New Military Technologies: Implications for Strategy and Arms Control

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ISODARCO XXVI Winter Course

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The 26th ISODARCO winter course focused on new military technologies and their relation to strategy and arms control; three previous ISODARCO courses on topics related to this one were held in the past, one in the summer of 1999, one in the summer of 2002 and the 2012 Winter Course. The 2013 Course had a broad scope, addressing both historical aspects and technical/political ones, such as the advent of drones, the ethical implications of using them for military purposes and their role in the context of non-state actors. Furthermore the course addressed the impact of new technologies on military planning, possible counter-measures against new, hi-tech weapons, as well as the implications of cyber-disruption in urban areas. The ethical and legal implications of the development and use of new technology weapons in the field have also been thoroughly discussed during the course, as well as prospects for BMD systems.

The course offered 63 (including lecturers) participants from 14 countries (Armenia 1, Austria 1, Brazil 1, China 3, Cyprus1, France 1, Germany 3, Italy 19, Russia 5, South Africa 2, The Netherlands 1, Turkey 1, UK 10, USA 13) and 4 different continents the opportunity to discuss openly a range of topics related to international cyber security issues.

16 distinguished lecturers and panelists accepted the invitation and challenge to share their knowledge and views on these topics with a highly motivated, multidisciplinary and international audience:
Jürgen Altmann (*Technical University, Dortmund, Germany*), Filippo Andreatta (*University of Bologna and Research Center on Peace, War and International Change (Fbk-Cerpeg), Trento, Italy*), Alexei Arbatov (*IMEMO and Carnegie Endowment for International Peace, Moscow, Russia*), Nadia Arbatova (*IMEMO, Institute for World Economy and International Relations, RAS, Moscow, Russia*), Fabrizio Coticchia (*Scuola Superiore Sant'Anna, Pisa, Italy*), Neta Crawford (*Boston University, MA, USA*), Peter Dombrowski (*Strategic Research Department, Naval War College, Newport, RI, USA*), Denise Garcia (*International Affairs Program, Political Science Department, Northeastern University, Boston, Ma, USA*), Catherine Kelleher (*School of Public Affairs, University of Maryland, College Park, MD, USA*), George Lewis (*Judith Reppy Institute for Peace and Conflict Studies, Cornell University, Ithaca, NY, USA*), Eugene Miasnikov (*Center for Arms Control, Energy and Environmental Studies, Moscow Region, Russia*), Niklas Schoernig (*Peace Research Institute, Frankfurt am Main, Germany*), Noel Sharkey (*Department of Computer Science, University of Sheffield, England*), Shi Shaozhu *(Northwest Institute of Nuclear Technology, Jiangsu, China),* Scott Smitson (*United States Military Academy, West Point, NY, USA*), Carlo Trezza (*Advisory Board of the UN Secretary General for*

Disarmament Matters, New York/Geneva), Steve Wright (*Applied Global Ethics, Leeds Metropolitan University, England*).

After a word of welcome to the participants of the ISODARCO course by the Director of the School, Judith Reppy presented an overview of the course. Among the main topics were the interplay between conventional arms, nuclear arms, military perspectives and new doctrines. Also new innovations on the battlefield were addressed, such as the use of drones, small, unmanned aerial vehicles (UAV) with different sorts of capabilities. In the United States, the Revolution in Military Affairs has been a widespread topic of discussion over the last decades, and in particular the information technology aspects of it. Another important topic was the current status of these affairs and their intended and unintended consequences. Similar issues discussed concerned the use of these innovative techniques in the context of police control and their consequences for civil rights.

A historical perspective on technology and war followed. History shows in many occasions that individual technological inventions, such as gunpowder or cannons, do not, on their own, lead to revolutionary changes in warfare. It is rather the social construction of technology that plays an important role. Factors in social construction may concern organizational aspects, such as the development of military doctrines and innovative strategies, but they may also be influenced by particular combinations of events, such as the economic situation of a state or the health condition of its population. This makes the assessment of the impact of technology on warfare often complex and unpredictable.

A recent development in warfare technology is the use of military robots, ranging from ground robots that can drive around on the battlefield to drones that can be armed and remotely controlled by a military command center that can find itself even on a different continent. Such robots could also be made increasingly autonomous in their operation and decisions, which is particularly important from a military perspective since the communication between the command center and the vehicle may get lost or interrupted during operations.

Automation of the battlefield has also profound consequences from an ethical and international humanitarian law point of view as has been argued during the third session. In particular, the increasing number of civilian casualties of drone attacks are a great concern, as well as the fact that attacks by drones taking place outside of the United States do not require Congress approval under the War Powers Resolution, because there is no direct presence of USA personnel on the battlefield and therefore no risk of American casualties. Furthermore, if an attack by drones in a foreign country does not constitute an act of war, but rather a crime, then this raises additional questions such as who should be held accountable for such acts.

Further technological developments of military robots may complicate the situation even further, since a single person may be able to control a number of drones. There is an urgent need to address these issues soon, since industrial interests and public opinion as well as governmental views seem to converge on the widespread introduction of these weapons without a good overview of the long-term consequences. The implications of the use of military robots on international law and arms control has been addressed in more detail by other lecturers.

In Western states the main reasons for the positive opinion on the development and use of military robots are a combination of available technologies, fascination with autonomous robots, expectation of more precision, reduced costs and the reduction of military casualties on the attacking side and civilian

casualties on the receiving side. To what extend these arguments match reality is however an open issue, and further research is urgently needed to put expectations in a more realistic perspective.

Besides concerns for the escalating use of drones by the USA military in countries such as Pakistan and Yemen, there was also concern about whether such weapons could be used by non-state actors such as terrorists and the insurgents.

Several presentations covered a perspective from a military point of view illustrating some of the technical aspects of drones as well as other new military technologies discussing a number of problems connected with their application. Some of these are the psychological reaction of the population under attack, the risk of the USA to loose their credibility, the lack of congressional oversight, the lack of military doctrine for their use and problems with accountability and control, in particular the responsibilities of the decisions in killing operations. There are also problems of multinational use and interoperability.

One problem is how new and future military technologies are advertised to politicians and other stakeholders. Film fragments showed futuristic, science fiction-like scenarios of automatized battlefields where humans played a very minor role. Such films give a strong impression of product and vision advertising rather than a realistic insight of what the use of new technology may imply in actual future warfare. This raises the serious issues of the role played by private industries and research establishments involved in the development of such technology on the social construction of the acceptation by the population and politicians of these new technologies.

A much more skeptic view on the imminent introduction of futuristic military technology was also presented. The Western way of war was described as reliance on superior technology and discipline and being resource-intensive following a decentralized pattern of decision-making. Moreover, by political choice, the procurement of weapons has been left for a large part to private industry. This means that industries, in competition with each other to promote their product, weapons in this case, rely on advertisements using the most persuasive methods available. This while among the general public and often also among the national security community, there is a basic unfamiliarity with science and technology and much technological credulousness. In a democracy, wars and the way wars are conducted are actually a political choice. The choice of the technologies used in war should not be determined totally by technology itself, but their use should be the result of a democratic political process in which the citizens should have a role. Citizens have responsibility for the laws that are designed, for example for the use of drones and other military technology. From invention to innovation to implementation, it usually takes a long time from ideas to real use. This is a long process, which actually should provide opportunities to stop ideas, change them and intervene politically. Although in the history books of many countries, like the United States, war is seen as a succession of major combat operations, the reality is that recent wars developed quickly into a protracted counterinsurgency operation that lasts long and requires much interaction with the local population.

Further ethical aspects of drone strikes were successively addressed. Drone strikes are very controversial. On one hand, the use of drones is seen as a good idea because of their presumed precision, limitation of collateral damage and possibility to assess results. They are presumed to be cheaper and avoid military victims from the side of the attackers. On the other hand, there is the problem of the control over those who take decisions during an attack, the problem that currently this type of war is left exclusively to the decisions of the executive branch of government with no Congressional oversight and the impossibility to distinguish between preventive and preemptive war.

Moreover there is a risk that low intensity wars might start with little attention of the public and the media and last for a long time with escalating casualties. Current results on the percentage of civilians killed in drone attacks in Pakistan vary widely, from a mere 6% to 77%. Collateral damage may be much higher than presumed by some.

A panel discussion on "Views from Europe" included a Russian, a German and an Italian and was chaired by Catherine Kelleher. It focused on the use of new technologies in the Military and the innovation of military concepts in Europe. The first panelist elaborated on the vision of a "New Defense Union" taking into consideration the impact of the financial crisis on military budgets within NATO countries, and reduced USA support to Europe and USA presence in European territory. Another point which has been elaborated upon was the controversial experience of the Libya campaign, the first NATO campaign in which the driving countries where Great Britain and France instead of the USA. The campaign revealed relevant gaps in European capabilities like air defense and intelligence, among others. In this context the notion of Pooling & Sharing was introduced, whose main pillars are: pooling the procurement of weapon services, sharing through partial or total integration of force structures (e.g. training facilities or setting up joint units), specialization. Pooling & Sharing is not new, it was already used in Europe and within NATO and it existed for many years. But now more emphasis is added to:

- Precedence of military effectiveness over political sovereignty;
- Cooperation efficiency in military terms, avoiding duplications;
- Economic savings.

Of course, a critical issue is the present role of NATO. What is NATO military usefulness to the USA, if Europe cannot fill the gaps mentioned? Europeans can be militarily relevant only by aligning their defense efforts. NATO needs to become more a "post-American alliance", which by definition will lead to a more autonomous Europe, both militarily and politically.

The second panelist addressed the issue of the German experience with military robots. In the past Germany had shown interest in the USA Reaper (unarmed) drone but in 2009 Germany took 3 Israeli HERON I drones in leasing. These drones are similar to the Predator and were intended for use in Afghanistan. HERON I was considered an "interim solution" since there was no fieldable European drone and HERON I was an off-the-shelf product. The leasing contract was renewed in October 2012. Until 2012, there has been no official position on German UCAVs: in the *Bundeswehr* there was great interest among the military, but no ministerial statement. Under pressure by the press, the Minister De Maizière declared that the *Bundeswehr* should procure UCAV and all major political parties agreed. Furthermore, Gen. Mueller suggested that the Reaper system should be chosen. Essentially there was no public debate or criticism. Finally, the issue of the debate on extrajudicial use of drones has been addressed, with features by some major magazines, like *Der Spiegel*. It focused on civilian casualties, with mixed receptions. De Maizière said he was "displeased" with CIA drone attacks but again no official position emerged.

The last panelist briefly illustrated the role of military programs and technology in Italian policy, and the evolution of Italian defense policy. After the collapse of both the domestic political system and the Cold War, Italy started deploying troops abroad: this was essentially the use of a military instrument as a crucial tool of foreign policy, but the military dimension of intervention has been neglected in the political debate. Again the case of Libya is illustrative: only six European countries contributed to strike missions, including Italy. The air campaign revealed shortages in Intelligence, Surveillance,

Target Acquisition, and Reconnaissance (ISTAR) capabilities.
The Italian approach was coherent with the Italian post World War II tradition, with emphasis on:

- Required multilateralism;
- Peace rhetoric;
- Bipartisan consensus;
- Absence of information;
- Preoccupation with collateral threats (e.g. migration).

Italy took a leading role in NATO using the best tools available (e.g. tornado), but there was a complete lack of information and consequently little public discussion.
More recent issues are the campaign against the joint strike fighter (F35) as well as the recent military reform, which tries to rebalance military expenditure (e.g. favoring training) while increasing budget (despite the recent spending review process). Again, citizens suffer from lack of information, since the most important military programs have been presented only briefly. To this we should add the fact that the substantial funding and involvements are not based on any actual military doctrine: the last official document is a white book of 2001. Furthermore, and as a general rule, military programs need only to get initial approval by the Italian Parliament, in order to be funded and set up; no intermediate or final assessment by the Parliament is required.

A lively discussion took place after the three presentations, which touched upon the several interrelated aspects of new concepts for defense in Europe, their relations to NATO and to the USA and the role of high-tech weapons in the related strategies and doctrines.

During the lecture on Counterforce Capabilities of Conventional Strategic Arms it was argued that conventional strategic arms are important since survivability of smaller nuclear forces will be a key condition to pave the way for further nuclear cuts, as long as the MAD (Mutually Assured Destruction) paradigm is alive. With no limits on the development of ballistic missile defenses and conventional strategic arms, there is a deep concern about survivability of future deterrents. Several scenarios of conventional disarming strikes against Russia have been developed in Russia, and some examples have been showed briefly during the lecture.

If conventional precision guided weapons (PGW) have counterforce capabilities, some widely shared views have to be revised. Single-warhead silo-based ICBMs are not stabilizing, provided that no limits are imposed on conventional PGW. De-alerting nuclear forces may lead to increasing vulnerability of these very forces, and – as a result – to destabilization. Ballistic Missile Defense is viewed as a tool to defend against an impaired second strike. What types of PGWs should be a subject of concern? The requirements to fulfill a counterforce mission are: precision, sufficient destructive power, long range, and short flight time or difficulty to be detected (at launch or on-flight). The main types of weapons to be discussed thus include: conventional ICBMs and SLBMs, Prompt Global Strike weapons, Heavy Bombers, Long range SLCMs deployed on submarine or surface ships and other types (e.g. tactical bombers deployed close to Russia bases, antisubmarine warfare, etc.)

Proving that long range conventional SLCMs threaten silo ICBMs or that they do not form a threat at all is a difficult task. What measures should be taken in order to resolve the issue of strategic conventional arms in the near term? New START contains some measures with reference to conventional strategic arms. Furthermore, sides have to:

- Identify what types of conventional arms need to be considered as strategic;

- Apply confidence-building measures to existing conventional arms that are not subject to the New START;
- Take transparency measures with respect to long range Submarine Launched Cruise Missiles;
- Apply limitations to the patrol range of submarines.

A following lecture concerned Conventional Strategic Arms, from the perspective of their implications for Strategic Stability and Proliferation. History shows a steady growth of the PGMs' role in local wars. By strategic PGMs (Precision Guided Munitions) we mean those that can be used to attack strategic targets and that can be delivered at long range or by a submarine. Apart from USA and Russia, also China is developing and deploying medium range Ballistic Missile systems with PGMs.

While the development of nuclear systems has been reduced, the development of PGM systems (both tactical and strategic) has increased. There is an unquestionable military effectiveness of PGMs in local wars. But there is a questionable utility of strategic PGMs in strategic wars between nuclear powers, foremost, the USA and Russia.

There is a kind of a myth of conventional weapons catching up with nuclear weapons by destructive power. In general, PGMs offer several advantages including constituting a moral barrier to the use of nuclear weapons, having less ecological consequences and causing less collateral damage, and postponing the dilemma of nuclear retaliation. However, there are also many deficiencies among which we can mention lengthy and visible preparation, the fact that the other side would have plenty of time to alert its strategic nuclear forces, missile attack warning and so on, and the fact that relying on hidden platforms (submarines) or fast flyers (ICBM, SLBM) greatly reduces the attacking force size.
But the most important deficiencies are:

- The fact that the response to conventional weapons could and would be the use of nuclear weapons, since the attacked side would not know what kind of bombs are carried by the incoming delivery vehicles, and their nuclear strategic forces could be destroyed if not used promptly. This would be the case with Russia, and particularly China, because of the smaller size of her nuclear forces;
- The PGMs and BMD arms race in the Western Pacific (i.e. USA systems);
- The higher danger of escalation of local conventional conflicts.

The growing technical counterforce capability of PGMs in the USA, and, in perspective, probably in other countries, would make strategic and non-strategic (tactical) nuclear arms control and disarmament more difficult. The same goes for de-alerting strategic forces and for enhancing the nuclear nonproliferation regime. Both recent arms developments, namely kinetic BMDs and PGMs systems, were originally developed to combat enemies at the regional and local levels and to counter WMDs proliferation and international terrorism. However, these weapons have begun to have a destabilizing effect on political and military relations between USA and Russia and other great powers. In so doing they are starting to undermine the nuclear disarmament and nonproliferation regime.

But if the parties concerned show political will, they can resolve or reduce the problems created by PGMs through a range of agreements and legal means. If limited by agreements, they would facilitate disarmament and enhance the non-proliferation regime.

A second panel discussion was on "The status of nuclear arms control" with four panelists. The first panelist started his talk by remarking that the disarmament stalemate is mainly determined by political

reasons, rather than technological/strategic issues. However, since politics can quickly change, there's hope for improvement. The Prague Treaty of 2010 was a (needed) refinement of the 2002 treaty, yet more work is needed. Agreement on ballistic missile defense is crucial for arms control, as it was in the 60s. There are new systems which fuel mistrust, like, for example, the X37b: a space shuttle secretly used by the USA.

Whereas the engagement of Russia and the USA is crucial, official 'nuclear' and unofficially 'nuclear' states should be involved in the negotiations. China represents a particularly worrisome example, given the lack of information on the scale of its weaponry. Moreover, the general non-proliferation agenda is also suffering from the problems posed by projects of Uranium enrichment, officially for energy reasons.

The second panelist pointed out that the focus on nuclear weapons, as opposed to other weapons of mass destruction, is crucial, because they still make the strategic difference in conflict, and because they are not completely prohibited: according to the Nuclear Non-Proliferation Treaty (NPT), the states who have exploded a nuclear weapons before Dec. 31st 1967 (incidentally, the members of the UN Security Council) have a 'temporary' authorization to possess nuclear weapons.
The NPT has no enforcement mechanism that follows the implementation of the Treaty. There's only a review conference every 5 years. The last one, held in 2010, was successful in that the participants agreed on matters of language, as it had never happened before, and for the first time countries acknowledged the humanitarian catastrophic consequences of the use of nuclear weapons. Furthermore, consensus was generally achieved on the three main pillars: non-proliferation (production of fissile material), nuclear disarmament (banning of weapons of mass destruction in the Middle East), and peaceful uses of the technology. Yet, the conference represents a statement of intention, as there is no follow-up mechanism for the decisions taken there.

The third speaker that day shed some light on the political situation in the USA for what concerns nuclear disarmament. Congress is split on nuclear disarmament, which is likely to lead to a stalemate; in practice, this translates into the Congress not passing any treaty. However, the Obama administration is willing to enter into negotiations on matters of disarmament, and to establish a cooperative approach with China. Control of strategic and tactical weapons in one treaty, although desirable, is unlikely. The relationship between offensive restrictions and reductions, and defensive activities, is not usually made in political discourse. Space is another unspoken area; however, the Republicans will likely give up their dreams on the domination of space.

According to the last panelist, China's nuclear policy is based on the perception of the role and impact of nuclear weapons. Nuclear capabilities have been kept under control following a principle of minimum deterrence. China will not participate in arms race and decided to adopt nuclear weapons only after receiving threats of being attacked with nuclear weapons. For what concerns nuclear arms control, it has been argued that China supports the prohibition of nuclear weapons and recognizes that the burden of disarmament is on Russia and the USA, and that global missile defense and counterforce strategies are perceived as obstacles to nuclear reduction. Furthermore, China fully supports CTBT but retains that other states should ratify it first.

The afternoon sessions on the fifth day where fully dedicated to new and future military technologies and in particular how these should and could be dealt with in international law, and what the role of civil society could be to make sure that the humanitarian needs are given sufficient importance. Two examples of international treaties in which civil society has played an important role are the 1997 Anti-

Personnel Mine Ban Treaty and the 2008 Convention on Cluster Ammunition. New military technologies, such as cyberwar techniques and UAV, which also have a strong information technology component, have very particular characteristics. For example, in cyberwar attacks computer malware can be used to disrupt critical infrastructures of another country through the international information infrastructure such as the Internet. These attacks could be launched from any place or even from many places at once. It is in general very hard, if not impossible, to be sure which state or sub-state actors are behind such attacks, and in some cases one cannot even be sure whether it is an intended attack in the sense of conflict between states. Furthermore, the malware is passing through the information structures of other countries, which may, in that way, get involved in a conflict involuntarily. One of the proposals to deal with cyber weapons in an international law context could be to declare the cyberspace common heritage of humanity, or "international commons". In that case, the Law of the Commons could be applied, which implies that no state can claim jurisdiction over it, that it has to be cooperatively managed, but also that no weaponization of it is allowed.

However, new military technology is not limited to cyber weapons or drones. As has been shown in the second lecture of the afternoon, there are many other developments that could potentially make it into the battlefield. Some of them might be considered biological weapons, while others have their origin in robotics and may lead to the use of small insect-like objects that may be used for intelligence purposes as well as for killing preselected individuals. Some of the current developments in military research seem to go beyond imagination. In many of these cases it is worthwhile to take stock of past experience with ways to limit arms. For example, arms limitations can be achieved if there are reliable mechanisms for verification. These mechanisms should be thought through carefully in the light of the new technologies.

The 26th winter ISODARCO course ended with a closing session introduced by the Directors of the Course and the Director of the School. In this session they looked back on some of the important issues raised during the course and opened the discussion on how to proceed from the current situation. Among the issues mentioned are the need for further international law that deals with new technologies. The Red Cross seems to be of the opinion that no new law is needed, but many people see that different. Another issue is the gap between actual wars and the way wars are imagined by those proposing new technologies led by a vision of superiority. Current wars are almost all characterized by counterinsurgency and long-lasting conflicts. They seem not to match with the ideal of high-tech battles advertised in the promotional movies for new weapon technology. It is likely that re-establishing peace needs much more effort and knowledge in terms of negotiations and collaboration with the local population. A deeper understanding of why and how new weapon technology comes about and gets introduced can perhaps lead to a better democratic control on this process. It was also recalled that behind political decisions there are usually huge emotional issues and the need to reduce anxiety. If we could manage to reduce anxiety in a positive way, such as by arms reduction, better understanding between populations, and by confidence building measures instead of by pursuing the idea of superiority, this could help to reduce tensions and the use of violence to resolve conflicts.
It was noted that all the major conflicts following World War II have been asymmetric, involving a highly industrialized country against a developing one: France in Indochina and Algeria, Russia in Afghanistan, USA in Vietnam, Somalia, Iraq and Afghanistan. In all these conflicts the problem of the industrialized nations has been the incapacity to control the territory, and the introduction of high-tech weapons has not solved and probably will not solve this problem in the future.

The second part of the discussion concerned ideas for future themes and suggestions of improvements of the organization of the course. Several themes were mentioned, among which: new technologies that

are able to shape the mind of people and emerging brain-machine technologies; societal implications of technologies and their relationship to regimes that aim at structuring peoples' lives; climate change and conflicts in relation to security and international law; sustainability; and nuclear weapons and disarmament. Also a focus beyond Europe and the Unites States would be much appreciated as well as interactive sessions in which some questions are addressed in small working groups before they are discussed in the audience.
One practical suggestion widely supported was to change venue of the next (2014) course from the traditional Sunday to Sunday to: Wednesday January 8 to Wednesday 15.

Students and lecturers attending the course enjoyed the informal atmosphere in which the lectures and discussions took place and the unique format of the course. As in previous years, the lively and well-informed participation of the international audience in the discussion following each lecture and in the roundtable sessions formed an invaluable contribution to the unique atmosphere in which these delicate topics could be openly discussed among students and professionals from so many different countries and disciplines.

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