION EXCHANGES

Efforts to regulate arms modernization, procurement and production could initially build upon the new Vienna CSBM Document, which requires exchanges of information and discussions on military forces and military budgets, and notifications of intent to deploy major weapons and equipment systems. Information exchanges on military budgets, however, include total procurement figures (as in the UN standardized reporting form, for example) and would thus be only the starting point for discussion on the regulation of production and modernization. The next step should move beyond aggregate information on procurement to exchanges of information on production rates, deployment plans and replacement programmes for treaty-limited items.³⁰ In fact, the United States originally proposed such transparency of production (through the monitoring of production facilities within the treaty zone) as part of the CFE, but this was dropped after objections were raised by NATO allies. Voluntary disclosures could occur without jeopardizing commercial considerations of confidentiality, because sensitive information on pricing and technologies would not be disclosed. Such a measure would probably be palatable only if it included the continental United States, and was part of a broader package.

Increased transparency of production and procurement of major military systems would fit well with the possible introduction of a United Nations register of transfers of major military systems (for which most NATO states have voiced support).³¹ One of the major objections to increasing the transparency of global arms transfers is that it discriminates against states that do not produce their own weapons. The solution is to increase the transparency of arms production for all major participants; such a measure adopted within the CSCE would go a long way to enhance the possible success of a UN register. In themselves, of course, such measures do not constitute actual control, but they would constitute a significant CSBM with positive global ramifications. States could also negotiate exchanges of information on developments in their own defence-industrial sectors (such as industry mergers, plant closures, and conversions to civilian production). Since much of this information exists in the public domain already for NATO states, there are benefits to NATO members in promoting such measures within the CSCE.

SPECIFIC MODERNIZATION RESTRICTIONS

Disclosure of information on weapons production (or any other matter) as a CSBM would only alert parties to potential problem areas that would then have to be addressed by more specific arms control measures. The most difficult, but most important, set of measures would have to go further to restrict the deployment of potentially destabilizing technologies. There are different stages when such qualitative measures are possible: as one analyst noted, control 'is most likely to take place after the initial testing and development work, but before the weapon is produced on a large scale'.³² Restrictions on weapons modernization could range from outright bans on the deployment of new systems, to agreements restricting the modernization of systems or sub-systems (guns, missiles, or armour), to the regulation of the testing or production of new systems, to more limited agreements that allowed deployment of specific numbers of systems (perhaps with basing or deployment restrictions). The idea would *not* be to attempt to control indiscriminately all new technologies, but to focus on those whose deployment would be destabilizing if left unchecked, either in a pan-European or more localized setting. Given the demonstrated value of sophisticated weapons outside the European context (in the Gulf war), perhaps what one should hope for are limited agreements that operate as extensions to CFE Treaty limits, rather than outright prohibitions.

Determining what constitutes a 'destabilizing' new weapon is admittedly difficult, but several aspects should be noted before the quest

is abandoned. First, as pointed out above, the primary military concern is with weapons that might contribute to crisis instability by appearing to possess first-strike capabilities, or that might trigger arms races. This makes the definitions somewhat different from the age-old (and unsustainable) distinction between offensive and defensive weapons.³³ Second, as argued above, particular weapons might be destabilizing for reasons that have nothing to do with their military utility or mission. One suspects, for example, that the acquisition by Germany of nuclear weapons would be tremendously politically destabilizing (notwithstanding John Mearsheimer's argument) to neighbouring states. Nuclear weapons pose the issue in stark terms, but it is entirely possible that other weapons systems might have analogous effects on a much reduced (but still important) scale. Third, the 'destabilizing' nature of a weapon is not a purely abstract technical characteristic that can (or more likely cannot) be determined by expert analysis. What are most important are the *perceptions* of the different parties; and their judgements often acknowledge that some weapons are more destabilizing than others, especially under particular doctrines. One US Air Force General admitted this difference when he agreed that 'F-111s . . . have an offensive, rather than a defensive connotation'.³⁵ Following from this, the determination of which weapons are considered destabilizing would be a subject for discussion and negotiation, within a particular context of defence doctrines and postures. Finally, the starting premise ought to be that 'better' weapons are 'worse' (and should not be introduced) unless it can otherwise be proved that they enhance security in the CSCE.

These last two points highlight the fact that any discussions of destabilizing weapon modernizations should be linked to military doctrine issues. As two German analysts note, 'the more far-reaching restructuring envisioned in follow-on phases [of CFE] will require detailed understanding of the disparate security precepts and military strategies and doctrines shaping . . . [the] forces'.³⁵ Virtually all CSCE states (including neutral and non-aligned states) are engaged in a redefinition of their defence postures, and existing activities, such as the military doctrine seminar, recognize that these should be arrived at openly and after multi-lateral discussion. Restrictions on modernizations would most likely emerge from such force-planning discussions. As one analyst notes, 'the idea would be to increase the sensitivity of defence planners to the interactive nature of their own planning process and to constrain at least some 'worst case' planning tendencies and assumptions'.³⁶ Since most of new doctrines under discussion have specific weapons requirements, these discussions easily spill over into the arms control realm, and specific limitations on procurement and modernization could be discussed as

an accompaniment to doctrinal developments.

Two examples of this could be offered. As Curt Gasteyer points out, new east European defence doctrines are likely to require a defence *tout azimuts* and emphasize high mobility.³⁷ These requirements will be difficult to meet with smaller forces, and will certainly generate demands for expensive new equipment. In the key area of air defence, many states will have neither good early warning systems nor adequate interceptor aircraft or defence systems. A modernization of aircraft (including armaments) on their frontiers would be destabilizing and/or could trigger costly mini-arms races. A second example would be the adoption of variants of 'alternative defence' doctrines, many of which rely upon mobile, dispersed forces equipped with precision-guided munitions and sophisticated command and control structures. If concentrated with heavy armour (tanks or armoured vehicles) or sophisticated aircraft, such forces could, however, appear rather threatening. Thus if any NATO states (or NATO itself) move in this doctrinal direction to replace the Follow-on Forces Attack (FOFA) or deep-strike doctrine, they will have an interest in, for example, encouraging the modernization of anti-tank weapons while slowing that of tanks, or of improving static air (and missile) defences while restricting mobile systems. Since the FOFA doctrine did guide (albeit imperfectly) procurement and force planning, a strict replacement or modernization of treaty-limited items would not be appropriate to the new security environment.

Even given the great uncertainty that exists over future doctrines and threats, it is possible to list some of the technologies that at first glance might be potentially destabilizing and therefore good candidates for negotiated restrictions on deployment or modernization in Europe:

- stealth aircraft;
- hypervelocity guided missiles;
- 'smart' missiles;
- tactical ballistic missile defences;
- mobile air defences;
- weapons (such as tank cannons or artillery) incorporating 'futuristic' technologies (directed energy/kinetic energy);
- tactile missile launchers; and
- new generation air-to-surface missiles.

None of these is *prima facie* destabilizing (some may be stabilizing), but many of them could be, depending on the environment into which they were introduced. Current CFE restrictions do not cover these technologies, many of which are in the advanced research or testing stage. Existing CFE restrictions may also serve to channel R&D and innovation

into these directions. As a simple illustration, one of the arguments in the CFE negotiations was over the weight of tanks (and whether they would be laden or unladen): the Soviet concern was that NATO 'might take a [heavy armoured combat vehicle] at the upper edge of the weight limit, pile a lot of reactive armour on to it, add a bigger gun, and really improve it to the point where it is a new tank'.³⁸ A sensible starting point for discussing the systems noted above would be a NATO commitment not to be the first to modernize certain types of treaty-limited equipment (combat aircraft, combat helicopters, or tanks) with new weaponry or to deploy new systems.³⁹

The most critical technologies probably focus on aircraft, which, as the Gulf war demonstrated, contribute crucially to military surprise and supremacy. Aircraft also represent a major piece of unfinished business from CFE I: the treaty limits of 6,800 are higher than those originally suggested by both sides (NATO suggested about 5,700, the Warsaw Pact about 4,700, and their definitions were different) and training aircraft were excluded.⁴⁰ Most NATO states are today not at their aircraft sub-limits, and CFE I could encourage a shift to combat aircraft unless lower levels are negotiated. More importantly, CFE I does not impose any specific reductions on the medium-range, ground-attack aircraft (such as F-15Ds or Tu-22s) that all parties find most threatening (especially when ground forces are being reduced). Equipped with new generation weapons (such as *Tacit Rainbow* loitering missiles) these systems could be destabilizing and trigger reciprocal arms races. Although the verification difficulties associated with most modernization restrictions are extreme, especially if they deal with the refitting of existing weapons platforms, the potentially destabilizing impact of uncontrolled modernization and innovations is too great to be ignored.

PROCUREMENT AND PRODUCTION RESTRAINTS

A third set of measures could move one step beyond the deployment process to restrain overall production levels of specific treaty-limited items. One of the concerns of the United States, for example, has been that the rate of production of tanks and other equipment within the Soviet Union long exceeded what would be expected under a CFE agreement (or even former President Gorbachev's unilaterally announced cuts).⁴¹ Industrial planning inertia may have been at work, and only in early 1991 did production appear to decline: production in 1991 was expected to be 800 tanks, down from a 1988 total of 3,500.⁴² This suspicion (and its dispelling) underlines that once conventional arms limitation agreements are in place, the focus shifts to production and modernization as the

means of determining intentions. Restrictions on rates of production would probably ultimately require, however, a more global approach that included restrictions on transfers of arms or military technology, because (as noted above) the leading world military powers (certainly the United States) are unlikely to restrict production of those systems (such as stealth aircraft) that ensure their military superiority outside the European theatre. It might be possible, however, to build confidence with agreements that dealt with the *rate* of production, or (in the previous category) with the basing and deployment of such systems.

One could also enhance transparency and build confidence through co-operative programmes of defence conversion to reduce arms production within the CSCE. This is especially important in order to pre-empt a shift in arms exports to the developing world, as CSCE producers strive to preserve their defence industrial bases in the face of declining procurement. Concrete, negotiated agreements are difficult to imagine, but assistance for industrial restructuring, worker retraining, or product and market development could be critical in easing the economic and social tensions that are appearing in eastern Europe. These could be implemented under the umbrella of a future CSCE confidence-building or arms control package. Commercial considerations weigh heavily in such matters, but the smaller European arms producers, such as Czechoslovakia, have expressed a desire to curtail arms exports and military production, and have already sought help in this regard.⁴³

MILITARY R&D

The final set of measures for the more distant future could attempt to move beyond restrictions on deployment and modernization to regulate development and testing (military R&D). Admittedly, attempts to increase the transparency of military R&D run directly counter to the basic impulse behind secret research. Further, restrictions on the matters to be researched, or on the amount of resources to be devoted to R&D, or on the military application of dual-use technologies, are virtually impossible to implement.⁴⁴ What could be considered, however, would be CSBMs designed to enhance confidence that particular types of destabilizing weapon were not being pushed to the developing and testing stage before thought was given to regulating their deployment. Specific controls on the testing of particular types of weapon, especially those incorporating futuristic technologies that fall outside the currently controlled weapons systems, could be developed. These would be analogous to a comprehensive test ban, or to the limits on the testing of

ballistic missile defence systems that were mooted early in the START negotiations. Such measures would not curtail basic research but would restrict the testing of prototypes or specific weapons components.

CONCLUSION

The future CSCE arms control agenda is likely to have to address at some point the qualitative issues associated with arms production and procurement and military technological innovation. Controls over weapons arsenals, or confidence-building measures to defuse the underlying sources of insecurity, will ultimately realize only limited gains unless accompanied by measures to restrain the powerful forces that sustain advanced military production and innovation. Unchecked military innovation might also undermine existing security arrangements, exacerbate some of the new problems on the security agenda, or hinder attempts to institutionalize broader co-operation in Europe.

Insofar as the CSCE becomes institutionalized in bodies such as the Conflict Prevention Centre or related organizations, it will provide a forum in which information can be exchanged, negotiations conducted, and issues addressed both formally and informally. But the move to the CSCE security forum for arms control negotiations will require a great conceptual shift on the part of all participants. It will take some time to cease viewing all potential conflicts solely through an East–West prism, and to pursue co-operative measures to improve security. One advantage of an early initiation of discussions on increasing transparency in production and restricting modernization is that it would help to build this co-operative spirit. These issues will not cleave along traditional East–West lines, but will implicate different CSCE states in a variety of ways. Perhaps dialogue on this topic could even be a means of building confidence in the practical value of the CSCE forum itself!

Military technology will continue to be modernized and diffused within the CSCE. Arms control cannot stop this, but should take as its goal the management of this process, in order that arms races may be prevented, politically and militarily destabilizing weapons may be restricted, and regional security building may proceed ahead of military build-ups. To create security ultimately requires the resolution of underlying political differences, not the mere manipulation of levels of armaments. But since the process of military modernization, technological innovation and technological diffusion can provoke or exacerbate conflicts, a focus on qualitative issues is well justified, not as a panacea for global or regional or European conflicts, but as a concomitant to other arms control efforts. The cold war is over and the central

European confrontation eliminated, but this should be seen not as the end, but the end of the beginning of the process of building security within the CSCE.

ACKNOWLEDGEMENTS

An early version of this article was presented as a discussion paper at the NATO High Level Task Force meeting in Palma de Majorca, 19 April 1991. I am grateful for the comments and advice received from James MacIntosh, members of the Canadian delegation, other participants, and the anonymous reviewers of *Arms Control*. The views expressed are mine alone.

NOTES

1. For exceptions in the literature, see S. J. Dudzinsky and James Digby, 'New Technology and Control of Conventional Arms: Some Common Ground', *International Security*, Vol.1, No.4 (Spring 1977), pp.143-59; Peter Jones, 'New Conventional Technologies and their Possible Impact on Conventional Arms Control Verification in Europe', *Arms Control*, Vol.10, No.2 (September 1989), pp.152-67; Stuart Croft, 'Military Technological Innovation and Stability', *Futures*, Vol.21, No.5 (October 1989), pp.466-79; Malcolm Chalmers, 'Beyond CFE: Cutting Conventional Procurement', *Arms Control Today*, Vol.20, No.5 (June 1990), pp.13-17. Dudzinsky and Digby define qualitative controls as 'constraints that would limit the development, testing, production or operational deployment of weapons systems that fit into an agreed-upon performance category'.
2. I am indebted for this to Hans Günter Brauch's review of treaties in 'Limiting R&D and technology exports as a topic of existing arms control treaties and proposals for the future', paper presented at the AFES-PRESS conference, Mosbach, Germany, 24 October 1991.
3. Each side is limited to 740 AVLBs. On the aircraft issue Ted Greenwood ['CFE - Taking Aim at Aircraft', *Arms Control Today*, Vol.20, No.2 (March 1990), pp.13-18] points out the difficulties with the offensive-defensive distinctions for aircraft.
4. Assessment from interviews conducted by the *Arms Control Reporter* in 1991. Immediately after the CFE treaty was signed, however, leaders and negotiators were calling for rapid progress to a CFE II treaty and a new mandate for CSCE talks on conventional arms control. As NATO's 6 July 1990 London declaration noted:
We will seek through new conventional arms control negotiations within the CSCE framework further far-reaching measures in the 1990s to limit the offensive capability of conventional armed forces in Europe, so as to prevent any nation from maintaining disproportionate military power on the continent . . . we will make provisions as needed for different regions to redress disparities and to ensure that no one's security is harmed at any stage. Furthermore, we will explore broader arms control and confidence building opportunities. (*New York Times*, 7 July 1990).
Similar sentiments were expressed at the NATO foreign ministers' meetings in February and December 1990, and in the *Charter of Paris* (and related discussions). All noted in *Arms Control Reporter*, (1990) 407B, pp.412, 419; *New York Times*, 12 February 1990.
5. As quoted in *Arms Control Reporter*, (1991) 410.B, p.8. The diplomat cited the Gulf war as evidence for this claim.
6. *Arms Control Reporter*, (1990) 407.B, p.354.

7. See, for some indications of this analysis, Jenonne Walker, 'New thinking about conventional arms control', *Survival*, Vol.33, No.1 (January/February 1991), pp.53-65; Richard Darilek, Ivo Daalder and Hilmar Linnenkamp, 'CFE: solving yesterday's problems not tomorrow's', unpublished paper, 1990; James Goodby, 'Can Arms Control survive the Peace?' *Washington Quarterly*, Vol.13, No.4 (Autumn 1990), pp.93-101; Robert Toth, 'Drinking a toast to Europe's future; the centerpiece of the party will be signing of a pact reducing conventional forces. Will such treaties be passe in the new Europe's future?' *Los Angeles Times*, 13 November 1990.
8. See the discussions of CFE delegates outlined in the *Arms Control Reporter*, (1990) 410.B, pp.6-8; Jonathan Dean, 'Building a post-Cold War European Security System', *Arms Control Today*, Vol.20, No.5 (June 1990), pp.8-12.
9. For an excellent discussion of these issues see Donald Mackenzie, 'Technology and the Arms Race', *International Security*, Vol.14, No.1 (Summer 1991), pp.161-75. The 'official view' is his term.
10. See *inter alia*, Matthew Evangelista, *Innovation and the Arms Race* (Ithaca: Cornell University Press, 1988); Barry Buzan, *An Introduction to Strategic Studies: Military Technology and International Relations* (London: Macmillan, 1987), pp.69-131. Mackenzie, ref.9, pp.162-63n, also offers several examples of both these logics.
11. See on this topic, Maurice Pearton, *The Knowledgeable State* (London: Burnett Books, 1982); William McNeill, *The Pursuit of Power* (Oxford: Blackwell, 1983).
12. Goodby, ref.7, p.94.
13. *Jane's Defence Weekly*, 23 June 1990; 14 July 1990.
14. Under CFE I, for example, some regional combat aircraft ratios are as follows: Hungary and Romania 1:2.4; Bulgaria and Turkey 1:3.2; Poland and USSR 1:11.2. Future military balances between Poland, Lithuania, Byelorussia and Ukraine, or between Serbia, Croatia and Slovenia (and their neighbours) could be equally unbalanced.
15. Stockholm International Peace Research Institute (SIPRI), *Yearbook 1987* (London: Oxford University Press, 1987), pp.153-62; Ulrich Albrecht, 'The Aborted UN Study on the Military Use of Research and Development: An Editorial Essay', *Bulletin of Peace Proposals*, Vol.19, Nos.3-4 (1988), pp.252-4. The total is estimated at \$85-100 billion by SIPRI and \$100-105 billion by Albrecht. Stephanie Neuman, 'International Stratification and Third World Military Industries', *International Organization*, Vol.38, No.1 (Winter 1984), p.190, estimates that the USA and the USSR together account for 85 per cent of all R&D expenditure, and with Britain and France, 90 per cent.
16. Cited in Kostas Tsipis, 'New Tasks for Arms Controllers', *Bulletin of the Atomic Scientists*, July/August 1989, p.8.
17. For examples from the 1950s, see SIPRI, *The Arms Trade with the Third World* (Stockholm: Almqvist and Wiksell, 1971), p.378; Edward Kolodziej, *Making and Marketing Arms: The French Experience and its Implications for the International System* (Princeton: Princeton University Press, 1987), p.47. For more recent figures see Keith Krause, *Arms and the State* (Cambridge: Cambridge University Press, 1992), Table 10.
18. Figures given in Saader Deger and Somnath Sen, *Military Expenditure: The Political Economy of International Security* (Oxford: Oxford University Press, 1990), pp.19-23; Andrew Moravcsik, 'The European armaments industry at the crossroads', *Survival*, Vol.32, No.1 (January/February 1990), p.73; Ian Anthony, Agnès Courades Allebeck and Herbert Wulf, *West European Arms Production: Structural Changes in the New Political Environment* (Stockholm: SIPRI, October 1990).
19. See, *inter alia*, Moravcsik, ref.18, pp.65-85; Michael Brzoska, 'The Structure of Arms Production in Western Europe beyond 1992', Occasional Paper 26 (Hamburg: Centre for the Study of Wars, Armaments and Development, 1989); Martyn Bittleston, 'Co-operation or Competition? Defence Procurement Options for the 1990s', Adelphi Paper 250 (London: International Institute for Strategic Studies, 1990); Pauline Creasey and Simon May, *The European Armaments Market and Procurement Co-operation* (London: Macmillan Press, 1988); Terrell Covington *et al.*, *A Review of European Arms Collaboration and Prospects for its Expansion under the Independent*

European Program Group, RAND Report N-2638-ACQ (Santa Monica: RAND Corporation, 1987).

20. Moravcsik, ref. 18, pp. 71–2.
21. William J. Perry, 'Desert Storm and Deterrence', *Foreign Affairs*, Vol. 70, No. 4 (Fall 1991), pp. 66–82.
22. Military expenditure figure taken from US Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers* (Washington: ACDA, 1990).
23. Figures for unit costs and employment from Jacques Gansler, *The Defense Industry* (Cambridge, MA: MIT Press, 1980), pp. 15–17, 83, 97, 286; Nicole Ball, 'Appendix I: the United Kingdom', in Nicole Ball and Milton Leitenberg (eds.), *The Structure of the Defense Industry* (London: Croom Helm, 1983), pp. 358–9; Kolodziej, ref. 17, p. 142. Of course, the unit cost of items such as microchips and processors has decreased enormously, but the qualitative improvements in weapons that accompany these developments have been costly.
24. Deger and Sen, ref. 18, p. 22.
25. *Ibid.*, p. 24. Emphasis mine.
26. For example, the Polish Chief of Staff complained in January 1991 that the defence budget was a 'survival' budget, and the Defence Minister protested that it would slow military modernization programmes. Cited in *Arms Control Reporter*, (1991) 407.E-1, p. 27.
27. Daniel N. Nelson, 'The Costs of Demilitarization in the USSR and Eastern Europe', *Survival*, Vol. 33, No. 4 (July/August 1991), p. 317.
28. An example of this was the acrimonious mid-1990 debates between Georgi Arbatov and military officials, in which Arbatov criticized excessive military secrecy and accused the military of creating foreign enemies to maintain its budget. For an excellent discussion of Soviet civil-military relations see Elaine Holoboff, *The Crisis in Soviet Military Reform*, London Defence Studies 3 (London: Brassey's 1991), especially pp. 15–21.
29. Croft, ref. 1, p. 474. See also Jones, ref. 1, p. 153.
30. I am indebted to James Macintosh for this suggestion.
31. See UN General Assembly, 'Study on Ways and Means of Promoting Transparency in International Transfers of Conventional Arms', Resolution A/46/301, 9 September 1991.
32. Jones, ref. 1, p. 153. I disagree, however, with his conclusion that abolition can only take place 'if the testing process has demonstrated that the early promise [of the weapon] was illusory'.
33. One example of the artificiality of the distinction was offered by Colin Gray, when he argued that the German Siegfried Line in 1939 was offensive because it facilitated a German attack in the east. Colin Gray, 'People Not Weapons, Make War', *Bulletin of the Atomic Scientists*, May 1989, p. 34.
34. *Jane's Defence Weekly*, 6 January 1990.
35. Manfred R. Hamm and Hartmut Pohlman, 'Military Strategy and Doctrine: Why They Matter to Conventional Arms Control', *Washington Quarterly*, Vol. 13, No. 1 (Winter 1990), p. 185.
36. James Macintosh, 'Future CSBM Options: post-Helsinki CSBM Talks', unpublished paper, (1991), p. 14.
37. Curt Gasteyger, 'The Remaking of Eastern Europe's Security', *Survival*, Vol. 33, No. 2 (March/April 1991), pp. 120–2. See also Hamm and Pohlman, ref. 35, *passim*.
38. Canadian delegate William McGill, quoted in *Arms Control Reporter*, (1991) 407.B, p. 368.
39. I am indebted to the discussion in Macintosh (ref. 36, p. 20) on this point.
40. For a pre-treaty survey of aircraft issues see Greenwood ref. 3, pp. 13–18.
41. For a discussion of conflicting American estimates of arms production rates in the Soviet Union see SIPRI 1990 *Yearbook* (Oxford: Oxford University Press, 1990), pp. 348–51.
42. According to Congressional testimony by DIA Director General Harry Soyster, the USSR produced only 1,300 tanks in 1990, and 800 were expected in 1991, compared with 3,500 in 1988 and 1,700 in 1989. *Jane's Defence Weekly*, 13 March 1991. Declines in

production of artillery, rocket launchers, helicopters and aircraft have also been noted.

43. The American protest of a planned Czech tank sale to Iran and Syria was met by the response 'that unless we receive substantial financial aid for the conversion of our arms industry, we cannot give up the deal'. Reported in *Arms Control Reporter*, (1991) 407.E-1, p.33. The Czechs have put 1,500 tanks, almost 2,000 armoured combat vehicles 2,000 artillery pieces and 100 aircraft on sale.
44. For a discussion of the difficulties in controlling or limiting military R&D see Albrecht, ref.15, pp.245-59; and Ulrich Albrecht, 'Military Use of Research and Development: Excerpts from the Aborted UN Study', *Bulletin of Peace Proposals*, Vol.19, Nos.3-4 (1988), pp.431-4.