FACTS AND FICTION OF THE KOSOVO WAR
- NEW QUALITIES OF WARFARE?

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CONTENTS

1. INTRODUCTION

1.1. **The Kosovo War in a War History Perspective.** Any war is a particular event in World History. However, among the hundreds or thousands of wars in modern history many do exhibit a lot of similarities, as to background, strategy, tactics, technology, and course of events.

Some wars, however, represent a renewal or turning point in an otherwise more gradual development of warfare. World War II and the Vietnam War are outstanding examples of such turning points.

Maybe, the war *Desert Storm* in Iraq in 1990/1991 represented such a qualitatively new kind of warfare.[1] It was characterized by the deployment of an enormous airpower and extensive use of electronic systems for intelligence, control, command, and communications (C^3I) on the Allied side. This aerial part of the warfare was indeed much more successful in the Iraqi War than in the Vietnam War. The efficiency of delivering the bombs on the targets was much higher, whereas the loss rate of aircrafts per combat sortie (and even more outspoken, per tonnage of bombs delivered) was almost unchanged.[2] The superior total efficiency was mainly due to the C^3I–superiority on the Allied side, especially after the quick destruction of the Iraqi C^3I–systems. This gave the US Army and the other deployed ground forces improved conditions for fighting the Iraqi troops. Still, it was the defeat of the Iraqi Army that led to the surrender.

Our question is now whether *Operation Allied Force*, the Kosovo War of 1999 against the Federal Republic of Yugoslavia and, in particular, against Serbia, was a more final version of a new kind of warfare, *a war from the sky* with *Operation Desert Storm* as a forerunner. In the Kosovo War, NATO's proclaimed intention was to enforce its will on the Serbian Government by means of aerial warfare alone. The loss of own personnel should be reduced to zero, and losses of civilians on the enemy side should be marginal, too, by the use of high precision weapons from the air.

In sum, the NATO Allies wanted to conduct a (new) kind of surgical warfare, obtaining their objectives in an efficient way and with losses on both sides which would be *acceptable* in the opinion of substantial segments of the public in the allied countries and in the world around. We shall study how the intentions were fulfilled.

Before trying to answer these questions we sketch a scenario, based on facts, of the ethnic conflicts and the accusations of ethnic cleansing in the Kosovo region. *Operation Allied Force* aimed at bringing the ethnic conflicts to a cessation by stressing the Yugoslavian Government through aerial attacks on military installations, broadcasting structures, the transport system, power plants, key industrial plants etc. We also sketch the strategic planning of the intervention to obtain this goal.

1.2. **Information Accessibility.** Availability of information - and to an even larger extent: spreading mis-information - have always been important ingredients of warfare. Public consent about involvement in the war activities is an important prerequisite for governments to build their strategies on, and it seems

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[1]See e.g. [12] for a careful analysis

[2]l.c., p. 261

that official approaches take huge advantage of limited and lacking knowledge when presenting points of view that suit specific political purposes.

The ongoing development of communication means and mass media actualizes this problem. There is an abundance of data and pictures. It permits mediators and media consumers to behave more cynically by focusing on what one wants to see and closing their channels, ears and eyes for remote or unwanted perspectives. However, at the same time, it permits striving for and achieving comprehensive and independent insight in full personal responsibility.

To the extent that we, not only as individuals, but as concerned scientists through our professions want to shed light on issues like contemporary warfare, our job must be to

(1) provide *information* and thereby prevent misleading and mistaken argumentation. Of course we cannot prevent the proliferation of deliberately misleading information, but we can recall generally accepted information, try to compare sources and, based on that, try to evaluate the quality of the sources.

(2) provide *sources* of information that are publicly available. That is not necessarily our job as specialists but as open-minded people, interested in getting closer to the facts of the matter.

(3) evaluate the *quality* of information within specific fields where we as scientists have got competence.

The purpose of the present report is primarily to create a more general openness towards available information, to present some of this information, and to reveal a selection of useful sources that may serve as entry points for public interest in the field. Our methodology is quite straight forward.

- To use primarily Internet based sources to compose different interpretations of the situation in Yugoslavia and Kosovo before, during and after the war.
- To focus on a number of incidents and scrutinize them in order to get a better understanding of their dynamics. And
- To discuss the quality of the Internet as a source of information for the continuous evaluation of the process.

Our report is not the final outcome of a research project, but a paper at a specific stage in a fact–finding process that basically never ends. We want to show that one is not in the mediators' pocket but can, with some endurance, gather quite substantial information about the war and assemble one's own well–founded judgment.

To re–combine available information and thereby to separate facts from fiction seems to us still more urgent when leading political circles from NATO countries present Operation Allied Force - the air war against the Federal Republic of Yugoslavia - as "the most effective air operation in history" (US Secretary of Defense William S. Cohen and Chairman of the US Joint Chiefs of Staff Henry H. Shelton when presenting [9]) having been politically imperative, militarily successful, and technologically encouraging to wage new 'operations', 'campaigns', or 'theatre wars'.[3]

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[3]This seems to be a major idea of the US Department of Defense's *Report to Congress* [9], besides justifying the action taken, the money spent for the military, and arguing for new funds and new means.

1.3. **The Structure of our Report.** The paper is organized as follows. Section 2 gives an overview of the war - step by step. Section 3 deals with the concept of "Ethnic cleansing" of Kosovo–Albanians by Yugoslavian police and army. This was a crucial argument for NATO's warfare, but till now there is only scanty evidence of systematic ethnic cleansing prior to NATO's bombings. Section 4 relates the intentions of the NATO participants with the actual outcome of the war. Section 5 reconsiders what NATO countries presented as a "clinical high precision aerial warfare without bloodshed".

Appendix A summarizes tenets of modern air war with emphasis on the double role of aerial platforms for C4 (Control, Command, Communications, and Computers) and munition delivery; the mathematics of Circular Error Probable (CEP); the costs of bomber invincibility and a description of the complicated "choreography" charted for each of the daily sorties during the war. Appendix B describes and analyzes technical characteristics of various types of precision weapons, smart bombs, and special–purpose bombs and missiles. Appendix C provides a provisional survey of major civilian and cultural objects not respected by NATO's bombardment. Appendix D gives excerpts of the international humanitarian law with emphasis on those articles of the Geneva Additional Protocol I of 1977 which shall "ensure respect for and protection of the civilian population and civilian objects" in armed conflict.

Appendix E provides maps, figures and photographs. For instance, the maps on Figures 1, 2 and 3 give an overview of Yugoslavia and of Kosovo. As sources we have chosen a number of maps that were produced and disseminated in connection with the war. They contain pieces of information relevant for the discussion in this paper.

2. THE WAR - STEP BY STEP

Of course, it is very difficult to give a total overview of such a complicated thing as a war. Therefore, the following overview does not intend to include all nuances, but to focus on events that are central to the topics of this paper, namely: NATO's bombing activity, the ethnic cleansing in Kosovo, and the damages caused by the participants of the war.

2.1. **Outline of the Prewar Situation.**

1974: - With a population of 2 millions of which more than 90% are ethnic Albanians, Kosovo enjoys autonomous province status under the 1974 Yugoslav Constitution.

1989 - 1995: - Changes in the Yugoslav constitution revoke the autonomous status and abolish the Parliament and Government of Kosovo. As a consequence, Dr. Ibrahim Rugova, President of the 'Coordinative Body of Albanian Political Parties of Kosova', sets up a shadow government and opens a campaign of resistance to the Serbian oppression.

1995 - 1998: - Rugova negotiates for the re-establishing of self governance, but does not succeed. Militant activities begin against Serbs who, at that time, make out around 10% of the population. Kosovo Liberation Army (KLA/UCK), announcing in Kosovo that its war to unify the province with neighbouring Albania has officially begun.

1998 March - June: - Kosovo-Albanians require full independence and separation. Continuing attacks by KLA. The Yugoslavian Government answers with several armed attacks and claims to have successfully destroyed the KLA's core. Violence along Kosovo's Albanian border causing casualties and Serbian civilians fleeing the region. The UN High Commissioner for Refugees estimates that over 45,000

persons from Kosovo have been internally displaced. An additional 8,000 refugees has fled to Montenegro and 10,000 into Albania.

July - September: - Foreign ministers of the six-nation Contact Group issue a statement declaring Kosovo to be a matter of priority, and USA advocate increased self–governance in the Kosovo region. Government forces are threatening the Kosovo-Albanians. An attack on Suva Reka is expected to cause another 60,000 residents to flee. In July UNHCR reports at least 52,000 persons internally displaced, and estimates that the number of refugees from Kosovo in Albania had reached over 13,000 with 10,000 in Albania's northern district, and additional 3,000 unregistered. By August UN estimates a total of 235,000 persons had fled their homes since the conflict began, with 170,000 displaced within the province while 20,000 to other parts of Serbia, 33,000 to Montenegro and 14,000 to Albania. KLA claims to control 50% of Kosovo. UN requires immediate cease of military activities and warns about a catastrophe in Kosovo. NATO prepares for air operations. Government forces take the town Junik after several weeks of fighting with KLA.

October - December: - NATO threatens with war if the Serb obligations of the UN requirements are not met. On October 13, a truce is established. The OSCE Kosovo Verification Mission (KVM) is given access to the whole area of Kosovo by the Government of the Federal Republic of Yugoslavia (FRY), which accepts re–establishing of substantial local and regional autonomy of Kosovo but not full independence. The KLA attracts world attention by continuing hit–and–run terrorist strikes, provoking massive countermeasures by police and army. In December, the truce finally breaks down and local fighting begins again in Kosovo.

1999 January: - NATO blames the Serb side for the massacre of at least 45 civilians in the village Racak and requires that those responsible are brought to court. New threats from NATO if the FRY does not meet her part of the October truce.

February: - NATO will send soldiers to Kosovo. Negotiations at the castle Rambouillet begin. Milosevic is willing to discuss the future as long as Kosovo stays a part of Yugoslavia, but insists on UN leadership of foreign forces in the Kosovo and rejects quasi-NATO-occupation status for the whole of Yugoslavia (Chapter 7 and Appendix B of Rambouillet draft treaty). Neither the Kosovo–Albanian nor the Serb side were supposed to influence the negotiations which consequently remain unsuccessful.

March 1-15: - Richard Holbrooke, the US-negotiator, does not succeed in making Milosevic accept the plan. The Kosovo-Albanian delegation signs the peace treaty in Rambouillet on March 15, but the FRY delegates still won't accept the given implementation part.

March 16-24: - Still no sign that the FRY will accept the dictate treaty, so NATO forces prepare for an attack, while the FRY police and armed forces are active in Kosovo wherever KLA is active. Thousands of villagers flee.

2.2. The War, Day by Day.

Day 1, March 24: - NATO engages in war at around 8 pm with a series of cruise missiles. At least 20 targets are hit in Serbia, Montenegro and Kosovo.

Day 2, March 25: - The attacks continue with rockets and flights during nighttime, and the first series of attacks is halted by dawn. The attacks are characterised as PHASE I against military strategic targets such as radars, aircraft, rockets etc. Defence is limited. Only few Yugoslav aircraft are involved, which comes as a surprise to NATO.

Day 3, March 26: - The NATO bombardment aimed at Yugoslav air defence forces increases without marked reaction from the Yugoslavs. No rockets are sent against NATO. Increasing worries about the situation in Kosovo - terrorisation of civilians is expected.

Day 4, March 27: - American Stealth F–117A shot down near Belgrade. Pilot rescued according to NATO. The bombing escalates while new reports speak of increasing attacks and ethnic cleansing in Kosovo.

Day 5, March 28: - Ten-thousands of Kosovo-Albanians are forced out of the province. NATO tries severe attacks on Yugoslav forces, while critics stress that this may give the Yugoslavs an excuse to increase ethnic cleansing. A second Stealth plane shot down according to Yugoslav sources (not confirmed by NATO).

Day 6, March 29: - The number of refugees is increasing dramatically. Air attacks are continuing. Phase II is initiated which involves attacks on military camps and troops. Attacks on Pristina.

Day 7, March 30: - The bombing continues - already now a Phase III is discussed. This will include bombing of police and military installations.

Day 8, March 31: - Bombing continues - NATO considers a more intensive bombing aimed at targets where "planning of military activities" is taking place.

Day 9, April 1.: - Around 156,000 Kosovo–Albanians have left the Kosovo province since the bombing started. Crash–landing in Zagreb of another damaged F–117A.

Day 10, April 2: - Bombing of military camp in Vranje -only material damages.

Day 11, April 3: - Government offices bombed in the middle of Belgrade, close to central hospital. Also bombings in Nis and Pristina, including oil refinery, police school and various bridges.

Day 12, April 4: - USA decides to prepare for attacks with helicopters. A video-documentation of an alleged massacre on 40 men in Krusha Emahde is revealed. Reportedly around 1 million refugees within Kosovo on the roads.

Day 13, April 5: - Increased bombing of oil refineries, airports, bridges, ammunition deployments and artillery.

Day 14, April 6: - Milosevic suggests a cease-fire, but it is rejected by NATO who continues the bombing, hitting among other targets a dwelling block in Aleksinac where 30 people are killed or wounded.

Day 15, April 7: - Increased doubt about NATO's ability to hit military targets. At the same time a large number of semi-military and civilian targets are hit, such as the chemical plant in Lucani, airport and parts of Belgrade, and an industrial complex in Cacak. Proof that Kosovo–Albanian people are expelled from their villages.

Day 16, April 8: - Bombing of Yugoslavian army buildings. Bombing of the Brankov-bridge is prevented by thousands of Serbs making themselves a living shield on the bridge. Similar action in Novi Sad protects the last bridge across the Danube river.

Day 17, April 9: - Dwelling area in Pristina hit by NATO bombs. Petroleum tanks 30 km south of Belgrade are burning.

Day 18, April 10: - NATO claims to have destroyed the Yugoslav Air Force headquarters and 29 MIGs - half of the Yugoslavian air force's fighters. Also three of the most important military headquarters including substantial deployments of fuel are allegedly hit. The Yugoslav army's system of control and communication has suffered severe damages.

Day 19, April 11: - Albania gives full NATO access to airspace, harbours and roads.

Day 20, April 12: - Train with international passengers hit by NATO bombing, and at least 16 killed. Also attacks on Pristina and bombing of a military factory.

Day 21, April 13: - NATO prescribes additional forces and additional 300 aircraft. Attacks on Pristina. Reportedly, Yugoslav forces move into Albania and create a tremendous provocation of the NATO forces.

Day 22, April 14: - 75 Kosovo-Albanian refugees killed in a NATO attack. Some 640,000 have fled from Kosovo. New mass graves excavated near Velika Krusa in Kosovo.

Day 23, April 15: - NATO admits the bombing of the refugees. Bombing of a variety of buildings in and near Belgrade.

Day 24, April 16: - UNHCR indicates that Kosovo is getting deserted by ethnic Albanians who fear NATO's bombs or are expelled. USA claims new evidence of mass graves.

Day 25, April 17: - Growing difficulties for NATO to explain bombing of civilian objects. NATO shows images of mass graves. Milosevic rejects the suggested UN peace plan.

Day 26, April 18: - Starvation is threatening the refugees in Kosovo. More than 30 targets in Yugoslavia hit by bombs during the last 24 hours. NATO distributes leaflets calling the Yugoslav soldiers to desert the army.

Day 27, April 19: - NATO admits propaganda. Warfare in the mountains is prepared.

Day 28, April 20: - Rumania opens its airspace for NATO missions.

Day 29, April 21: - NATO forces move temporarily into Kosovo. NATO announces destruction of the party headquarters in Belgrade.

Day 30, April 22: - NATO bombs Milosevic's residence. Yugoslavs claim that more than 500 civilians have been killed through NATO attacks.

Day 31, April 23: - NATO summit in Washington. NATO bombs the Serb state television building in central Belgrade. NATO rejects Milosevic's peace plan.

Day 32, April 24: - NATO blocks access from the sea. A new NATO rocket ends up in Bulgaria.

Day 33, April 25: - NATO bombs a TV station and a chemical factory. Information about new massacres in Kosovo. NATO countries disagree on the marine blockade.

Day 34, April 26: - NATO bombs the last working bridge across the Danube north of Belgrade. A suggestion from Serb party leader and FRY government member Vuk Draskovic creates some confusion about the consent in the Yugoslav government.

Day 35, April 27: - An American Apache-helicopter crashes. NATO won't use power to keep up the oil embargo. Growing fear of epidemics.

Day 36, April 28: - Vuk Draskovic dismissed from the government. A new misguided bombing causes problems for civilians. New reports from refugees on cruelties against them.

Day 37, April 29: - NATO intensifies the bombing of Montenegro, and a rocket hits a dwelling house near Sofia, Bulgaria. Albania is close to a break-down and refugees report on cruelties in Kosovo.

Day 38, April 30: - NATO is bombing Belgrade and other targets in Yugoslavia. A report about ethnic cleansing in Kosovo concludes that the activities have been planned ahead.

Day 39 - May 1: - Milosevic frees three American soldiers. NATO bombs hit a bus in Kosovo and kill 40 civilians. New attacks against Belgrade and other targets. New ethnic cleansing campaign. Thousands of refugees cross the border to Albania.

Day 40, May 2: - An American F-16CG aircraft is shot down over Western Serbia, but the pilot is saved according to NATO. In Novi Sad the inhabitants are stressing the ecological consequences of the bombing of an oil refinery. Milosevic submits an appeal for peace but is rejected.

Day 41, May 3: - Yugoslavian authorities claim that NATO has hit another bus with civilians. The Obrenovac electric power plant in Belgrade is struck by NATO planes, and large parts of the power supply in Serbia are affected by the bombing. Macedonia won't allow refugees to pass the border. The Kosovo Task Force register a total of 665.520 refugees, with 395.600 in Albania, 193.200 in Macedonia, and 61.800 in Montenegro.

Day 42, May 4: - New calculations recognise that more than 900,000 refugees have fled Kosovo. Yugoslav officials contends that 400 civilians have thus far been killed in the NATO air strikes, while NATO officials deny. A Stealth F–117 and an A–10 Thunderbolt II are hit by ground fire and heavily damaged, but return safely.

Day 43, May 5: - Another Apache-helicopter crashes on a training mission in Albania with two U.S. crew members killed: NATO's first reported deaths in the war. NATO

intensifies the bombing, and strikes Yugoslav airfields, radar sites, command-and-control installations and ground forces.

Day 44, May 6: - British Ministry of Defense officials said that the air campaign has damaged or destroyed 50% of Yugoslavia's MIG-29s, 9 of 17 airfields, 32 bridges, and 20% of the major ammunition depots. NATO now has approximately 700 aircraft and 30 ships in the theatre. Macedonia closes the border for all passage of refugees. Nis is targeted for bombing.

Day 45, May 7: - The Yugoslavs are prepared for an honourable compromise. UN authorities are allowed into Kosovo. NATO air strikes continued, with armoured vehicles, petroleum depots, and airbases were the principal targets, especially near Nis. Additional 176 US aircrafts bringing the US total to 815 of the 1,092 NATO aircraft in the conflict. NATO recognises that an erroneously dropped cluster bomb dropped on a residential area in Nis has killed at least 14 civilians. Milosevic's home town is bombed. A NATO aircraft, reportedly a U.S. B–2, drops bombs on China's embassy in Belgrade, killing 3 and wounding 20.

Day 46, May 8: - Pentagon claims that at least 4600 Kosovo-Albanians have been massacred since the start of the war and that the moderate Kosovo-Albanian leader Fehmi Agani has been killed.

Day 47, May 9: - CIA misinformation based on outdated maps is blamed for the bombing of the embassy. 100,000 demonstrate in Beijing, where USA closes its embassy.

Day 48, May 10: - Milosevic claims that Yugoslav forces are withdrawn from Kosovo. A total of 407,000 refugees in Albania, 230.900 in Macedonia, and 61.700 in Montenegro.

Day 49, May 11: - China requires a stop of the bombing, but the UK minister of foreign affairs, Robin Cook, promises to continue. The Yugoslav news agency Tanjug claims that several have been killed by NATO attacks. NATO stepped up the air campaign, flying 623 sorties over the past 24 hours, striking Yugoslav forces in the field, airbases and communications/logistics sites.

Day 50, May 12: - Increased number of strike sorties, bringing the total to about 20,000 since the war started. Yugoslavs claim that a large number of civilians have been killed and wounded by the attacks. NATO troops in Macedonia totalling 14.400, and in Albania 10.700. In addition there are 2.200 US Marines in the Adriatic. Jeltsin threatens with the withdrawal of Russia from peace activities. General Segers, chief of operations of the Belgian general staff, questions NATO assessments of damage to FRY ground forces. Evidence indicated that only 6% of FRY tanks have been destroyed (instead of claimed 20 %. He also describes damage to the FRY's air defence system as "moderate", saying the overall system remains "effective", with only minimal damage to mobile air defence missiles.

Day 51, May 13: - Bad weather limits the bombing, but targets include the Serb television building in Novi Sad, and a military airport in the Belgrade suburbs. JCS Chairman Gen. Shelton provides the following statistics on targets destroyed or damaged: 50% of air defense radars, 33% of military fuel reserves, 66% of ammunition factories, 25% of armoured vehicles, and 40% of artillery. Between 140 and 250 Yugoslav soldiers leave Kosovo as a first sign of the partial withdrawal pledged by the Yugoslav government.

Day 52, May 14: - Yugoslav press claims another 100 civilian victims of NATO attack with cluster bombs. USA claims that Yugoslavia is responsible, but NATO promises investigations. With 679 sorties completed, strikes hit electrical power lines and cut out power supply to the three largest Yugoslavian cities. Greece does not allow Greek territory and air space to be used for carrying out military operations against the FRY.

Day 53, May 15: - NATO claims that a bombed village in reality was a military camp guarded by civilians.

Day 54, May 16: - A video of a massacre in Kosovo is revealed.

Day 55, May 17: - UNHCR estimates the total number of refugees to be 744.100. Serbs force a train with 2000 Kosovo–Albanian refugees trying to reach Macedonia to return. Bombing results in the death of 2 civilians. 70,000 refugees are on their way to the border.

Day 56, May 18: - NATO attacks more towns, highway bridges and communication sites. 1000 new refugees arrive in Macedonia.

Day 57, May 19: - The Italian parliament calls for a stop of bombing. NATO claims that around 1000 Yugoslav soldiers have deserted. Serbs claims at least four people were killed when NATO planes struck the town of Gnjilane in Kosovo. NATO claims to be studying satellite photographs to see where FRY forces are digging up mass graves and reburying the bodies separately to hide evidence of war crimes against Kosovo Albanians.

Day 58, May 20: - A fierce attack on selected targets in and near Belgrade also causes damages on a hospital near Belgrade military barracks was hit, and four patients are killed. The Swedish, Norwegian and Spanish ambassador's residences also suffered damages. Pentagon reports that NATO air strikes so far have destroyed 556 items of military equipment in Kosovo, including 312 armoured vehicles and artillery.

Day 59, May 21: - A missile that struck a fuel depot in Belgrade damaged the nearby Swiss and Indian ambassador's residence. NATO bombs a jail in Kosovo killing the deputy governor, but claims it is a military installation and therefore a legitimate military target. UCK claims to have conquered a village.

Day 60, May 22: - Intensified attacks by NATO. NATO claims that Yugoslav forces in Kosovo are attacked. USA requires that 50,000 men are stationed at the Kosovo border. NATO admits bombing UCK guerilla.

Day 61, May 23: - UCK asks NATO to intensify, and NATO conducts massive bombing.

Day 62, May 24: - NATO intensifies air strikes against the Yugoslav electrical grid, causing lengthy blackouts in Belgrade and Novi Sad. A UN delegation in Kosovo finds proof of ethnic cleansing. According to Lt. Gen. Michael Short, commander of NATO's air war, NATO planes are now flying some sorties below 15,000 feet (5,000 m), in part to gain better sighting of targets. If the alliance continues the bombing "for two more months, we will either kill this army [in Kosovo] or send it on the run."

Day 63, May 25: - 1,004 aircraft are now participating in Allied Force. NATO wants to double the number of soldiers in the planned peace force - from 28,000 to 50,000 soldiers. Internal disputes result in a continuation of the bombing. UN reports claim that Kosovo-Albanian women are raped by Yugoslav soldiers. More than 20,000 refugees on their way to Macedonia.

Day 64, May 26: - For the third time NATO bombs the TV station in Novi Sad. Red Cross first aid to Pristina.

Day 65, May 27: - NATO commander Gen. Clark has received permission to expand targeting to civilian telephone and computer networks used by the Yugoslav military. The chief prosecutor of the International Criminal Tribunal for the former Yugoslavia announced the indictment of President Milosevic, President Milutinovic and four other Yugoslavian leaders at The International Criminal Tribunal for the former Yugoslavia (ICTY) in The Hague, and one of the statements includes the killing of at least 23 children. Fierce NATO attack on selected buildings in and near Belgrade.

Day 66, May 28: - The attacks on Belgrade result in cut-off of electrical power. The FRY intensifies air defence attacks by radar–guided surface–to–air missiles. Yugoslav TV announces that Yugoslavia accepts the G8-peace plan.

Day 67, May 29: - France and Germany call for a G8-meeting on the peace process.

Day 68, May 30: - Several civilians die after NATO attack. UK will send 50,000 soldiers to Kosovo.

Day 69, May 31: - NATO bombing hits sanatorium. Rumours claim that Milosevic will accept the main content of the peace plan.

Day 70, June 1: - A bridge where civilians were returning from market is bombed, and NATO bombs a playground. In total more than 40 civilians killed is reported by Yugoslav media. EU and Russia address Belgrade with a peace proposition.

Day 71, June 2: - Arrival of the mediation group. Yugoslavs claim that they have experienced minimal losses, but a total of 1.800 soldier have been killed since NATO's air campaign began.

Day 72, June 3: - Yugoslavia accepts the peace plan. The head of a UN mission to Kosovo found "indisputable evidence" of Serbian "ethnic cleansing", as well as "ample evidence" of serious bombing damage. According to the Pentagon, 99,6% of the 20,000 munitions used in the air campaign have hit the intended target.

Day 73, June 4: - NATO continues the bombing in spite of the Yugoslav acceptance. UCK supports the peace plan. Yugoslav bombing of targets in Northern Albania.

Day 74, June 5: - Military representatives from Yugoslavia and NATO discuss the withdrawal of forces.

Day 75, June 6: - The meeting continues. Rumours that FRY police and armed forces are burning corpses in order to hide committed atrocities in the course of ethnic cleansing.

Day 76, June 7: - The FRY rejects withdrawal, and peace negotiations continue.

Day 77, June 8: - G8-countries accept the UN resolution about international forces in Kosovo. Still no agreements on the Yugoslav withdrawal. Bombing of Belgrade and other towns continue. UNHCR estimates the total number of refugees in the region to be 782.300, including 444,000 in Albania, 247,000 in Macedonia, 69.600 in Montenegro, and 21.700 in Bosnia.

Day 78, June 9: - Agreement on Yugoslav withdrawal from Kosovo signed. The first groups of Serbian police from combat units in Kosovo pulled out on order given by the Yugoslav Army. The Serbs celebrate in Belgrade and Pristina. USA will not give money for reconstruction work.

Day 79, June 10: - According to the agreement withdrawal of FRY forces is to begin immediately and be completed in phases by June 20. The Yugoslav withdrawal starts around 12.30. 3 hours later NATO officially stops the bombing, and the war is over. By 7.00 pm a UN resolution authorises the peace corps led by NATO in Kosovo. British KFOR troops could enter Kosovo, and the initial elements of the US KFOR contingent will be 3.6000 troops, to be replaced within 30 days by 7,000 troops.

2.3. **Internet Sources and Monographs.** There have been five main Internet sources for the above list of events. First of all the Norwegian *Nettavisen*[4] with as well daily updates as regular Kosovo summaries of activities and events. This information source has proved to be very objective, and for more details about daily events, consult it if you are able to read Norwegian. We have also used the *Stratfor*[5], the *MSNBC* service[6], and reports from the *Federation of American Scientists*[7]. This source also provides day by day images, maps and even videos which may serve as very useful information. Especially in relation to photographic evidence, the official homepage of the US Department of Defense[8] also proves a valuable source, just as the "Kosovo/Operation Allied

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[4]http://www.nettavisen.no

[5]http://www.stratfor.com

[6]http://www.msnbs.com

[7]http://www.fas.org

[8]http://www.defenselink.mil/photos/operations/

Force After-Action Report - Report to Congress" [9] does. In addition, the book [7] "Kosovo-Serbia: A Just War?", edited by Frank Columbus, includes two chapters on this issue, Chapter Sixteen: 'Pre-bombing Kosovo Conflict Chronology', by Valerie Makino and Julie Kim, and Chapters Seventeen and Eighteen: 'Kosovo Situation Reports: May 1999' and 'June 1999', based on Library of Congress Kosovo Task Force, which is a very detailed source of information.

Most of the official NATO presentations of strategic maps, targets etc. are available on a more or less day-by-day basis, but the numbering of the lists of maps is not consecutive. For instance maps and images from March 28 (day 5) are available on `http://www.fas.org/irp/imint/kosovo-03.htm` while maps and images from May 24 (day 62) are available on `http://www.fas.org/irp/imint/kosovo-75.htm`.

Both sets of maps are shown in Figures 4, 5 and give a very good idea of the types of information that are actually available. The information pages also include more general overviews, satellite images etc. relevant for understanding the situation in Yugoslavia. An overview of Kosovo imagery is available on `http://www.fas.org/irp/imint/kosovo-imint.htm`.

The value of Internet sources is seriously restricted by the often limited life time of electronic home pages. In the long run, it may turn out that traditional hard copy monographs provide more accessible and lasting information than the Internet. In addition to the aforementioned monograph [7] we shall give the following references.

From quite different angles descriptions of the pre–war development and an assessment of NATO's declared or supposed motives and scope are provided by Chomsky [4], Collon [6], Jacobs [18], Judah [20], Loquai [22], Richter, Schmähling, and Spoo [25], and Weller [32].

Other books focus on the actual course of the war. Most of them point to a powerful but limited influence of airpower. Some address also what they perceive as diplomatic miscalculations and moral blunders in the lopsided, ill–advised conflict. In particular, we refer to Atkins [1] (important for examining the weapon systems that were used and the designed and implemented tactics and strategies), Clark [5] (announced), Daalder and O'Hanlon [8], the Yugoslav Government Report [11], Gentile [13] (Afterword), and Ignatieff [16].

A variety of viewpoints (rather opinions) upon the war has been collected in Buckley and Buckley [2]. For a comprehensive account of the media and the war see Hammond and Herman [15].

3. ETHNIC CLEANSING

The concept of "ethnic cleansing" and the alleged atrocities by the FRY police and armed forces against Kosovo–Albanians have been crucial in the argumentation and political legitimation of the NATO countries for their warfare. Before, during, and after the air attacks, it was claimed that 'one could not look away'. In his address of September 22, 1999 to the United Nations' 54th General Assembly, the German foreign minister Fischer asked:

> "What is to be done when entire states collapse and the civilian population is massacred in neverending civil wars from all sides? What if ethnic tensions in a state are partly provoked by criminal governments which then respond with pogroms, mass expulsions and mass

> murders, even genocide? Should the UN then regard state sovereignty
> as more important than protection of individuals and their rights?"

Fischer went on to legitimate NATO's air attacks (and violation of international law) by referring to systematic mass murders close to genocide which he claimed had taken place in Kosovo before the war.[9]

The question, however, is - was he right?[10]

The EU Forensic Expert Team headed by Dr. Helena Ranta has been investigating the alleged atrocities in Kosovo since October 1998. According to Dr. Ranta,

> "The original mission of the EU forensic experts was authorized to investigate in an impartial and independent manner, sites of alleged killings of civilians in Kosovo, i.a. in Glodjane, Golubovac, Gornje Obrinje, Klecka, Orahovac and Volujak."[11]

It seems that the investigations concerning Klecka and Volujak were not completed before NATO's air attacks began, and that the other investigations were interrupted or postponed when the Racak tragedy was discovered on 16 January 1999 and it was decided that the Team should also investigate this. In a press conference on the Racak tragedy of March 17, 1999, Dr. Ranta made the following personal statement (excerpts):[12]

> "According to various sources of information, the incident in Racak most probably took place on or around 15 January 1999. The EU forensic experts only started working in Pristina on 22 January when the bodies had already been brought to the morgue. ... According to these sources (OSCE/KVM and EU/KDOM observers and reports in the media, *red.*), altogether some 45 bodies were found in Racak", yet only 40 were taken to the morgue at Pristina. "Based on the information obtained from the KVM and KDOM observers the total of 22 men were found in a gully close to the village of Racak. They were most likely shot where found. Most of them have been turned

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[9] http://www.auswaertiges-amt.de/6_archiv/99/r/r990922b.htm. Just to record remarkable war arguments, we quote Fischer a little more: "The intervention in Kosovo, which took place in a situation where the Security Council had tied its own hands after all efforts to find a peaceful solution had failed, was intended to provide emergency assistance and, ultimately, to protect the displaced Kosovo Albanians." The German version (http://www.auswaertiges-amt.de/3_auspol/3/3-3-1f.htm) reads the Latin *ultima ratio* instead of the ominous 'ultimately'. The Hamburg philosopher Harald Wohlrapp comments in [33], p. 132 (his translation): "With some basic historical knowledge the meaning of *Ultima Ratio* becomes obvious: It refers to the moment when the authorities believe that they need not care for non–violent solutions any longer. Thus there is no sense in musing whether a *Ratio* for war was really a *Ultima* one. The question is instead whether war has a *Ratio* at all or if it should more appropriately be seen as the beginning of *Irratio* (i.e. the release of the subrational human potential). War is under control only as a plan in mind. In reality it sooner or later becomes a self–dynamic process destroying the cultural network which is needed for rational orientation among human beings."

[10] When one shows that he was not, as it seems to us we do, it might be interesting to ask further - is he lying? or was he really poorly briefed before the war and still poorly briefed about the evidence available by September 22, 1999, the day of his address? Who has the motive and the capacity to mislead Fischer and other leading politicians of NATO countries? Who is responsible: military circles, diplomatic circles, mass media -or the political establishment itself?

[11] Three of the alleged killings were attributed to Serbs, three to Albanians, [22], p. 48.

[12] http://www.usia/gov/regional/eur/balkans/kosovo/texts/racak.htm

over at some stage. The rest of the victims were found at or close to the village and had either been turned over or moved after death into houses in the village".

"The Racak events have been described as a 'massacre'. However, such a conclusion does not fall within the competence of the EU Forensic Team or any other person having participated solely in the investigations of the bodies. The term 'massacre' cannot be based on medico-legal facts only but is a legal description of the circumstances surrounding the death of persons as judged from a comprehensive analysis of all available information. Thus, the use of this term is better suited to be used by organs conducting criminal investigations for the purpose of initiating legal proceedings. Moreover, medico-legal investigations cannot give a conclusive answer to the question whether there was a battle or whether the victims died under some other circumstances".

The report also mentions that

"No indication of tampering or fabrication of evidence was detected".

And

"After the completion of the autopsies in January, the Serbian and Belorussian pathologists decided to draw up common reports summarizing their findings. The Finnish Team declined to sign these which was erroneously interpreted as disagreement on the findings between the local experts and the Finnish Team."[13]

Evaluation in media segments when commenting the Paris/Rambouillet negotiations:

"The negotiating team's hopes of being able to use the forensic findings on the killing of more than 40 ethnic Albanians at Racak in January - which led to the peace talks in France - to increase pressure on the Serb delegation evaporated in the vague conclusions of the Finnish forensic team. Releasing the report in Pristina on Wednesday the head of the team, Dr. Helena Ranta, declined to term the event as a massacre or to blame Serbian security forces."[14]

From a professional logical point of view, perhaps the best to be said on fact and fancy is the following:

"The fact is that there were no massive expulsions from Kosovo before NATO started its air attacks. Whether (1) Serbia cleverly timed the expulsions to occur after the bombing began (as suggested by the Pentagon publication of the ominous 'Horse Shoe Plan' attributed to the Yugoslavian government, eds.), or (2) NATO stupidly timed the bombing to start before the expulsions, or (3) the expulsions were

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[13]In addition to this statement by Dr. Ranta, one finds on `http://www.srpsk-mreza.com/ddj/Racak/Tiker/RacakFile.htm` a file of 13 pages compiled by a Yugoslavian team of journalists on January 23, 1999. Available are also the medico-legal report by a Belorussian pathologist (l.c.) and a Washington Post Foreign Service report by R. Jeffrey Smith (`http://06.132.25.71/wpsrv/inatl/daily/march99/racak17.htm`), claiming that the German EU presidency vetoed the publishing of a summary and the full report by the (Finnish) EU Forensic Expert Team: "One Western official said the German government, which holds the rotating chairmanship of The European Union, had ordered the Finnish team not to release a summary of its probe, which includes details about how some of the victims appeared to have died. Instead, at Bonn's request, the team agreed to release only the voluminous summaries of autopsies it helped conduct on bodies of victims."

[14]World News, Sydney Morning Herald, 19 March 1999

a reaction to the bombing, or (4) the two events were unrelated, is speculation."

"Of course, the best solution for the residents of Yugoslavia would have been for Serbia to cleverly delay its expulsions until after the bombing started and NATO to cleverly delay its bombing until after the expulsions started. This bit of double cleverness would have prevented an unnecessary and completely counterproductive war. The bombing created a military necessity for the expulsions (but not the murders), and NATO must have known that the expulsions would follow the start of its campaign. I have the impression that some ... would blame the bull in a bullfight."[15]

NATO Headquarters estimates of Kosovo–Albanian victims in connection with ethnic cleansing reached a number of 10,000 persons before air attacks. These figures grew markedly during and after the war. In comparison, expert teams mentioned around 2.500 victims before the war. By the end of the war (June 17) once again, figures of "more than 10,000 victims" are mentioned (British foreign minister). On August 2, the number increases with another 1,000 when Bernard Kouchner - UN administrator in Kosovo - claims that more than 11,000 persons have been found in mass graves.

After the war a number of investigation committees have been involved in further research.

- One of the most severe cases - 700 Albanians whose corpses were said to be hidden in the Trepca mines in Kosovo - was investigated and the result released on October 11, 1999 by the International Criminal Tribunal for the Former Republic of Yugoslavia: no corpses were found.
- By the end of October 1999 a team of experts from 15 nations, including Denmark, had investigated 150 out of 400 supposed mass graves and concluded that a number of corpses had been found, but nothing which could indicate mass executions.
- FBI investigated 30 alleged mass graves and excavated a total of 200 corpses.
- A Spanish team excavated a number of graves, expecting to find more than 2,000 corpses according to informants, but found a total of 187 corpses, and nothing which could resemble mass graves.
- An alleged mass grave in Ljubenic near Pec should, according to informants, include a total of 350 corpses, but only 7 were found.
- In Pusto Selo reports - including satellite imagery indicating graves - supposed the killing of 106 persons, but no corpse was found.
- By November 11, 1999 The International Criminal Tribunal for the Former Yugoslavia had dug out a total of 2.108 corpses in Kosovo[16], whereas the alleged number, circulating between informants and reports, was a total of 11.334 corpses in 529 graves.[17]

It is not the purpose here, and probably not yet possible at all, to come up with precise figures, or give a moral evaluation of the deeds or misdemeanours

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[15]David Lorge Parnas, Ancaster, Ontario, Canada, Professor of computer science and for decades scientific adviser of the US government in military matters, in a letter to the Guardian Weekly, August 5, 1999

[16]Statement by Carla del Ponte

[17]Main Source: http://www.stratfor.com

and their outcome. The only purpose is to draw attention towards the uncertainties about the scale of ethnic cleansing which was the declared basis of the NATO actions.

4. Plans and Outcome

What did NATO participants intend with the war and what did they get?

The media, at least, expected a "nice clean war" similar to the image produced by USA and NATO of Operation "Desert Storm" in Iraq. Unlike the Gulf War of 1991, however, nothing indicates that NATO's air power defeated Serb ground forces in Kosovo or elsewhere. It is also obvious that Serbs successfully resisted NATO's entrance into Kosovo, in as far as NATO forces were too few to carry out the kind of overwhelming attack that planners felt required.[18] As a consequence, NATO only attacked from the air.

4.1. **Target Selection and Order of Battle.** As to NATO's military targets in Yugoslavia, Dana Priest[19] emphasises:

> "NATO began the war over Kosovo with a one-volume Master Target File containing 169 targets. It ended with more than 976, filling six volumes. 'Producing' targets fell mainly to the U.S. Joint Analysis Center in Molesworth, England. There, U.S. intelligence was brought together, analyzed and transmitted over the classified Siprinet computer system to targeteers at the U.S. European Command. It also went to U.S. targeting cells in Vicenza and Aviano, Italy, where blue folders stuffed with maps, satellite photos and 'aim points' made up a pilot's recipe for demolition.... Locating underground bunkers, storage sites, command posts and the like was only the first step in producing targets. Analysts then checked all sources of timely intelligence–satellite imagery, human sources, electronic intercepts of phone conversations–to make sure the buildings were still being used by the military as close to the scheduled strike as possible. ... This time-consuming process threw targets back into the loop over and over again. By late April, NATO had more combat planes than it did targets to hit. Both Clark and the airmen putting together each day's tasking orders were frustrated."

The second month of the bombings had ever increasing focus on seemingly (or clearly) civilian objects. Dana Priest summarizes the command and target selection structure:

> "By May, the group was churning out 25 targets a day, up from five a day at the start of the war. . . Yet only once – in the case of an electronic plant in the Serbian town of Nis – did the group reject a target for lack of a sufficient military link. After the internal military review, the target approval process passed through the White House, the British prime minister's office and the French presidential administration. During the first 45 days, Gen. Henry H. Shelton, chairman of the Joint Chiefs of Staff, was at the White House every day, seven days a week, with targets that needed the president's approval."[20]

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[18] `http://www.stratfor.com/crisis/kosovo/specialreports/special91`

[19] Washington Post, 20 September 1999

[20] The decisive and almost absolute role of one single NATO member state, the USA, in target selection and operation planning during Operation Allied Force may appear strange and

On August 20, 1999, NATO's Allied Commander in Europe, Gen. Wesley Clark, gave a BBC Newsnight[21] a review of the 11-week NATO air campaign. He said he had faced a tough internal battle in the alliance about which targets the military allowed to bomb in Yugoslavia – and that he had effectively "sidelined" the more doubting doves.

> "I found which ones wanted to push harder, which ones were nervous and I tried to pick out the targets in such a way that I maintained support and cohesion. ...I didn't always defer to those who wanted targets withheld."

4.2. **Anticipated Phases - Plans and Reality.** Figure 6 shows[22] how the NATO forces developed during the war: the air forces involved are nearly trebled. Various explanations have been given which we won't discuss all here. To us, it may illustrate that NATO planners expected the war to take place more or less according to the following schedule[23]:

Phase I. Destruction of offensive as well as defensive systems. This would include the destruction of radar systems and the defeat of rockets and air force. Consequently surrender was expected. Otherwise Phase II would commence.

Phase II. Destruction of the military infrastructure: severe damaging and destruction of airports, military transportation and communication lines. Consequently surrender was expected. Otherwise Phase III would commence.

Phase III. Destruction of military support structure including severe damaging and destruction of power lines and military installations. Consequently surrender was expected. Otherwise Phase IV would commence.

Phase IV. Blocking of civilian structures: severe damaging and destruction of main energy supply including power plants, oil refineries, infrastructure such as communication lines, main transportation lines, means of transportation, key industrial structures etc. By now a total surrender was expected.

Instead of this plan, the outcome seems somewhat different:

Phase I. [Destruction of offensive as well as defensive systems] The Yugoslav radar system only in limited use and therefore only partly destroyed. The Yugoslav defensive rocket systems and air force only active to a very limited degree, and consequently only partly damaged. *Effect*: Instead of surrender, a massive expulsion of ethnic Albanians from Kosovo started (predictably, but nevertheless confusing NATO).

Phase II. [Destruction of the military infrastructure] The Yugoslav airports, military transportation systems and parts of the communication lines are severely

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conflicting with the NATO command structure as described e.g. in [29]. However, it can also be considered as quite normal in an alliance of sovereign states that a member state contributes forces only subject to own and full control about its deployment. It seems that exactly this was granted the alliance's most mighty partner and by far most mighty contributor to Operation Allied Force. The deviation from standard NATO practice may also explain why France and Spain did not permit their ally's USA's heavy bombers to use French or Spanish airspace for bomb and missile delivery, only for return (see [34]).

[21]`abcnews.go.com/wire/World/Reuters19990820_1935.htm`

[22]The illustration is from `http://www.fas.org/man/dod-101/ops/allied_force_orgat_trends.htm`. More detailed information about the types of the Operation Allied Force aircraft involved are available on `http://www.fas.org/man/dod-101/ops/kosovo_orbat.htm`, see also our Appendix A.

[23]See also [9], p. 7f where the term 'phased air campaign' is used and similar but partly more vaguely defined labels are given to the different phases

damaged and partly destroyed, but with little effect due to the limited involve-ment of the military. Unlike the Gulf War, the allies were not able to break the Yugoslav C4 network. *Effect*: Instead of surrender, the expulsion of ethnic Albanians from Kosovo is intensified.

Phase III. [Destruction of military support structure] Severe damaging and de-struction of power lines and military installations, but also civilian losses and destruction of non-military structures such as churches, hospitals, schools etc. *Effect*: Instead of surrender, the expulsion of ethnic Albanians from Kosovo is further intensified.

Phase IV. [Blocking of civilian structures] Severe damaging and destruction of main Yugoslav energy supply including power plants, oil refineries, infrastruc-ture such as communication lines, main transportation lines, means of trans-portation etc. At the same time an increased number of civilians are hit. *Effect*: Instead of surrender, the expulsion of ethnic Albanians from Kosovo is dramat-ically increased and almost completed, causing a massive fear for the long term consequences, not only for the Balkan countries, but for Europe in general.

5. TOWARDS A CONCLUSION: QUALITATIVELY NEW MEANS OF WARFARE?

We are now turning to the questions mentioned in the Introduction concern-ing the more technical aspects of the warfare. Did *Operation Allied Force* reveal qualities and advantages of a new kind of warfare so that it may repre-sent a model of future warfare? Even if the intervention from a general point of view (including the political aspects) did not proceed according to its plans, it might from a technical point of view imply features of future warfare.

Many characteristics of the war deserve attention:

5.1. **The Costs of the Air War.** First of all, the air war cost $7 billion[24]. That probably makes it one of the cheapest wars in history, with an average eco-nomic expense of less than $15 per capita in the NATO countries. Very cheap compared to Operation Desert Storm against Iraq in 1991, which lasted only a few weeks, but cost $102 billion. The aftermath of the war seems to be con-siderably more expensive for the NATO countries. The costs of the occupation force is estimated at around $60 billion per annum.

The preceding cost estimate deals with the direct costs of the warfare, in-cluding expenses of running the military operations as such (munitions, fuel, loss of equipment, wages, etc). This kind of estimate can be made rather easily, but it is only of limited relevance. The costs in pre–war time related to tech-nological development, maintenance of the military systems and the hardware, wages for the permanent staff and so on should be taken into consideration, too. However, it is very difficult to include these expenses in a cost benefit analysis.

Whether the costs are balanced by considerable profits for the arms and air-craft industry is anyone's guess.[25] To give a hint, the new (though still manned) Joint Strike Fighter (JSF) program with Boeing and Lockheed still competing

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[24]Financial Times, June 7, 1999

[25]The issues of *Aviation Week and Space Technology* can be consulted profitably

as main contractors, has a *potential* of \$300-400 billions, 5-6 times the budget of the disputed National Missile Defense (NMD) program.[26]

It is much more complicated to make up the costs and losses for Yugoslavia. The Economist Intelligence Unit estimated that NATO's bombing campaign will cost Yugoslavia almost \$64 billion and make it the poorest country in Europe[27]. According to Stratfor.Com[28], NATO's air campaign caused the collapse of nine bridges across the Danube and Sava rivers. This has of course been a severe blow to the Yugoslav economy. But in addition, the blocking of the rivers has cost shipping companies from the Ukraine, Rumania and Bulgaria over \$200 million in losses.

An exact account of the destructions and loss of life has not been made yet. The two white-books produced by the Federal Republic of Yugoslavia, Federal Ministry of Foreign Affairs, are valuable sources of information regarding the civilian losses. But though they attempt to give a reasonable full coverage of the consequences, they are only small parts of the big puzzle that still has to be finished.

As to damages on civilian objects, the list in Appendix C is not complete, but rather indicative of the types of damages deliberately caused by NATO. In connection with these incidents more than 2,000 people have lost their lives.

5.2. **Means of Orientation.** It is a common belief that with the use of satellite images it is possible to detect any enemy activity, and even "to read licence plates on automobiles". The fact is that the present types of satellites that constantly monitor the surface of the earth are rather useless in connection with the types of information needed in warfare. Situated in altitudes of between 800–32,000 km above the Earth, the highest spatial resolution of presently used satellites is no better than around 1 metre. And even with this resolution the minimum size of recognizable items would at least be 5 to 10 times this size. Furthermore, most resource satellites are *passive* and require reflected sunlight from the surfaces that are monitored. An important condition for their use is a cloud free sky which severely limits their usability. The *active* satellites are based on radar, which makes them independent of the weather conditions, but their usability is limited by the reflection characteristics of the surfaces that are monitored. It is very easy to hide from them, simply by moving in cover of large standing vegetation.

Satellites, therefore, are of very limited use in connection with attacks, especially in climatic and terrain conditions as those characterising Yugoslavia. The following examples may serve as an illustration of their limitations.

In the first case the satellite image has been used as evidence for a mass grave of Kosovo-Albanians. Indeed, if you look for mass graves, you may interpret the minimal differences in a specific area as indicative for that. But if you study other parts of the image, you can find exactly the same type of differences. So nothing specific can be stated from the image.

The subsequent two images contribute to the fact that if you know what is supposed to be seen, it is possible to see it. But the resolution of the images does not allow you to conclude more than you already know before an attack, and they are therefore useless or of limited use.

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[26]*Aviation Week and Space Technology*, April 24, 2000, pp. 74f; December 4, 2000, p. 41

[27]Report of August 23, 1999

[28]October 6, 1999

Satellite imagery, however, have proved useful for constant monitoring the consequences of the attacks. That was the purpose of two 15-ton Lockheed Martin NRO[29] imaging radar spacecraft overflying the target area twice a day in 680 km high orbits[30]. The images have a spatial resolution of 1-3 feet which enables them to make basic bomb damage assessments at night and in all weather conditions. During days with clear weather other spacecraft were used additionally with visible and infrared high resolution imagery for more precise bomb damage assessment. From three to six spacecraft flying in a 280×1000 km orbit have given valuable evaluation material.

5.3. **Effective Surgical Strikes?** If warfare has a new quality, it is not connected to the monitoring activity, but to some of the weapons systems used. Lasers for locking rockets on specific targets have been known for a long time, but in addition to the traditional type, aircraft equipped with Thermal Imaging Airborne Laser Designator pods were now used to illuminate targets for laser-guided bombs. Another type of equipment is the GPS guided missiles, requiring precise geographical coordinates for each target, and in case of moving targets, informants on ground who can give the necessary precise information.

Both types of equipment, however, turned out to have limitations. The former because the laser system does not work through clouds and may be obscured by smoke and fire so that the rockets loose their targets, resulting in mis-hits. And the latter because it is dangerous to rely solely on data on file as the bombing of the Chinese embassy illustrated (if it was not a deliberate act): GPS confines bombing to stationary or easily programmable targets (consequently of limited military value) and favours civilian objects for the bombing (see Appendix C).

In addition to high-tech systems not always being precise, substantial parts of the battles were fought with rather old-fashioned weapons, old cruise missiles etc., which the incidents of missiles hitting Bulgaria and other remote places clearly indicate.

It seems likely that this war never aimed at mass killing civilians. Perhaps even the contrary - that greater losses of lives have been deliberately avoided, possibly by warnings before severe bombings took place. But decisive civil–life support objects like power stations were targeted to make life in Yugoslavia more miserable. Besides for that, a limited number of unintended damages (trains on bridges etc) was not to be avoided.

Even new types of weapons with a much better precision have been of limited use. NATO had to maintain a security height of 5000 metres above ground level to avoid the air defence[31]. Moreover, no E-8 or satellite on-line real time targeting could be obtained. Therefore effective attacks have not been possible against moving military units.

What was then the new quality of the means of warfare so much referred to in NATO's argumentation and defence of the bombings?

A general conclusion is that even with the new means, the outcome qualitatively seems to be almost the usual - that a large number of civilians are, if not

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[29](US)–National Reconnaissance Office

[30]*Aviation Week and Space Technology*, March 29, 1999, pp. 31–33

[31]Robert Wall, SEAD concerns raised in Kosovo, *Aviation Week and Space Technology* July 25, 1999, p. 75

killed, then victims of the war, and that the wealth of a nation, built up in generations, crumbles (unless or until foreign aid packages possibly will replace bombed outdated facilities).

The higher precision of the bombings gives a slightly higher efficiency of each combat sortie and of each delivered ton TNT. It seems, however, that the main difference to low–precision warfare is that waste and chance are almost removed from the destruction pattern and that the destruction is pending on the definition of *strategic importance* (a concept amalgamating military and civilian importance and as such banned in international humanitarian law, see Appendix D) of buildings, installations, and different kinds of infrastructures, rather than a true limitation of damages. Therefore, there are no indications that this leads to less destructions of civil objects and greater or faster military success and quicker peace. Imposing one's will on one's opponent seems to require prolonged and unconstrained series of acts of force, when the means or the will are lacking to defeat the opponent militarily.

The widely proliferated concept of "clinical high precision aerial warfare without bloodshed" of a high-tech *no tear* warfare may encourage the use of military power in problem solving and striving for military supremacy. The facts of the Kosovo War, however, indicate that even the most advanced means of aerial warfare do not guarantee unconstrained military supremacy. Much rather, it seems that NATO states and non-NATO states are invited to even greater military efforts and expenditures.

APPENDIX A. QUALITATIVE AND QUANTITATIVE ASPECTS OF AIR WAR

A.1. **Tenets and Dilemmas of Modern Air War.** 1. Simple geometry reveals what elevated platforms can do for *reconnaissance*. Reportedly[32] on November 21, 1783, a physician and an army officer rose to a height of 1 km over Paris in a hot–air balloon. To find the range of vision from any elevated platform (on a clear day and looking for non–elevated objects), we consider the Earth approximately as a ball of radius ca. $R = 6370$ km and of circumference $2\pi R = 40,000$ km. Let C denote the center of the Earth. Let P denote the position of an observer (on a tip of a tower, a balloon, an aircraft, or a satellite), elevated to an altitude of h km over the ball surface. By drawing a tangent from the observer's position P to the ball touching the ball at the horizon in a point H, we obtain a triangle CPH which has a right angle at H, see Figure 10. Let us denote the angle at C by α. We define the (approximate) *range of vision r* as the distance between the foot point of the observer (the intersection of the vertical from P with the ball surface) and H. Clearly, we obtain the distance r from the angle α (measured in grad) by the following formula

$$r = \frac{\alpha}{360} \times 2\pi R.$$

To calculate α, we recall

$$\cos \alpha = \frac{R}{R+h}.$$

In this way we obtain a range of vision of approximately $r = 113$ km for our 1783–platform - and correspondingly much more for the higher altitudes and electronic eyes of modern platforms.

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[32][12], p. 206

2. While the role of aerial platforms in reconnaissance is documented in a long story of successes, the history of aerial bombardment is first of all a history of *promises*: conventional war would become obsolete; theoretically, aircraft could rain explosives wherever they wanted to.

- They would move without restriction over terrain or even ground forces;
- no theoretical limit of range;
- nor limit on bomb load.

Aircraft could not be stopped, and if enough sorties were made, they could destroy *anything*.[33]

3. It is hard to see how the bombing promises could, can or will be fully realized in conventional, non–nuclear war. The bombing *theories*, however, have gained substantial reality and relevance as they developed over the years. According to these theories the typical target of air power is not field battle support (where air power has proved to be decisive in World War II) but attack on prime military installations (where air power has not proved very successful) and also and foremost attack on the industrial system which after all is the heart of modern warfare and, contrary to many military installations and deployments, obtainable for destruction by air power. Thus, compensating for operational limitations of aerial warfare, doctrines developed which "believed that aerial warfare was an assault on the urban centres of modern society. Partly the purpose was operational and partly psychological".[34] This may explain the words of Lt. Gen. Michael Short, Chief of NATO's air forces, who in front of running BBC cameras[35] reported his threats to the President of the Federal Republic of Yugoslavia, delivered in personal communication before the war:

> "I said: 'Mr. President. . . , if you cause me to start a bombing campaign, your country will never be the way you see it today again. And in fact we ought to stop negotiations now and ride round in Belgrade because the way it is today it will never be that way again.' And I generally believed that."

4. A categorical difference to the bombing promises are the substantial efforts at high costs which must be afforded to secure the promised *invincibility*. Contrary to the naive concept that "aerial warfare admits of no defense, only offense"[36], the bomber became an extraordinary complex, delicate, and rather inefficient weapon demanding excessive resources to simply survive in an impossibly hostile environment due to its visibility from large distances. (See below the complicated choreography reportedly charted for each of the several hundred daily sorties during Operation Allied Force).

5. The obsession with *precision* has shaped air doctrines from World War II right through to Kosovo. On the one hand, this is a typical US-American problem posed by logistical problems of power projection: fighting with vast oceans

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[33]l.c. The Battle of England in World War II provided, however, the first dramatic counterexample to this old belief by the enormous military futility of the massive German air attacks.

[34]l.c. p. 208. Here one better should distinguish between the psychological effects on the adversary, which after all seem to be marginal and the effects on strengthening the home front which seem to be almost overwhelming, case World War II and Nis air attacks.

[35]Reproduced in *Særudgave Horisont* of the Danish television, June 5, 2000

[36]Giulio Douhet, an Italian general and the "father of modern air–power theory", quoted l.c., p. 209

separating American power from combat zones forbids wasting ordnance on nonmilitary targets which would strain productions and transportation capabilities. On the other hand, saturation bombardment (which in military terms is the alternative to precision bombing) tends to solidify resentments and actually to strengthen the moral of the bombed while it strains the moral of the bomber and support personnel.

A.2. **The Mathematics of Circular Error Probable (CEP).** We assume that the precision of some bombs or rockets is described approximately by the normal distribution. Then, roughly speaking, when one drops one hundred bombs at a point shaped target, the bombs will spread like the hailstones of a shotgun or the arrows on a dart wheel (see Figure **??**).

They hit roughly according to the bell shaped Gaussian curve with the hits circularly distributed around the goal and a rapidly decreasing number of large error hits. Then the average precision of a munition is characterized by the *Circular Error Probable (CEP)*. That is the radius of a disc around the goal point such that (on average) 50% of the shots hit inside the disc and 50% hit outside.

We will determine how much the efficiency of a bomber increases with decreasing CEP.

Recall[37] that a 2–dimensional (i.e. "bivariate") non–degenerate standard normal distribution of two stochastic variables X and Y is characterized by the density

$$f_{XY}(x,y) = \frac{1}{2\pi} e^{-\frac{1}{2}(x^2+y^2)}.$$

Then the stochastic variables

$$R := \sqrt{X^2+Y^2} \text{ and } \Theta := \tan^{-1}\left(\frac{Y}{X}\right) \quad \text{for } X > 0 \text{ etc}$$

are independent. It turns out that Θ is uniform in the interval $[0, 2\pi]$ and that R has the "Raleigh" density

$$f_R(r) = re^{-r^2/2} \quad \text{for } r \geq 0.$$

Then the probability of hitting within a disc of radius r_0 becomes

$$P(R \leq r_0) = \int_0^{r_0} re^{-r^2/2}\,dr = \int_0^{r_0/\sqrt{2}} \sqrt{2}\rho e^{-\rho^2} \sqrt{2}\,d\rho = -[e^{-\frac{r_0^2}{2}} - 1]$$
$$= 1 - e^{-r_0^2/2},$$

where

$$\frac{r}{\sqrt{2}} = \rho,\ dr = \sqrt{2}\rho,\ \rho_0 = \frac{r_0}{\sqrt{2}}$$

and $-e^{-\rho^2}$ is an anti–derivative of $2\rho e^{-\rho^2}$.

We notice that $P(R \leq r_0) = \frac{1}{2}$ is valid precisely if $e^{-r_0^2/2} = 2^{-1}$ or, equivalently, if $e^{r_0^2/2} = 2$. Hence, the CEP of the standard model is $2\ln 2$.

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[37]e.g. see [26], p. 96

To make our model more realistic, we stretch our variables by a common factor σ and obtain new variables

$$\Xi\Upsilon = A \begin{pmatrix} X \\ Y \end{pmatrix} ; A = \begin{pmatrix} \sigma & 0 \\ 0 & \sigma \end{pmatrix}$$

with the probability distribution density

$$f_{\Xi\Upsilon} = \frac{1}{2\pi |\det A|} e^{-\frac{1}{2\sigma^2}(\xi^2 + \eta^2)} .$$

Defining the new radial variable

$$\Psi := \sqrt{\Xi^2 + \Upsilon^2} = \sqrt{\sigma^2 X^2 + \sigma^2 Y^2} = \sigma\sqrt{X^2 + Y^2}$$

we obtain

$$P(\Psi \le \rho_0) = P(R \le \rho_0/\sigma) = \int_0^{\rho_0/\sigma} r e^{-r^2/2} \, dr$$

$$= 1 - e^{-\frac{\rho_0^2}{2\sigma^2}} .$$

Hence

$$P(\Psi \le \rho_0) = \frac{1}{2} \iff \frac{\rho_0^2}{2\sigma^2} = \ln 2.$$

The corresponding ρ_0 is the CEP by definition, hence

$$\text{CEP} = \sigma\sqrt{2\ln 2} \quad \text{and} \quad \sigma^2 = \frac{\text{CEP}^2}{2\ln 2} \text{ becomes the variance.}$$

Ploughing this σ^2 into the previous formula yields

$$(1) \qquad P(\Psi \le \rho_0) = 1 - e^{-\ln 2 \frac{\rho_0^2}{\text{CEP}^2}} .$$

As an application of (1) we calculate the number of (1000 kg) bombs required for destroying (hitting) a 20×30 m object. Approximating the object by a disc of radius $\rho_0 = 13,82$ m, we may reformulate the exercise and require to hit within a distance of ρ_0 of a fixed central point. Now, for given CEP we can calculate the hit probability

$$p = 1 - e^{-\ln 2 \frac{\rho_0^2}{\text{CEP}^2}} .$$

Then the required number of bombs is approximately $1/p$. We calculate the following table (differences from corresponding tables in the literature are due to a common error, namely replacing $\ln 2$ in (1) by $1/2$):

War	CEP[m]	# bombs
WW II	1100	9140
Korea	330	823
Vietnam	130	128
Gulf	70	38
Kosovo	13	2

TABLE 1. Dramatically reduced bomb numbers due to CEP decrease

From the preceding table one could get the impression that modern aerial warfare is thousands of times more efficient than 50 years ago. That is wrong. One thing is the table, another the statistics of a concrete attack where the nature of the goal, the demanded "kill probability", and various human factors will enter in a decisive way. Also, as we have noticed, modern bombers are far more complicated (and far more expensive) than bombers of previous air wars. In the following paragraph we will see that they also require a substantial armada of accompanying specialized support aircraft.

A.3. **Set-Up of Aerial Information and Munition Carriers.** Partly following [30], we give a description of the complicated "choreography" which charted the daily bombing expeditions.

(1) Before the final run into hostile airspace, aircraft from remote bases have to slow down to gulp fuel from an *aerial tanker*. One of every three flights is an aerial tanker sortie - more of them than of attack flights.

(2) The bombers fly behind a *Suppression of Enemy Air Defense (SEAD) package* consisting of EA-6B radar–jamming planes, EC-130 communication jammers, ground attack F-16CJ radar–killing fighters, F-117 stealth ground attack fighters, and far above a layer of F-15C fighters ensuring that no enemy pilot gets close enough to take a shot.

(3) Above the fighters (at altitudes up to 22 km with spacecraft much higher) there is the *Intelligence, Surveillance and Reconnaissance (ISR) package* to comb the sky and the ground for the enemy; to provide navigation data; to feed targets to pilots; to keep allied warplanes safely apart. The ISR spacecraft layer consists of GPS navigation satellites, military communication / signals intelligence spacecraft, NRO imaging visible and infrared spacecraft, weather satellites providing imagery that aids both aircraft strikes and reconnaissance image acquisition, NRO imaging radar spacecraft. The ISR aircraft package consists of U-2S optical spy planes, E-2C radar early warning planes; E-3 AWACS air and combat control planes that sense for the entire strike force; RC-135 rivet joint planes, intercepting enemy communication; and E-8 Joint Surveillance and Targeting Attack Radar Systems (JS-TARS) ground surveillance and target acquisition planes for moving targets.

A.4. **Operation Allied Force's Aerial Platforms.** In this paragraph we shall give a review of all the aerial platforms and vehicles applied by NATO for the bombings and for bomber support. As a general rule, we shall distinguish between aerial platforms for C4 (Control, Command, Communications, and Computers) and for munition delivery, though most air crafts have dual capabilities.

1. Operation Allied Force has been characterized by a substantial aerial military contribution by unmanned aerial platforms and vehicles. Therefore, in

ISR	↑
SEAD	↑
Bombers	↑

TABLE 2. Order of battle - seen from ground

alt [km]							#
			ISR spacecraft				
38,000	GPS		GPS			GPS	(24)
38,000		COM			COM		10+
1000			IR-NRO				3
850		MET			MET		10
680			LM-NRO				2
			ISR aircraft				
20	U-2					U-2	5
10	AWACS		AWACS			AWACS	12
10	RC-135					RC-135	5
5-12			E-8				2
			SEAD package				
5-10	F-15 F-15	F-15	F-15	F-15	F-15 F-15		51
5	EC-130				EC-130		6
5	EA-6B	EA-6B	EA-6B	EA-6B	EA-6B		37
5	F-16 F-16	F-16	F-16 F-16 F-16	F-16	F-16 F-16		157
5	F-117	F-117	F-117	F-117	F-117		24
			Heavy bombers				
5	B-52H		B-1B/B-2A		B-52H		29

TABLE 3. Front view of bomber support by ISR and SEAD packages. Available numbers (#) may be allocated to different simultaneous missions

this review, we define aerial forces to comprise all platforms, including weapon carriers and weapons, which exploit the third dimension no matter if being propulsed or ballistic and regardless of which service they were affiliated.

The air campaign consisted of over 38,000 sorties. Combat-support missions outnumbered bombing missions by nearly three to one.[38] Combat aircraft (cbt ac) and armed helicopters (arm hel) refer to platforms normally equipped to

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[38][9], pp. xxiii, 68; [23] 1999/2000, p. 289

ac	aircraft
arm hel	armed helicopter
awacs	airborne warning and control system
bbr	bomber
cbt	combat aircraft
ecm	electronic countermeasures aircraft (radar jammer)
ew	electronic warfare aircraft
fga	fighter ground attack aircraft
ftr	fighter
recce	reconnaissance platform
tkr	tanker
tpt	transporter

TABLE 4A. Warplane acronyms

deliver air-to-air or air-to-surface ordnance. In the category cbt ac one distinguishes between bombers (bbr); fighters (ftr); fighter ground attack ac (fga); and electronic warfare aircraft (ew). Many of these ac are multi-role ac with different roles in which they are deployed.

For combat-support missions we distinguish between reconnaissance platforms (recce), i.e. technical means of gathering information for surveillance and target acquisition; tankers (tkr) for air-to-air refuelling; and transporters (tpt).

Sources: Estimates of NATO air assets have been based on official statements, as of 12 April[39] and of 31 May[40].

According to these sources, the number of applied NATO combat and support aircraft (ac) grew from 350 to something between 1050 and 1250. As of 31 May, it was disclosed that 830 US, 18 Canadian, 11 Turkish, 4 NATO, and 306 European ac have been deployed:

29	long range bbr (all US)
16	short range bbr (France)
12	light bbr (UK)
ca 500	ftr/fga
ca 100	Recce/EW/AWACS
37 EA-6B	(all USA) for EW
ca 60	tpt
ca 200	tkr (180 USA).

TABLE 4B. Order of battle as of May 31

Unmanned aerial vehicles as weapons and for target acquisition:
ca 450 sea-launched Tomahawk Land Attack Cruise Missiles (TLAM) have been available around 31 May. 240 have been launched during the war (20 from UK submarine, 220 from US naval platforms). Like the Conventional Air-Launched Cruise Missiles (CALCM), fired from B-52, F-117, B-1, and B-2, also the TLAM use inertial navigation systems (INS) and receive navigational data from the satellite-based global positioning system (GPS).

100 (?) US RQ-1A Predator and Hunter unmanned aerial vehicles (UAV) for gathering timely data for target-acquisition and assessment process. 100 (?)

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[39]http://www.janes.com/defence/features/kosovo/airassets.htm
[40]Flug Revue July 1999, p. 65; see also http://www.fas.org/xxx

French CL-289 UAV, operated over Yugoslavia by French and German forces. "The Predator is the most capable of these ac as it can operate at altitudes of up to 7.600 metres, with a typical endurance of up to 24 hours, compared to 600 m and just 30 minutes for the CL-289."[41] Our description of the various aerial platforms has been based on [19] and [23].

2. bbr - bombers. We distinguish four types of bombers:

Long-range bbr are capable of delivering weapons payload of more than 10,000 kg over an unrefuelled radius of action of over 5,000 km. The USAF deployed

6 Stealth bbr B-2A: "Spirits strategic penetration bbr" (Northrop Grunmann[42]), based at Whiteman AFB, MO (USA). Out of a US total of 21 B-2A (US$2 billion each). Mission duration ("endurance") demonstrated 36+ h. Total armament capacity of 16 AGM-129 ACMs (tactical or nuclear air launched cruise missiles). Alternative weapons include

16	B61 tactical/strategic or
16	B83 strategic free-fall nuclear bombs;
80	Mk 82 500 lb bombs;
8	GBU-28 4.400 lb deep-penetration, near-precision bombs;
16	GAMs (GPS–Aided targeting Munitions);
16	Joint Direct Attack Munitions;
16	Mk 84 2,000 lb bombs;
36	M117 750 lb fire bombs;
36	CBU-87/89/97/98 cluster bombs;
80	Mk 36 560 lb or Mk 62 sea mines.

TABLE 5. Ordnance options for US Stealth B-2A

5 B-1B strategic bbr: (Rockwell[43]), based at RAF Fairford (UK), out of a US total 93 B-1B.

18 B-52H "Stratofortress" strategic bbr: (Boeing[44]), based at RAF Fairford (UK), of a US total of 94 B-52H.

Medium-range bbr are capable of delivering weapons payload of more than 10,000 kg over an unrefuelled radius of action between 1,000 and 5,000 km.

16 French Super Etendard (Dassault Aviation[45]), based at aircraft carrier (cv) Foch, of a French total of 36 (+16) Super Etendard.

Short-range bbr are capable of delivering weapons payload of more than 10,000 kg over an unrefuelled radius of action of less than 1,000 km.

Light bbr (few) are designed to deliver a payload of less than 10,000 kg and do not fall into the category of fga (these characteristics, however, are not sharply distinguishable).

12 Tornado, version GR.1 RAF interdiction/strike ac (Panavia= Daimler-Chrysler-Aerospace+British Aerospace+Alenia[46]), based at Corsica, of a RAF total of 101 Tornado GR-1/4 ids/bbr. Nominal max external stores load more

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[41][23] 2000, p. 288

[42][19] 1999/2000, pp. 705-708

[43][19] 1990/1991, p. 491

[44][19] 1991/1992, p. 371

[45][19] 1991/1992, p. 74

[46][19] 1999/2000, pp. 246-252

than 9,000 kg. Max. level speed with external stores Mach 0,92. Radius of action with heavy weapons load, hi-lo-lo-hi: 750 n miles (1,390 km).

3. fga/ftr/ecr.

fga — fighter ground attack

24 US Stealth "Nighthawk" F-117A (Lockheed Martin[47]), based at Aviano and Spangdahlem, of a US total of 45. Precision attack aircraft with stealth elements, optimized for radar energy dispersion and low IR emission. "Company claims result (of full-scale development of 18 advanced low-observable technologies) to be vastly enhanced stealth fighter with greatly improved survivability prospects in high-threat environment".

48 F/A-18C/D (US), sea-based

6 Italian Tornado IDS, based at Brescia

ftr — fighter

28 F-14 (US), sea-based

51 F-15C/E (US)

157 F-16/A/C (88 US, 10 B, 9 DK, 20 NL, 16 N, 3 P, 11 T) and corresponding British and French ftr

ew/ecr — electronic warfare, combat and reconnaissance

37 US "Prowler" EA-6B (Grumman[48]), four-seat carrier-borne electronic countermeasures (ecm) ac — radar jammer. According to [23] 1999/2000, p. 289, this ac was considered "to be particularly important in the effort to suppress Yugoslav air defence with its electronic counter-measures capability." *Aviation Week and Space Technology*, Aug 30, 99, p. 22, emphasizes, however, "that low–frequency early warning radars capable of detecting stealth aircraft were still in operation a week after air attacks began. Meanwhile, still-operational air defense arrays kept EA-6Bs far from some critical targets to be attacked."

6 US "Compass Call" EC-130H (Lockheed Martin[49]). Communication jammer. [Aviation Week and Space Technology Oct 16, 99, p. 50ff] claims: "The synergistic effect provided by the EA-6B Prowlers (radar jammer), F-16CJs (Harm-shooter) and EC-130 Compass Calls (communication jammer) is the major force for breaking down enemy air defenses."

30 Tornado ECR (14 D, 16 I)

4. recce/awacs —

recce

5 USAF U-2

2 USAF E-8C Joint Surveillance and Targeting Attack Radar System (JS-TARS) ac

5 USAF "Rivet Joint" RC-135V/W signals intelligence-gathering ac, based at RAF Mildenhall (UK). "Its sole role is monitoring the electromagnetic environment. A Rivet Joint can call 'cease buzzer', the universal call to stop jamming."[50]

awacs — airborne warning and control system

12 E-3/A/D/F (4 NATO, 4 US, 2 F, 2 UK)

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[47][19] 1995/1996, pp. 567-568

[48][19] 1993/1994, pp. 482f

[49][19] 1999/2000, p. 677

[50]*Aviation Week and Space Technology*, Oct. 18, 1999, p. 53

5. tkr — tanker

"The US provided the majority of the tanker support, with some 150 deployed. European airforces have only a small number of these aircraft. France and the UK each had 12 tankers available for the operation, and Italy and Turkey had two each. Germany had none."[51]

"Because of the shortage of tankers, significant numbers of combat aircraft had to be deployed nearer to the theatre of operations, placing extra demands on resources, particularly logistic support."[52]

"If they have any pretensions to an independent military capability, this deficiency is a clear lesson for the Europeans."[53]

6. tpt — transport

Regarding transport support for the deployment of forces and their logistic needs, "there was heavy reliance on the US, particularly on its C-17 fleet. While shorter-range transport aircraft such as the C-130 are widely available in most forces there was a lack of longer-range transports..."[54]

7. Unmanned aerial vehicles
Cruise missiles
uav

APPENDIX B. TECHNICAL CHARACTERISTICS OF VARIOUS MUNITIONS

The so–called *Surgical Aerial Warfare* performed in Operation Allied Force is depending on a number of necessary prerequisites, such as sophisticated reconnaissance and intelligence systems to provide very detailed and up-to-date data about the targets, efficient aerial platforms to support and carry-through the attacks (see App. A3), and finally an arsenal of high accuracy and varied munitions of specific performance characteristics. We will now have a look at the munitions.

In Operation Allied Force the total picture of weapons systems was rather complicated due to the involvement of several allied countries, and also because of a certain element of improvisation during the development of the conflict situation. A list of important types of weapons is given in Table 6. [55] The choice of munitions was often determined by the actual stockpiles, rather than by relevance characteristics as to performance characteristics alone. [56]

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[51][23] 1999/2000, p. 290

[52][23] 1999/2000, pp. 289f

[53]l.c.

[54][23] 1999/2000, p. 290

[55]The GPS–guided weapons (especially no. 1,2,3, and 7 in Table 6) were used extensively all over Kosovo and the whole of Yugoslavia. Bad weather and terrain conditions, and the unwillingness to risk shutdowns of the launching aircrafts favoured these weapons. Among the direct attack weapons the laser–guided / man-in-the-loop weapons were dominating.

[56]Despite a heavy use of precision weapons, a large number of unguided, ballistic bombs was used, too. Even with these bombs greatly improved precision can be obtained, because very precise data about the position and course of the launching aircraft is at disposal from GPS–data. Also, the ballistic bombs have been developed to carry many types of submunitions (e.g. bomblets to be dispersed over a relatively large area).

	Range [nm]	Guidance	Weapon name	Characteristics
1	Long (over 870)	GPS	Tomahawk (TLAM) Cruise missile Powered	Ship– or Submarine–launched, 1 ($\geq$ 1000 lbs TNT) or several warheads.
2	Long (over 600)	GPS/INS	CALCM/AGM-86C Cruise missile Powered	Air–launched (B-52H), 1 ($\geq$ 3000 lbs) or several fragmentation warheads. High precision (CEP $\leq$ 5m)
3	Middle, stand–off (over 150)	GPS/INS + infrared imaging	SLAM-ER/AGM-84H, Powered missile	Air–launched, 500 lbs warhead
4	Middle, stand–off (14–40)	GPS + remote controlled + infrared + television imaging system	AGM-130 Rocket Powered	Air–launched, 1 ($\geq$ 2000 lbs) warhead uranium enforced
5	Middle, stand–off (10–40)	GPS/INS + various terminal sensors / man–guidance	JSOW(AGM-154) Unpowered, glide weapon	Air–launched (F-18), Submunition dispenser
6	Middle (up to 15-20)	GPS/INS + terminal sensor/man guidance	HAVE-NAP Rocket Powered	Air–launched (B-52), Fragmentation or penetrator warheads
7	Direct attack	GPS	JDAM(GBU-31) Joint Direct Attack Munition	Air–launched (B-2), Low cost. Tail kit for guidance. Different warheads, penetrator or fragmentation
8	Direct attack	Man-in-the-loop (high precision)	Maverick (AGM-65)	Shaped charge or unitary warhead
9	Direct attack	Man-in-the-loop, Laser–guided	GBU-10,-12,-16, -24,-27,-28	Fragmentation, penetrator and very hard target penetrator

TABLE 6. Some important weapons used in *Operation Allied Force*

Even so, some marked trends of qualitative changes of the weapons used - compared to earlier, but modern wars - may be observed, especially concerning the war effort of the US-forces. In Operation Allied Force about 90% of the US strike aircrafts were capable of delivering precision munitions.[57] For comparison it may be noticed that during Operation Desert Storm in the Gulf this number was 10% only. Also many English and French aircrafts were able to deliver advanced munitions.

B.1. **Main Categories of Precision Bombs/Missiles.** Two main categories of precision or near-precision munitions , either GPS–guided (Global Position Systems) or laser/electrooptical–guided bombs/missiles were used.

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[57][9], p. 88

GPS–guidance systems use satellite input data fed into a computer in the missile to track flight and target position coordinates. The satellite data may be used, too, to correct an INS-guidance unit (<u>I</u>nertial <u>N</u>avigation <u>S</u>ystem). The long–range cruise missiles may have terrain contour matching systems comparing actual GPS–data or observations made from the missile itself with a stored map.

Laser or electrooptical guidance systems offer a more direct aiming technique. Up to now these guidance systems often involve a man in the guidance loop (observation by sensor or video camera → man/computer → course correction → further observation → etc.). The laser systems require an illumination of the target by laser light, provided from the ground, from an aircraft (e.g. the attacking aircraft), or from the attacking missile itself. The reflected/re–emitted laser light is detected by a sensor system with a high sensitivity to the laser light spectrum, thereby getting a sharp picture by suppressing light of other wavelengths.

The highest precision (CEP, see A2, down to a few metres) and flexibility can be obtained by the electro/optical or laser light guidance systems, compared to the GPS guidance systems (CEP down to 12–18 metres, and dependence on up-to-date satellite or pre–coded data). However, the GPS systems may even so still be the best choice. They are rather insensitive to bad weather conditions, which are often preventing the use of systems relying on the detection of light signals. Further, with the GPS systems the launching ship or aircraft needs not come close to the target. [58]

The technology development and the actual choice of munitions on the battlefield is based on a wide range of criteria. Table 7 gives a list of important factors, not pretending to be complete.

B.2. **Weapons With Special Performance Characteristics.**

HARM/AGM - 88. The <u>H</u>igh–<u>S</u>peed–<u>A</u>ntiradiation–<u>M</u>issile is designed specifically to detect, attack, and destroy early warning radars, radar sites for surface–to–air missiles, and radar directed air defence artillery, from ranges of 30+ miles.

It is a multipurpose weapon to be used against both offensive and defensive enemy radars. In Operation Allied Force the Serbian air defence was quickly destroyed (especially the aircrafts) or hidden by the Serbians (especially the air defence missiles). The Serbian radars were active for short periods only, and the counterattacks only spurious. This tactical behaviour was unexpected, and saved the Serbian capacity to threaten the Allied Forces. Even so, the losses of Allied aircrafts were very low, compared to losses in earlier wars.

Electronic Bombs. The US have developed a non–lethal, air–launched "electronic" bomb able to cut–off temporarily the electrical supply to large areas. This type of bomb was used first time in Operation Desert Storm, and in Operation Allied Force it was used a number of times to cut off electricity supplies to up to 70% of Yugoslavia.

The bomb has containers filled by reels of flexible, special–coated carbon–graphite wire, having a low electrical resistance. These wires are unfolded and spread over electrical power plants, transformer installations, etc., causing short–circuiting, flash fires, and large explosions of sparks. The power plant

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[58]*Aviation Week and Space Technology*, May 3, 1999, p. 66

Capacity:	Range, precision, speed, load capacity, weight and size, 'offensive punch'
Flexibility:	Load flexibility and fast targeting, independence on weather conditions
Vulnerability:	Vulnerability to enemy interference, sensitivity to defects/faults

• Claims to the conveying system:	Reconnaissance and launching platforms
• Claims to the operating personnel:	Education, attention and accuracy, cooperation, etc
• Costs:	Direct and total costs

• The potential of further technology development and new applications

• The relations to technological development for civilian purposes

• Visions, needs of future warfare

TABLE 7. Selection criteria for the choice of precision munitions

safety circuit breakers are activated, shutting off the distribution of electricity. Of course, such a paralysing event – lasting for some hours – may be used as a military weapon as such, but may also have a big psychological effect on the civilian population.

Another kind of electronic bomb spreads clouds of tiny pieces of conducting fibres, which are drawn into electronic devices, such as computers, by the ventilation fan, causing short–circuiting.

Maybe a new EMP–weapon (Electromagnetic Pulse) using conventional explosives to produce the electromagnetic pulse was tested in Yugoslavia.[59] It is designed to destroy electronic equipment.

Uranium Enforced Munitions. Long time after the ending of Operation Allied Force early Yugoslavian information about the use of uranium enforced munitions have been confirmed by NATO. According to these releases, about 30,000 30 mm armour–piercing projectiles with a core of 280 grams of uranium–238 (depleted uranium - DU) each have been fired in attacks on Serbian armoured vehicles and installations.

Such projectiles have a big penetration power due to the high density (weight) of uranium, which is one of the heaviest elements. The US Department of Energy possesses about 728,000 metric tonnes of DU as a byproduct from the isotope–separation process taking the uranium–235 isotope out of the refined natural uranium (containing 1% U–235 and 99% U–238). The uranium–235 is used as fuel in nuclear power reactors, whereas uranium–238 is not sufficiently fissile to be used in reactors.

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[59]*Aviation Week and Space Technology*, June 7, 1999, p. 30

Still uranium–238 is slightly radioactive with 4.468 billion years half–life, emitting alpha particles at 4.2 MeV and 4.15 MeV that cause significant internal ionization with consequent cellular damage. It is also chemically very toxic. DU ignites upon impact. Serious damages may occur if pieces of uranium-238 are taken up by humans or animals and if dust of DU fragments or oxides is inhaled.[60] Therefore dispersed uranium-238 will provoke local environmental damages and be a long–term threat to the fauna and population. Of course, the immediate contamination with uranium-238 will also be an extra danger to the health of soldiers and other categories of personnel coming in direct contact with dust of uranium during the war situation.

The accumulated, environmental damages on the unprotected fauna and unprotected civilian population living in the region seem to be the worst part of the problem. Even so it was the suspicion of an increased rate of leukaemia incidents among soldiers exposed to uranium at Kosovo that (late in 2000, almost 2 years after the war) started the debate in the NATO countries about the use of munitions enforced by depleted uranium.[61]

Appendix C. Civilian Objects Damaged or Destroyed

Figure 11 is based on what a number of sources has made publicly known about the NATO attacks. There may be marked differences in the level of activity, the number of people involved, the costs etc., but nevertheless the list of "incidents" shows how NATO's attacks changed character during the war – from obvious military targets to more civilian objects.

In [28], the German ret. Admiral Elmar Schmähling provided an analysis of the military necessity or lack of military necessity (or disproportionate character) of selected incidents. For each of the selected incidents he examined the military, respectively political argument for bombing that target and worked out what contribution the attack rendered or should render to achieve the war goal.

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[60]The updated version [27] of a paper presented in the British House of Commons claims about the proportions between dust and pieces: 'On–site impact investigations suggest that the mass loss is about 40% which forms fixed and loose contamination leaving about 60% of the initial mass of the penetrator in the solid or pencil form.

[61]There is now a special Yahoo category `http://dir.yahoo.com/Government/Military/Weapons_and_Equipment/Depleted_Uranium/`. One article (by Felicity Arbuthnot) exposes and blames the delay in Western attention already in the title: 'It Turns out Depleted Uranium is Bad for NATO Troops in Kosovo', `http://www.emperors-clothes.com/articles/arbuth/port2.htm`. At that time a press report from January 10, 2001 still reported that 'Defense Secretary William Cohen had said earlier this month that DU was no more dangerous than "leaded paint", and a US Army briefer assured reporters it was safe enough to eat.' It is a sad fact that UNEP Balkans, the *United Nations Environment Programme* in the environmental studies of its Balkans Task Force / Balkans Unit in the first year after the Kosovo War was content with a purely desk study on DU - 'without actual information on whether DU was indeed used and if so, where and how much was used.' It was first in November 2000 that UNEP became willing to conduct field studies of 112 sites in Kosovo that were struck by bombs containing DU, see `http://balkans.unep.ch/du/du.html`.

Type of facility	Number of incidents
Education	44
Larger house complexes and dwellings	32
Hospitals	37
Economic structures	27
Energy production	31
Sport facilities	5
Cultural facilities and structures	146
Means of communication	20
Bridges	53
TV and Radio communication	36
Jails	1
Refugee convoys	1

TABLE 8. Presumably civilian objects not respected by NATO

We summarize his evaluation which also the Ramsey Clark Tribunal will draw on in its investigation of war crimes committed by the USA and the NATO against the people of Yugoslavia:

- Roads, railways, bridges: Schmähling concedes that they "also serve as transport ways for military units and supplies." To declare the whole FRY transport system military objectives, however, is disproportionate, according to Schmähling. In particular, the destruction of the bridges across the important international waterway Danube, some of them in the North of Yugoslavia and hence far away from Kosovo where the Yugoslav military operational capability should be hindered, was unlawful.
  Violation of Art. 35 (1), Art. 48, Art. 52, Art. 54, and Art. 57 of the Geneva Protocol I (Appendix D)
- Attack on non–combatants: For the night attack on the building of the State Serbian Television (RTS) the responsible NATO politicians and generals must have accepted the death of many civilian employees, actually 16 out of more than 150 present in such a typical night work place.
  Violation of Art. 35, Art. 48, Art. 51, and Art. 52 of the Geneva Protocol I (Appendix D)
- Collateral damages: NATO's deliberate attacks on civil objects does not cause collateral damages but main damages. Schmähling concedes that in this war NATO tried to avoid collateral damages, first of all by applying precision guided munition. However, even the non–intended damages like attacks on a refugee convoy or a civilian train passing a bridge are relatively high losses compared to the modest, if any, military advantage gained or hoped for by the bombing.
  Violation of Art. 57 of the Geneva Protocol I (Appendix D)
- 'High value targets': This new designation for civilian objects without immediate military importance was introduced into the International Humanitarian Law by NATO. This label and the following unlawful destruction was attributed to several office buildings like the Belgrade Usce tower block (before the war housing important party and government offices) and a number of factories (some of them of potential military value if the war would have been prolonged for years like the car factory Zastava in Kragujevac, others solely engaged in civilian

production like a destroyed cigarette factory and a number of food processing factories).

Violation of Art. 48, Art. 52, Art. 54, and Art. 57 of the Geneva Protocol I (Appendix D)

- 'No combat fatalities to NATO forces': To avoid own losses NATO's reconnaissance and combat aircraft had to stay on distances where attacked targets no longer could be uniquely determined as military objectives.

  Violation of Art. 48, Art. 51, and Art. 54 of the Geneva Protocol I (Appendix D)

- Switching off and extinction of electrical power and district heating supply: Many life support functions were disrupted by NATO's special electricity shortening munition. For the Novi Beograd "Beogradske elektrane" district heating plant, a connection with the immediate support of the war conduct is not to construe.

  Violation of Art. 54, Art. 55, and Art. 57 of the Geneva Protocol I (Appendix D)

- Environmental degradation: Whereas in short and middle range time horizon the Yugoslav military was not dependent on stationary energy supplies, the destruction of the oil refineries and energy inventories has caused substantial environmental degradation.

  Violation of Art. 35, Art. 54, and Art. 55 of the Geneva Protocol I (Appendix D)

- Application of poisonous and particularly cruel weapons: U–238 tipped anti–tank bombs generating radioactive pollution and dispersion bombs with 5–15% fault rate (and unexploded bomblettes dispersed in the landscape) have been doomed unlawful by the United Nations.

  Violation of Art. 35, Art. 48, Art. 51, Art. 52, Art. 55, and Art. 57 of the Geneva Protocol I (Appendix D)

APPENDIX D. INTERNATIONAL HUMANITARIAN LAW

D.1. **Excerpts from the Geneva Protocol I of 1977.** *Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977*[62]

Part III. Methods and Means of Warfare Combatant and Prisoners-Of-War
Section I. Methods and Means of Warfare

Article 35. Basic rules
1. In any armed conflict, the right of the Parties to the conflict to choose methods or means of warfare is not unlimited.
2. It is prohibited to employ weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering.
3. It is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long–term and severe damage to the natural environment.
...
Part IV. Civilian Population
Section I. General Protection Against Effects of Hostilities

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[62]The Protocol I is signed and ratified by almost all member states of the UN, among them Russia, China, the FRY, and all member states of NATO except the United States of America and France.

Chapter I. Basic rule and field of application

Article 48. Basic rule
In order to ensure respect for and protection of the civilian population and civilian objects, the Parties to the conflict shall at all times distinguish between the civilian population and combatants and between civilian objects and military objectives and accordingly shall direct their operations only against military objectives.
. . .

Chapter II. Civilians and civilian population

Article 50. Definition of civilians and civilian population
1. A civilian is any person who does not belong to one of the categories of persons referred to in Article 4 (A) (1), (2), (3) and (6) of the Third Convention and in Article 43 of this Protocol. In case of doubt whether a person is a civilian, that person shall be considered to be a civilian.
2. The civilian population comprises all persons who are civilians.
3. The presence within the civilian population of individuals who do not come within the definition of civilians does not deprive the population of its civilian character.

Article 51. Protection of the civilian population
1. The civilian population and individual civilians shall enjoy general protection against dangers arising from military operations. To give effect to this protection, the following rules, which are additional to other applicable rules of international law, shall be observed in all circumstances.
2. The civilian population as such, as well as individual civilians, shall not be the object of attack. Acts or threats of violence the primary purpose of which is to spread terror among the civilian population are prohibited.
3. Civilians shall enjoy the protection afforded by this section, unless and for such time as they take a direct part in hostilities.
4. Indiscriminate attacks are prohibited. Indiscriminate attacks are:
(a) those which are not directed at a specific military objective;
(b) those which employ a method or means of combat which cannot be directed at a specific military objective; or
(c) those which employ a method or means of combat the effects of which cannot be limited as required by this Protocol; and consequently, in each such case, are of a nature to strike military objectives and civilians or civilian objects without distinction.
5. Among others, the following types of attacks are to be considered as indiscriminate:
(a) an attack by bombardment by any methods or means which treats as a single military objective a number of clearly separated and distinct military objectives located in a city, town, village or other area containing a similar concentration of civilians or civilian objects; and
(b) an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.
6. Attacks against the civilian population or civilians by way of reprisals are prohibited.
7. The presence or movements of the civilian population or individual civilians shall not be used to render certain points or areas immune from military operations, in particular in attempts to shield military objectives from attacks or to shield, favour or impede military operations. The Parties to the conflict shall not direct the movement of the civilian population or individual civilians in order to attempt to shield military objectives from attacks or to shield military operations.
8. Any violation of these prohibitions shall not release the Parties to the conflict from their legal obligations with respect to the civilian population and civilians, including the obligation to take the precautionary measures provided for in Article 57.

Chapter III. Civilian objects

Article 52. General Protection of civilian objects

1. Civilian objects shall not be the object of attack or of reprisals. Civilian objects are all objects which are not military objectives as defined in paragraph 2.
2. Attacks shall be limited strictly to military objectives. In so far as objects are concerned, military objectives are limited to those objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.
3. In case of doubt whether an object which is normally dedicated to civilian purposes, such as a place of worship, a house or other dwelling or a school, is being used to make an effective contribution to military action, it shall be presumed not to be so used.

Article 53. Protection of cultural objects and of places of worship
Without prejudice to the provisions of the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict of 14 May 1954, and of other relevant international instruments, it is prohibited:
(a) to commit any acts of hostility directed against the historic monuments, works of art or places of worship which constitute the cultural or spiritual heritage of peoples;
(b) to use such objects in support of the military effort;
(c) to make such objects the object of reprisals.

Article 54. Protection of objects indispensable to the survival of the civilian population
1. Starvation of civilians as a method of warfare is prohibited.
2. It is prohibited to attack, destroy, remove or render useless objects indispensable to the survival of the civilian population, such as food–stuffs, agricultural areas for the production of food–stuffs, crops, livestock, drinking water installations and supplies and irrigation works, for the specific purpose of denying them for their sustenance value to the civilian population or to the adverse Party, whatever the motive, whether in order to starve out civilians, to cause them to move away, or for any other motive.
3. The prohibitions in paragraph 2 shall not apply to such of the objects covered by it as are used by an adverse Party:
(a) as sustenance solely for the members of its armed forces; or
(b) if not as sustenance, then in direct support of military action, provided, however, that in no event shall actions against these objects be taken which may be expected to leave the civilian population with such inadequate food or water as to cause its starvation or force its movement. 4. These objects shall not be made the object of reprisals.
5. In recognition of the vital requirements of any Party to the conflict in the defence of its national territory against invasion, derogation from the prohibitions contained in paragraph 2 may be made by a Party to the conflict within such territory under its own control where required by imperative military necessity.

Article 55. Protection of the natural environment
1. Care shall be taken in warfare to protect the natural environment against widespread, long–term and severe damage. This protection includes a prohibition of the use of methods or means of warfare which are intended or may be expected to cause such damage to the natural environment and thereby to prejudice the health or survival of the population.
2. Attacks against the natural environment by way of reprisals are prohibited.
. . .
Chapter IV. Precautionary measures

Article 57. Precautions in attack
1. In the conduct of military operations, constant care shall be taken to spare the civilian population, civilians and civilian objects.
2. With respect to attacks, the following precautions shall be taken:
(a) those who plan or decide upon an attack shall: (i) do everything feasible to verify that the objectives to be attacked are neither civilians nor civilian objects and are not

subject to special protection but are military objectives within the meaning of paragraph 2 of Article 52 and that it is not prohibited by the provisions of this Protocol to attack them; (ii) take all feasible precautions in the choice of means and methods of attack with a view to avoiding, and in any event to minimizing, incidental loss or civilian life, injury to civilians and damage to civilian objects; (iii) refrain from deciding to launch any attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated;

(b) an attack shall be cancelled or suspended if it becomes apparent that the objective is not a military one or is subject to special protection or that the attack may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated;

(c) effective advance warning shall be given of attacks which may affect the civilian population, unless circumstances do not permit.

3. When a choice is possible between several military objectives for obtaining a similar military advantage, the objective to be selected shall be that the attack on which may be expected to cause the least danger to civilian lives and to civilian objects.

4. In the conduct of military operations at sea or in the air, each Party to the conflict shall, in conformity with its rights and duties under the rules of international law applicable in armed conflict, take all reasonable precautions to avoid losses of civilian lives and damage to civilian objects.

5. No provision of this article may be construed as authorizing any attacks against the civilian population, civilians or civilian objects.

D.2. **ICRC Commentaries.** [63]

[p.597] *Article 48 – Basic rule*

[p.598] 1863 The basic rule of protection and distinction is confirmed in this article. It is the foundation on which the codification of the laws and customs of war rests: the civilian population and civilian objects must be respected and protected in armed conflict, and for this purpose they must be distinguished from combatants and military objectives. The entire system established in The Hague in 1899 and 1907 and in Geneva from 1864 to 1977 is founded on this rule of customary law. It was already implicitly recognized in the St. Petersburg Declaration of 1868 renouncing the use of certain projectiles, which had stated that "the only legitimate object which States should endeavour to accomplish during war is to weaken the military forces of the enemy".

...

1865 Up to the First World War there was little need for the practical implementation of this customary rule as the population barely suffered from the use of weapons, unless it was actually in the combat zone itself.[64] The few measures adopted in The Hague in 1899 and 1907 seemed sufficient: a prohibition to attack places which are not defended, the protection of certain buildings, the fate of the population in occupied areas etc.

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[63]The International Committee of the Red Cross, http://www.icrc.org/ihl.nsf/

[64]From a Danish perspective, however, one could refer to the Copenhagen bombardment of September 2–7, 1807 for an early case of terror warfare against civilian population and civilian objects. To quote [10], p. 838: 'Fearful that Denmark and her fleet would join the Franco–Russian alliance after the Treaty of Tilsit, Britain sent a powerful combined force to Zealand under Admiral James Gambier and General Lord William S. Cathcart. A landing force under Sir Arthur Wellesley invested Copenhagen. When the Danish government refused to negotiate, the British land and naval forces severely bombarded the Danish capital.' Later it appeared that both Cathcart and Wellesley had opposed the then unprecedented treatment of Copenhagen, see [31], p. 279.

1866 The situation altered radically already during the First World War as a result of the increased range of artillery and the arrival of the first aerial bombardments from aircraft or airships. However, it was above all the development of weaponry after this conflict and its use during the Second World War which radically changed the situation. As a result the customary rule was affected to such an extent that one might have wondered whether it still existed.[65]

1867 By the repeated use of reprisals the point was reached where attacks were systematically directed at towns and their inhabitants.

…

1871 As finally adopted, this article has the great advantage that it clearly establishes the rule that a distinction must always be made between the civilian population and combatants, on the one hand, and between civilian objects and military objectives, on the other, and that it proclaims the respect and protection to which the civilian population and civilian objects are entitled. It was not discussed in the plenary meetings and was adopted by consensus.

…

[p.629] *Article 52 – General protection of civilian objects*

…

2000 Although States in general recognized that attacks should only be directed against military objectives, there was no agreed definition of such objectives, and in fact, during the Second World War and during several armed conflicts which have taken place since then, each belligerent determined what should be understood by such objectives as it pleased. It should be noted that their ideas often differed considerably, depending on whether the territory concerned was their own, enemy territory, or territory of an ally occupied by enemy forces. Thus a restrictive definition was necessary if the essential distinction between combatants and civilians and between civilian objects and military objectives was to be maintained.

…

Paragraph 1

…

2013 A vote was taken in Committee III on retaining the words "nor of reprisals", in this paragraph; the Committee decided to retain them.[66] In explaining why it abstained from voting on this article at the plenary meeting, one delegation indicated that it was opposed to a prohibition of reprisals against civilian objects that would apply in all circumstances; it considered that "the availability of this sanction may persuade an adversary not to commit violations of the law in the first place"; but, as stated above, the Conference did not share this point of view.

[p.635] Paragraph 2

…

2016 The definition of military objectives had been the object of study for a long time, and the solution adopted by the Diplomatic Conference is broadly based on earlier drafts. The text of this paragraph certainly constitutes a valuable guide, but it will not always be easy to interpret, particularly for those who have to decide about an attack and on the means and methods to be used.

…

2018 The definition comprises two elements:
a) the nature, location, purpose or use which makes an effective contribution to military action; b) the total or partial destruction, capture or neutralization which in the circumstances ruling at the time offers a definite military advantage.

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[65]See H. Meyrowitz, Le Protocole additionnel I et le droit général de la guerre, in *Forces armées et développement du droit de la guerre. Recueil de la Société internationale de droit pénal militaire et de droit de la guerre*, Brussels, 1982, pp. 119ff, in particular p. 124 (with notes).

[66]With 58 votes in favour, 3 against and 9 abstentions.

Whenever these two elements are simultaneously present, there is a military objective in the sense of the Protocol.

. . .

[p.636] 2020 A closer look at the various criteria used reveals that the first refers to objects which, by their ' nature, ' make an effective contribution to military action. This category comprises all objects directly used by the armed forces: weapons, equipment, transports, fortifications, depots, buildings occupied by armed forces, staff headquarters, communications centres etc.

2021 The second criterion is concerned with the ' location ' of objects. Clearly, there are objects which by their nature have no military function but which, by virtue of their location, make an effective contribution to military action. This may be, for example, a bridge or other construction, or it could also be, as mentioned above, a site which is of special importance for military operations in view of its location, either because it is a site that must be seized or because it is important to prevent the enemy from seizing it, or otherwise because it is a matter of forcing the enemy to retreat from it. It should be noted that the Working Group of Committee III introduced the location criterion without giving reasons.

2022 The criterion of ' purpose ' is concerned with the intended future use of an object, while that of ' use ' is concerned with its present function. Most civilian objects can become useful objects to the armed forces. Thus, for example, a school or a hotel is a civilian object, but if they are used to accommodate troops or headquarters staff, they become military objectives. It is clear from paragraph 3 that in case of doubt, such places must be presumed to serve civilian purposes.

2023 Other establishments or buildings which are dedicated to the production of civilian goods may also be used for the benefit of the army. In this case the object has a dual function and is of value for the civilian population, but also for the military. In such situations the time and place of the attack should be taken into consideration, together with, on the one hand, the military advantage anticipated, and on the other hand, the loss of human life which must expected among the civilian population and the damage which would be caused to civilian objects.

2024 Finally, destruction, capture or neutralization must offer a ' definite military advantage ' in the circumstances ruling at the time. In other words, it is not legitimate to launch an attack which only offers potential or indeterminate advantages. Those ordering or executing the attack must have sufficient information available to take this requirement into account; in case of doubt, the safety of the civilian population, which is the aim of the Protocol, must be taken into consideration.

2025 Some statements and declarations were made with regard to the interpretation of this paragraph in the final discussion or when the Protocols were signed. The statements related to two points:

a) a specific area can constitute a legitimate military objective in view of its location and the circumstances . . .

b) the paragraph is not intended to deal with the question of damage caused incidentally by attacks directed against military objectives.

2026 These interpretations were not discussed during the Diplomatic Conference; nevertheless, they appear to be reasonable. Of course, an area as described under a) can only be of a limited size. In addition, this concept is only valid in the combat area.

. . .

Paragraph 3

. . .

2030 The presumption established here constitutes an important step forward in the protection of the civilian population, for in many conflicts the belligerents have "shot first and asked questions later".

. . .

2035 This article was adopted only after long and difficult discussions. Many delegations would have wished for a more precise definition, possibly containing a list of

examples of civilian objects and military objectives. The Conference preferred a general definition. The three examples of civilian objects given in paragraph 3 was as far as it was willing to go.

2036 It is true that a more pragmatic definition would have been useful, and the ICRC paved the way for this in the 1956 Draft Rules. However, it soon became clear that drawing up a list of military objectives or civilian objects would have raised insuperable problems, and the ICRC therefore abandoned the attempt.

2037 However, it remains the case that the text adopted by the Diplomatic Conference largely relies on the judgment of soldiers who will have to apply these provisions. It is true that there are clear–cut situations where there is no possibility of doubt, but there are also borderline cases where the responsible authorities could hesitate. In such circumstances the general aim of the Protocol should be borne in mind, i.e., the protection of the civilian population. In any case an essential step forward has been taken in that belligerents can no longer arbitrarily and unilaterally declare as a military objective any civilian object, as happened all too often in the past.

. . .

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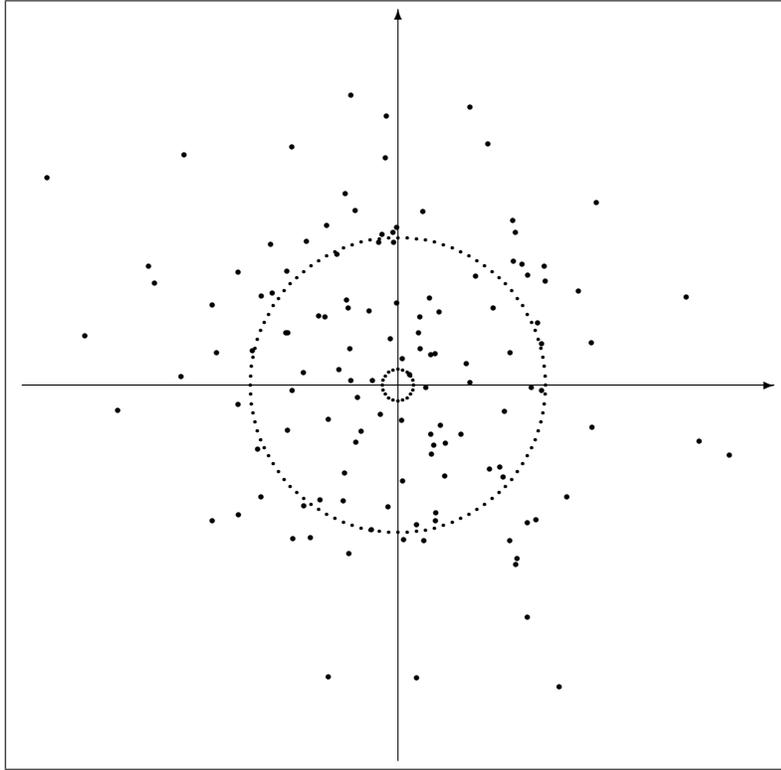APPENDIX E. MAPS, FIGURES AND PHOTOGRAPHS

DIAGRAM 1. Hitting a disc of radius ρ_0 with normally distributed shots of dispersion CEP (case Vietnam War with CEP = 130 m, i.e., ρ = 13.6 m), and 128 shots in this illustration by numerical simulation, by courtesy of Jørgen Larsen. To load the underlying PASCAL simulation program visit `http://mmf.ruc.dk/~booss/natowar/bombs.pas` and to load an appropriate LaTeX visualization program visit `http://mmf.ruc.dk/~booss/natowar/bombfig.tex`.

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FIGURE 1.   Map of Balkan. The map gives an overview of the Adriatic and the central parts of the Balkan region, and of the major airports. Source: `http://www.fas.org`

FIGURE 2.   Map of Yugoslavia.   The map is pro-
duced by Djordje Pavicevic and gives an overview of
allegedly damaged or downed NATO aircraft over Yu-
goslavia as of June 8.   1999.   Source: `http://`
`www.pancevo.co.yu/agresija/nato_gubici.shtm`

FIGURE 3. Map of Kosovo. The map shows all major towns
in Kosovo. Source: `http://www.fas.org`

FIGURE 4.   Selection   of   available   maps
and   images   from   March   28.   Source:
`http://www.fas.org/irp/imint/kosovo-03.htm`

FIGURE   5.   Selection   of   available   maps
and   images   from   May   24.   Source:
`http://www.fas.org/irp/imint/kosovo-75.htm`

FIGURE 6.   Operation Allied Force order of battle development. Source: `http://www.fas.org`

FIGURE 7.   Mass graves in Velika Krusa. Source: `http://www.fas.org`

FIGURE 8.   Internally displaced persons in Glodane village.
Source: `http://www.fas.org`

FIGURE 9.   Internally displaced persons in Lapusnik. Source:
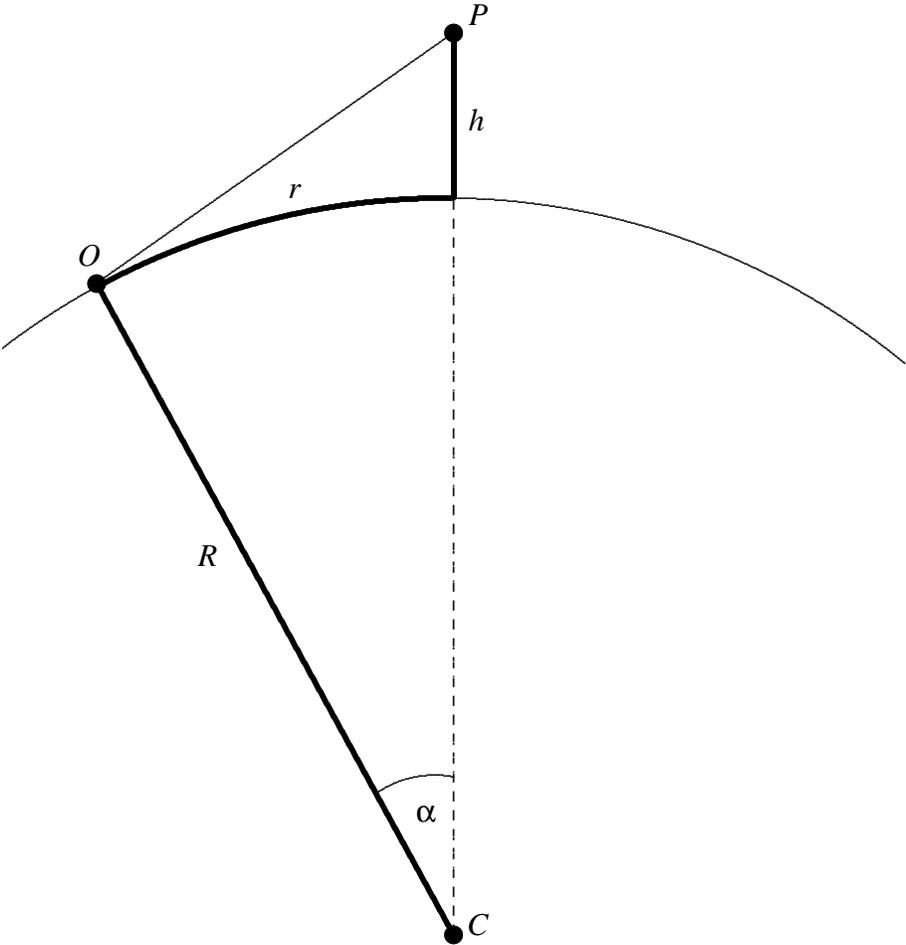`http://www.fas.org`

FIGURE 10.   Calculation of the range of vision

FIGURE 11.   Distribution of "incidents".   Source:
`http://mmf.ruc.dk/ booss/natowar/incidents.xls`