Introduction

Terrorist organizations have exponentially grown in number in the past few decades and terrorist acts have been carried out in countless locations globally, all initiated by hateful political motives. Due to this rise in terrorism, it is now an ongoing concern that weapons which have evolved to incorporate radioactive materials and sources are falling into the hands of terrorists and are having devastating consequences unlike ever seen before. One example would be the terrorist attacks of 11 September 2001 which killed 2,996 people (including the 19 hijackers) and injured more than 6,000. This triggered international concern about the potential malicious use of radioactive materials and sources by terrorist groups.

Many terrorist acts are carried out with different kinds of destructive weapons that range from homemade ones such as, pressure cooker bombs to weapons of mass destruction (WMD) such as, dirty bombs. A dirty bomb, also known as a radiological dispersal device (RDD), is as simple as an explosive device packed with radioactive materials along with conventional explosives. Hence, it does not just injure or kill people with a blast, but also by radiation caused by the dispersion of the radioactive elements inside the explosive.

The death of thousands and the injury of many more have been a result of the ongoing acts of nuclear terrorism. And yet, radioactive materials capable of such damage are still falling into the destructive hands of terrorists.

Definition of Key Terms

Black market

Where illegal buying and selling of goods and services takes place. Goods on the black market are usually harmful goods, such as radioactive material, WMDs, guns or drugs. For example, Moldova hosts one of the world’s largest black markets for nuclear materials and organisations such as ISIS are known for acquiring some materials from the black market.

Highly enriched uranium (HEU)
Weapon grade radioactive substance. Used in nuclear explosive devices, for example, a hydrogen bomb.

Illicit Armament

Weaponry bought through illegal means by terrorist organisations, individuals or nations themselves. One of the most prominent users of such weaponry is ISIS.

*Weapons of mass destruction (WMD)*

A nuclear, radiological, chemical, biological or any other weapon that can kill and bring significant harm to a large number of humans or cause great damage to man-made structures such as, buildings or natural structures such as, mountains.

*Pressure cooker bombs*

Also known as an improvised explosive device (IED), it is a pressure cooker packed with shrapnel including nails and screws attached with a blasting cap into the cover of the cooker.

*Nerve gases*

Nerve agents, sometimes also called nerve gases, are chemicals that disrupt the ways by which nerves transfer messages to organs. Symptoms include runny nose and eyes, small pupils or blurry vision, coughing, chest tightness, wheezing, or shortness of breath.

*Dirty bomb (Radiological dispersal device (RDD))*

A device that consists of radioactive material and conventional explosives used to disperse radioactive material across a large area, often resulting in radiation and contamination.

*Conventional explosives*

Weapons whose ability to damage comes from kinetic or explosive energy and exclude weapons of mass destruction (e.g. nuclear, biological, and chemical weapons).

Non-State actor

An individual or organization that has significant political influence but is not joined to any particular country or state. For example, non-governmental organisations (NGOs), religious groups, international media organisations, United Nations (UN), World Trade Organization (WTO).

Radioactive materials and sources
A radioactive material such as uranium, thorium or potassium that can occur naturally and is harmful to living organisms due to the radiation it gives off. Radioactive materials can be turned into nuclear weapons of mass destruction.

**Radiation**

The emission of energy as electromagnetic waves, especially high-energy particles which cause ionization.

**Terrorist**

A person/organization who uses illegal violence, particularly against civilians, to express their strong religious, political or ideological views. For example, ISIS and Al-Qaeda.

**Background Information**

Former U.S. President Barack Obama called nuclear terrorism "the single most important national security threat that we face". In his first speech to the U.N. Security Council, President Obama said that "Just one nuclear weapon exploded in a city - be it New York or Moscow, Tokyo or Beijing, London or Paris -- could kill hundreds of thousands of people". It would "destabilize our security, our economies, and our very way of life".

Nuclear weapons started to gain recognition as a global safety hazard towards the end of 1945. However, the acquisition of radioactive materials by terrorists has only significantly increased in number recently. Until four years ago, there have been around 20 documented cases of theft of highly enriched uranium (HEU) and plutonium.

**International Convention for the Suppression of Acts of Nuclear Terrorism**

The International Convention for the Suppression of Acts of Nuclear Terrorism, also known as the Nuclear Terrorism Convention, is a treaty by the United Nations which was first adopted in 2005. Its intention is to protect against attacks on a range of targets, including nuclear power plants and reactors. It details crimes relating to illegal possession and use of radioactive materials. As of September 2018, the convention has 115 signatories.

**Convention on the Physical Protection of Nuclear Material**

The Convention on the Physical Protection of Nuclear Material was a treaty signed at Vienna and at New York in 1980 and later implemented in 1987. The treaty's main focus is to establish measures related to the detection, prevention, transport and punishment of offenses relating to nuclear materials. It also includes measures to recover stolen or smuggled nuclear material. As of October 2018, 157 state parties have signed the treaty.

**The acquisition of radioactive materials and sources by terrorists**
Terrorists have been interested in acquiring radioactive materials and sources for use in attacks for years. The increase in nuclear materials being sold on the black market is now a global concern within countries around the world. Radiological weapons may be very appealing to terrorist groups as they are able to create fear and panic among people because of the threat of radiation contamination.

Since 11 September 2001, terrorist arrests have shown that individuals linked with al-Qaeda planned to acquire materials for a RDD. In 2004, a British national was arrested by British authorities on various charges, including plotting to use radioactive materials. On another occasion in 2004, authorities arrested another British national, and six others on terrorism-related charges related to trying to buy a "radioisotope bomb" from the Russian mafia.

**Consequences of nuclear attacks**

A nuclear attack can cause considerable deaths, injuries, and infrastructure damage from the heat and blast of the explosion. Most nuclear attacks can result in severe health damage to those within a certain radius of the blast due to the radiation and contamination.

**Acute Radiation Syndrome (ARS)**

People who are exposed to radiation, depending on the type of radiation and the individual, may develop Acute Radiation Syndrome (ARS). Symptoms of ARS include nausea, vomiting, diarrhea and a decrease in number of blood cells. Radiation can also cause skin burns and can prevent stem-cell growth. At very high levels of radiation, people can die within hours or days due to effects on the central nervous system.

**Long-term Effects**

Exposure to radiation increases the risk of developing DNA mutations, which in turn may result in cancer, such as leukemia, a group of cancers that usually begin in the bone marrow and result in high numbers of abnormal white blood cells. Other cancers include thyroid cancer, bladder cancer, breast cancer and lung cancer.

**Major Countries and Organizations Involved**

**Pakistan**

Pakistan is home to many nuclear facilities which makes it susceptible to attack by terrorist organizations such as Al-Qaeda and the Taliban who are wanting to acquire radioactive materials and sources. According to the director of the Pakistan Security Research Unit at Bradford University, Pakistan has already been the victim of at least three radioactive material acquisition attempts just in 2007 and 2008. He said militants had attacked a nuclear storage facility in Sarghoda on 1 November 2007, launched a suicide bomb on a nuclear air base in Kamra on 10 December 2007, and set off explosions at entrance points to Wah military camp, one of Pakistan's main nuclear assembly plants, in
August 2008. A study by the Belfer Center for Science and International Affairs at Harvard University found that Pakistan's stockpile "faces a greater threat from terrorist groups seeking nuclear weapons than any other nuclear stockpile on earth". These attempts to take over Pakistan's radioactive material have launched programs to further improve Pakistan's nuclear security.

**Mexico**

The Iridium 192, a highly radioactive material, was stolen on the outskirts of Guadalajara. Luis Felipe Puente, head of national emergency services, placed nine states on high alert after the material disappeared from the Texan border. Iridium 192, which has a half-life of 73 days, is a radioactive material which can be used in an act of radiological terror. But authorities are concerned the radioactive isotope may have been stolen accidentally, as the thieves attempted to steal the pickup truck it was placed in, not the radioactive material.

**North Caucasus terrorists**

North Caucasus terrorists have attempted to take over a nuclear submarine equipped with nuclear weapons. They have also engaged in investigation activities on nuclear storage facilities and have repeatedly threatened to harm nuclear facilities. Similar to Al-Qaeda, these groups’ activities have been hindered by counter-terrorism activity.

**Aum Shinrikyo**

The Japanese terror cult Aum Shinrikyo, which used nerve gas to attack a Tokyo subway in 1995, has also tried to acquire radioactive materials. However, according to nuclear terrorism researchers at Harvard University’s Belfer Center for Science and International Affairs, there is no evidence that they continue to do so.

**Al-Qaeda**

According to leaked political documents, al-Qaeda can produce radiological weapons, after finding nuclear material and getting rogue scientists to build dirty bombs. Al-Qaeda has constantly stated that they seek nuclear weapons and have tried to acquire them. They have sought nuclear weapons for almost two decades by attempting to purchase stolen nuclear material. Osama bin Laden, the founder of Al-Qaeda, stated himself that he views the acquisition of WMDs a “religious duty”. The first evidence of Osama Bin Laden’s plans to carry out nuclear attacks occurred in late 1993-1994, where Al-Qaeda attempted to purchase uranium. Although counter-terrorist activities have obstructed Al-Qaeda's ability to acquire radioactive materials, there is no sign that they have stopped trying.

**International Atomic Energy Agency (IAEA)**

The International Atomic Energy Agency is an international organization which was established on 29 July 1957. It encourages and supports research, development and practical applications of atomic
energy for peaceful uses throughout the world, and to stop its use for any military purpose. The IAEA helps policymakers worldwide to improve nuclear security, manage radioactive sources and combat nuclear terrorism.

**Timeline of Events**

<table>
<thead>
<tr>
<th>Date</th>
<th>Description of event</th>
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<tr>
<td>March 3, 1980</td>
<td>Convention on the Physical Protection of Nuclear Material was signed</td>
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<tr>
<td>February 26, 1993</td>
<td>Al-Qaeda detonated a car bomb under the World Trade Center in New York City.</td>
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<td>Late 1993 – early 1994</td>
<td>Al Qaeda tries to acquire uranium in Sudan to use in a nuclear device.</td>
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<td>September 11, 2001</td>
<td>A series of four coordinated terrorist attacks by the terrorist group al-Qaeda against the United States on September 11, 2001, which led to the death of 2,996 people.</td>
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<td>May 8, 2002</td>
<td>The United States arrested Jose Padilla for plotting to build and detonate a dirty bomb in Chicago.</td>
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<tr>
<td>September 14, 2005</td>
<td>The Nuclear Terrorism Convention was signed</td>
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<td>February 2006</td>
<td>Oleg Khinsagov of Russia was arrested in Georgia, along with three other Georgians, with 79.5 grams of 89% HEU.</td>
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<td>November 1, 2007</td>
<td>Militants attacked a nuclear storage facility in Sarghoda, Pakistan.</td>
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<tr>
<td>December 10, 2007</td>
<td>Militants launched a suicide bomb on a nuclear air base in Kamra, Pakistan.</td>
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<tr>
<td>August 2008</td>
<td>Militants set off explosions at entrance points to Wah military camp, one of Pakistan's main nuclear assembly plants.</td>
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<tr>
<td>June 2014</td>
<td>ISIS gained access to 40kg of uranium from the University of Mosul in Iraq.</td>
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**Relevant UN Treaties and Events**

- Amendment to the Convention on the Physical Protection of Nuclear Material, 6 September 2005, (GOV/INF/2005/10-GC(49)/INF/6)
- Preventing the acquisition by terrorists of radioactive sources, 11 December 2014, (A/RES/69/50)
• Measures to prevent terrorists from acquiring weapons of mass destruction, 8 July 2016, (A/71/122)

Previous Attempts to solve the Issue

In 2004 the U.N. Security Council passed Resolution 1540, which obligated all nations to implement policies that would keep the financing, technologies and materials needed to create WMDs out of the hands of non-State actors. Although it was controversial at first, the majority of the world’s states have come around to supporting it. Today, more than 90% of the world's governments have met the requirements of the resolution and worked with the committee.

In 2014, the Working Group started a new project on ‘Ensuring Effective Inter-Agency Interoperability and Coordinated Communication in case of Chemical and/or Biological Attacks.’ The project aims to analyse gaps in current international cooperation and explore solutions for better coordination of activities, people and information. The project was launched at a workshop in The Hague in February 2015.

The IAEA has previously issued a number of publications on nuclear security, including three publications on combating illicit trafficking in nuclear and other radioactive material. These publications provide information mainly for police and other law enforcement bodies on how to effectively prevent, detect and respond to illicit trafficking of radioactive material.

Furthermore, The IAEA launched a co-operation project (the Model Project) which aimed to strengthen Member States’ radioactive source security by developing their monitoring infrastructures. The Model Project initially enrolled the 52 IAEA Member States but it now includes more than 80 countries.

Possible Solutions

The first possible solution is to improve security at and around nuclear power plants and other vulnerable nuclear facilities. Security can be improved through educating the population and international cooperation and treaties being implemented. States should screen people who have access to dangerous materials and facilities to make sure the materials are not falling into the wrong hands. Implementation of radiation detection equipment at borders should also be done to prevent and detect the trafficking of radioactive materials.

In addition, hospitals should replace blood irradiators that use the most dangerous material, cesium-137, with alternative, safer technologies that give the same outcomes, to prevent the radioactive materials from being susceptible to theft.

International communication among all states is needed, in order to ensure that countries do not export or import resources for WMDs to terrorists.
Furthermore, increased government funding in research and development in areas such as new radiation detectors, radiological modelling computer software and effective decontamination techniques should be encouraged and implemented.

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