

INTRODUCTION

A **weapon of mass destruction** (WMD) is generally taken to be a type of weapon which is designed to kill large numbers of people, usually civilians but also potentially military personnel. Weapons of mass destruction are generally considered to be of limited military usefulness because their destructiveness is likely to trigger an extreme response.

The types of weapons traditionally considered to be of this variety are formerly known as Nuclear, Biological, and Chemical weapons considered morally equivalent and referred to collectively by the phrase "NBC weapons", until this phrase was replaced by weapons of mass destruction, due to confusion about the line between chemical and biological weapons, concerns about genetic manipulation of biological entities, or nanotechnological methods to generate new molecules with lifelike characteristics, or to exude dangerous chemicals, and the danger of weapons using artificial intelligence and robotics, all of which could conceivably get beyond human control.

The abbreviation "NBC" was traditionally used to refer to these

- Nuclear weapons and radiological weapons
- Biological weapons
- Chemical weapons

WEAPONS OF MASS DESTRUCTION AND NEW TECHNOLOGICAL THREATS

However, new technologies such as genetical, proteomics, molecular



Weapons of Mass Destruction

From Wikipedia

<http://www.wikipedia.org/>

engineering, artificial intelligence and robotics, led to new concerns that are hard to qualify since these technologies have not yet been (and hopefully will never be) used in war.

Supported by these concerns, some claim "NBC" weapons should now include genetic, proteomic, robotic and AI threats as well. They say that :

One concern met with each of the "NBC" types is that the different treaties applicable had legal loopholes, due to confusion about the line between chemical and biological weapons (e.g. prions which are not organisms but simple single-molecule proteins, and could thereby be considered either chemical or biological), and the spread of "dual use" technology through commercial channels that could easily be put to military use.

Another concern was that most "NBC" treaties predated the ability to DNA-sequence and genetically modify biological entities (to be, make or carry poisonous substances, virus or prion), e.g. altering the well-understood e.coli bacterium to generate prions).

The early treaties also did not anticipate nanotechnological molecular engineering methods to generate new molecules with lifelike characteristics, or to exude substances useful in chemical weapons.

Nor did it anticipate the danger of efficient and miniature weapons-grade robotics to control all of the above, nor artificial intelligence and computer graphics to train, brainwash, motivate and guide human carriers of such weapons to their targets. Modern video game technology indeed may be sufficient to train such terrorists or suicide bombing kamikazes, including evasion of detection by guards - a classic "dual use" technology.

For all these reasons, the more generic phrase "weapons of mass destruction" came into use, and is now generally used by international institutions, e.g. UN Security Council, in assessing and describing threats. Lack of clear treaties has enabled arguments, especially in the United States, that there is a duty to strike first and disable any state or entity deemed to be developing such weapons. Many non-american people in particular, think the United States government excludes itself from this duty.

IMPACT OF NEW TECHNOLOGIES OF MASS DESTRUCTION

Some of these technologies could have impacts far beyond a single generation of the human species in one place on Earth, and so are generally considered to be wholly inappropriate for conflict between nation-states. The only use of such

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weapons seems to be threatening human extinction or mutual assured destruction of an opponent who attacks first - perhaps including other populations innocent in the conflict.

Miniaturization, mastery of genomes and proteomes, and adaptive software, all seem to have the potential to be combined to create pseudo-life-forms that may compete successfully with natural life. Indeed, some scientists in the artificial life field believe it is desirable to do so. The dangers of these technologies in combination, and of loss of human control over biological or robotic runaways, is a major reason that the United Nations seek to control their spread, especially to non-state actors such as terrorists groups, that typically have no population to defend, and so can be quite reckless, and are not concerned with the threat of retaliation against a nation.

COUNTRIES THAT MAY POSSESS WMD

Countries that may possess WMD according to the Federation of American Scientists, over 30 countries may possess WMD by the most common definitions (not the new definition as outlined here). Their assessment is at http://www.fas.org/irp/threat/wmd_state.htm

NUCLEAR WEAPON

A **nuclear weapon** is a weapon of enormous destructive potential, deriving its energy from nuclear fission or nuclear fusion reactions. Nuclear weapons are referred to by a variety of names, including atomic bombs (A-bombs),

hydrogen bombs (H-bombs), fission bombs, fusion bombs, and thermonuclear weapons.

These weapons were initially developed by the United States during the Second World War in the Manhattan Project. A considerable amount of international negotiating has focused on the threat of nuclear warfare and the proliferation of nuclear weapons to new nations or groups. positioning system units; portable meteorological stations; laptop computers and cameras.

TYPES OF NUCLEAR WEAPONS

Nuclear weapons are often divided into two classes, fission bombs and fusion bombs, based on the dominant source of the weapon's energy. Fission bombs derive their explosive power from heavy nuclei (in fact uranium or plutonium) splitting into lighter elements and fusion bombs derive their power from light nuclei (usually hydrogen in the form of deuterium or tritium) fusing together into heavier elements.

Pure **fission bombs** are historically called *atom bombs*, though this name is less precise due to the fact that chemical reactions release energy from atomic bonds and fusion is no less atomic than fission. Despite this, the term atom bomb has still been generally accepted to refer specifically to nuclear weapons, and most commonly to pure fission devices.

Fusion bombs are often called *hydrogen bombs* due to the fact that hydrogen isotopes are usually used as fuel for the fusion reaction, and they can also be called *thermonuclear weapons* because fusion reactions require high temperatures for ignition.

The distinction between these two types of weapons is blurred by the fact that nearly all modern weapons combine both types of energy release. All multi-stage thermonuclear devices use a smaller

fission bomb to reach the necessary conditions (high temperature and pressure) for fusion ignition. And the efficiency of a fission device is greatly increased when a fusion core is used to boost the weapon's energy. Since most modern weapons are complicated combinations of fission and fusion devices and the distinguishing feature of both fission and fusion weapons is that they release energy from transformations of the atomic nucleus, the best general term for all types of these explosive devices is 'nuclear weapon'.

RADIOLOGICAL WEAPON

A **radiological weapon** is any weapon that is designed to spread radioactivity, either to kill, or to deny the use of an area (a modern version of salting the earth) and consists of an device (such as a nuclear or conventional explosive) which spreads radioactive material. They have recently been called "dirty bombs," although that term more correctly refers to a type of nuclear weapons.

Radiological weapons are widely considered to be militarily useless for a state-sponsored army and are not believed to have been deployed by any military forces. Firstly, the use of such a weapon is of no use to an occupying force, as the target area becomes uninhabitable. Furthermore, area-denial weapons are generally of limited use to an attacking army as it slows the rate of advance so the need for a radioactive denial system is limited. Finally, like biological weapons, radiological weapons can take days to act on the opposing force. They therefore not only fail

in neutralizing the opposing force instantly, but they also allow time for massive retaliation.

Radiological weapons have been suggested as a possible terror weapon in order to create panic in densely populated areas. They do not require weapons-grade materials, and common materials such as Cesium-137, used in radiological medical equipment, could be used. In fact even very mild sources would likely be enough to cause panic. Anything from dynamite to compressed air could be used to create an aerosol of the material, or it could be dumped from the air.

BIOLOGICAL WARFARE

Biological warfare, also known as **germ warfare**, is the use of any organism (bacteria, virus or other disease-causing organism) or toxin found in nature, as a weapon of war. It is meant to incapacitate or kill an adversary.

Biological warfare is a cause for concern because a successful attack could conceivably result in thousands, possibly even millions, of deaths and could cause severe disruptions to societies and economies. However the consensus among military analysts is that except in the context of bioterrorism, biological warfare is militarily of little use.

The main problem is that a biological warfare attack would take days to implement and therefore unlike a nuclear or chemical attack would not immediately stop an advancing army. As a strategic weapon, biological warfare is again militarily problematic, because it is

difficult to prevent the attack from spreading to either allies or to the attacker and a biological warfare attack invites immediate massive retaliation.

BIOLOGICAL WEAPONS CHARACTERISTICS

Ideal characteristics of biological weapons are low visibility, high potency, accessibility, and easy delivery.

Diseases most likely to be considered for use as biological weapons are contenders because of their lethality (if delivered efficiently), and robustness (making aerosol delivery feasible).

The biological agents used in biological weapons can often be manufactured quickly and easily. The primary difficulty is not the production of the biological agent but delivery in an infective form to a vulnerable target.

For example, anthrax is considered an excellent agent. First, it forms hardy spores, perfect for dispersal aerosols. Second, pneumonic (lung) infections of anthrax usually do not cause secondary infections in other people. Thus, the effect of the agent is usually confined to the target. A pneumonic anthrax infection starts with ordinary "cold" symptoms and quickly becomes lethal. Finally, friendly personnel can be protected with suitable antibiotics or vaccines.

A mass attack using anthrax would require the creation of aerosol particles of 1.5 to 5 microns. Too large and the aerosol would be filtered out by the respiratory system. Too small and the aerosol would be inhaled and exhaled. Also, at this size, nonconductive powders tend to clump and cling because of electrostatic charges. This hinders dispersion. The aerosol must be delivered so that rain and sun does not rot it, and yet the human lung can be infected. There are other technological difficulties as well.

Diseases considered for weaponization, or known to be weaponized include anthrax, ebola, pneumonic plague, cholera, tularemia, brucellosis, Q.fever, VEE, SEB and smallpox. Naturally-occurring toxins that might be used in weapons include ricin, botulism toxin and mycotoxins.

PROTECTION MEASURES FOR BIOLOGICAL WEAPONS

The primary civil defense against biological weaponry is to wash one's hands whenever one moves to a different building or set of people, and avoid touching door knobs, walls, the ground and one's mouth and nose. Washing literally sends the germs down the drain.

More exotic methods include decontamination, usually done with household chlorine bleach (5% solution of sodium hypochlorite). One useful decontamination is to leave shoes in an entranceway and make people wade and handwash in a footbath of bleach. Another useful technique is to periodically decontaminate floors and door knobs.

Medical methods of civil defense include stockpiles of antibiotics and vaccines, and training for quick, accurate diagnoses and treatment. Many weaponized diseases are unfamiliar to general practitioners.

Positive pressure shelters are possible but not cost-effective except for the most important installations. This is because in most attacks, the agent will disperse in a long narrow ellipse downwind from the release point.

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Persons outside the ellipse will not be affected except by secondary infection. Persons within the release ellipse cannot be helped by civil defense measures. They need medical diagnosis and treatment.

CHEMICAL WARFARE

Chemical warfare is the use of non-explosive chemical agents (that are not themselves living organisms, that being biological

warfare) to cause injury or death. The main types of agents used in chemical warfare are:

- Nerve agents
- Mustard agents
- Hydrogen cyanide-based agents
- Botulinum
- Arsines
- Toxins
- Tear gases

Pepper spray

Incapacitating agents such as Psychotomimetid agents

Potential chemical warfare agents

The use of chemical weapons is generally abhorred in international law, and there are many rules to discourage or make difficult their acquisition and use. Of these the most important is the Chemical Weapons Convention.