Nuclear Terrorism: Prospects and Perspectives

February 10, 2004
Big Questions

• Why would a terrorist group want to achieve a nuclear capability?
  – What would a terrorist group do if they got one tomorrow? Would they really use it?

• What are the prospects for a terrorist group getting hold of a nuclear weapon?
  – Is it getting more or less likely that a terrorist group will get one?

• Bottom line: What is the threat of nuclear terrorism?
Why Go Nuclear?

• What possible reason could a terrorist group have for acquiring a nuclear weapon?
Why Go Nuclear?

- Stern offers a laundry list of possible rationales:
  - Prestige
  - Attention
  - Punishment/revenge
  - Emulate God
  - Ask God to hurry up
  - Kill as many people as possible
  - Overcome countermeasures
  - Economic damage
  - Copying another group’s use of WMD
The In/Utility of Nuclear Weapons

• Many argue that nuclear weapons are “useless,” that is, they really can’t be *used* by nation states.
  – Would invite retaliation by opposing nuclear weapons state
  – Are no good for taking territory
  – International condemnation, sanctions, general hatred if used
  – No real strategic purpose to use them once you’ve been attacked by nuclear weapons
The In/Utility of Nuclear Weapons

• Are nukes “useless” for terrorists?
• Do these arguments hold for a terrorist organization sitting on a nuclear weapon? Why/not?
• Are there any arguments against using a nuclear weapon for a terrorist group?
Why Not Go Nuclear

• Possible reasons not to go nuclear:
  – Not strategically very useful
  – Not usable in areas they care about (too close for comfort)
  – Invites condemnation from supporters, ROW (more than usual, that is)
  – Resource intensive and dangerous
What Would They Do?

• Would the group you are analyzing be interested in a nuclear weapon if offered one?
• If your group woke up tomorrow and had a 2kt nuclear weapon in its possession, what would it do and why?
  – Option A: use it
  – Option B: not use it
  – Option C: threaten to use it (but not use it)
  – Option D: get rid of it soon (sell/trade/etc.)
  – Option E: something else
What Would They Do?

• What if Hezbollah had a secure second strike against Israel?

• What if Al Qaeda announced that it had nuclear weapons ready to go off in five major cities around the globe, including the US?

• Would TO be more likely to use first, then talk, or threaten/talk first, then use?

• What is the worst scenario we can imagine involving the use of a single nuclear weapon?
Quick History of Nukes

• Invented and first used in 1945
• World changer was fusion (hydrogen) bomb - much bigger megatonnage
• Cold war was terrifying, assumption was wide spread proliferation
• Cuban missile crisis
• Evolution of MAD and nuclear strategy
• Arms control, NPT, test bans - seems to have kept the lid on
Quick History of Nukes

- **Fission Weapon:**
  - Bombard fissile material (U 235 or PU 239) with neutrons
  - Fissile nuclei split, emit two or more neutrons, which in turn cause more nuclei to split --> chain reaction
  - More energy released in each generation of splits. Small nuke (up to 100kt) would explode within microseconds and involve 50 generations - 99.9% of all energy would be release in last 7 generations of reaction
  - Minimum amount of fissile material to sustain chain reaction: critical mass; goal is supercritical mass to make things go boom
  - Two ways to go supercritical:
    - Implosion via chemical high explosive
    - Gun assembly - ram two chunks of fissile material together via conventional explosion
Quick History of Nukes

• Fusion/Hydrogen/Thermonuclear Bomb
  – Requires high density of fusion material and extraordinary heat
  – Lithium-6 deuteride = source of deuterium and tritium whose nuclear will merge
  – Boosted weapons use fusion material to increase the yield of fission weapon
  – Big ones first set off fission bomb to make fusion occur - about 1/2 of energy comes from fission, 1/2 from fusion
NUCLEAR WEAPON STATUS 2002

Abstaining Countries
The following industrialized countries have the technological base, but thus far not the desire, to develop nuclear weapons. Some have installations that can produce weapons-grade material under international inspection:

Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, Germany, Hungary, Italy, Japan, Netherlands, Norway, Slovak Republic, South Korea, Spain, Sweden, and Switzerland.

Renunciations
Argentina, Brazil, and South Africa had active nuclear weapon programs during the 1980s, but renounced such activities by opening all of their nuclear facilities to international inspection and by joining the non-proliferation regime.
Belarus, Kazakhstan, and Ukraine acceded to the NPT as non-nuclear-weapon states and cooperated in the removal of all remaining nuclear weapons to Russia after the breakup of the Soviet Union.

Worldwide Nuclear Stockpiles

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Nuclear Warheads</th>
</tr>
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<tbody>
<tr>
<td>China</td>
<td>410</td>
</tr>
<tr>
<td>France</td>
<td>348</td>
</tr>
<tr>
<td>India</td>
<td>50–90</td>
</tr>
<tr>
<td>Israel</td>
<td>98–172</td>
</tr>
<tr>
<td>Pakistan</td>
<td>30–50</td>
</tr>
<tr>
<td>Russia</td>
<td>–20,000</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>185</td>
</tr>
<tr>
<td>United States</td>
<td>–10,700</td>
</tr>
<tr>
<td>Maximum Total</td>
<td>31,055</td>
</tr>
</tbody>
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1. India is thought to have produced enough weapons-grade plutonium to produce between 50 and 90 nuclear weapons. The number of actual weapons assembled or capable of being assembled is unknown. No weapons are known to be deployed among active military units or on missiles.
2. Israel is thought to possess enough nuclear material for between 98 and 172 nuclear weapons. The number of weapons assembled or capable of being assembled is unknown, but likely to be on the lower end of this range.
3. Pakistan may have produced enough weapons-grade uranium to produce up to 80 nuclear weapons. The number of actual weapons assembled or capable of being assembled is unknown. Pakistan's nuclear weapons are reportedly stored in component form, with the fissile core separated from the non-fissile explosives.

Proliferation: Good, Bad, and Ugly

- **Good Side**
  - De-nuclearization of FSU states
  - Roll backs and renunciations
  - Tougher export controls
  - NPT extension
  - CTB Treaty
  - Arms reductions
  - Pressure on potentials in many forms

- **Bad Side**
  - Loose nukes in Russia, others
  - India and Pakistan enter nuclear club
  - Missile proliferation spreading
  - Organized crime and black market for nukes larger than understood
  - Watch list still includes Iran, North Korea, Algeria, and Syria

- **Ugly side**
  - Al Qaeda actively seeking WMD
Who’s Next?

• 8 countries have them, maybe 9
• 4 have had them but given them up
• Roughly 20 are “a screwdriver away”
• 69 countries have nuclear power programs and could have a bomb for an investment of merely $1 billion
How Will Terrorists Acquire Nukes?

• Four paths
  – Build one - hard, but not impossible
  – Steal one - hard, but not impossible
  – Buy one - easier, very possible
  – Borrow one - unknown likelihood, but scary
Prospects for Terrorist Acquisition of Nuclear Weapons

• To determine how likely a terrorist organization is to acquire a nuclear capability we look at four factors:
  – Access to nuclear materials
  – Access to scientific and engineering expertise
  – Access to nuclear weapons related technologies and equipment
  – Access to delivery platforms
Delivery Platforms

• Easiest part of the equation
• Won’t be a missile
• Drive it around in a truck
• Deliver “conex” bomb in standard shipping container that looks just like the other 2,000 that entered the US in the same hour!
Equipment & Technology

• Need to have metal forming machines to bend the good stuff and its container
• Labs and lab equipment to handle fissile material
• Available everywhere
Expertise

• Los Alamos team studied the question of whether terrorists could build a bomb.
• Their answer was qualified yes.
• Need 10 - 15 people: chemist, physicist, engineers, etc. Fairly wide array of capabilities
• General know how to build bomb, however, is widely available in texts, government documents, etc.
• MIT educations don’t cost that much, either…
Nuclear Material

- The bottleneck is the 50kg of uranium or plutonium you need for a bomb (8 coke cans)
- 1300-2100 tons of weapons-grade stuff exists in the world (much in Russia)
- Loose nukes in Russia (still sitting on 15,000 warheads) make world worry about materials getting smuggled
- Easier to get radioactive material than to get weapons-grade materials
- Nuclear power programs is a potential path to weapons-grade stuff
- Real threat is not terrorist break in to facility; real
The Troubling Case of Pakistan

- Abdul Q. Khan, father of the Pakistan nuclear weapons program, admitted selling nuclear weapons technology to other countries
- Pakistan has helped Iran, Libya, North Korea and possibly others (Syria?) attain key pieces of nuclear weapons program
- Part of supermarket for nuclear weapons
- Next to impossible that this was work of Khan alone - gov’t surely involved
- What does this tell us about ability of terrorist organization to find what they need?
Takeaways

• Nukes are both easier and harder to acquire than you thought
• Radiological bombs are more likely than fission bombs
• Rogue state/terrorist partnerships are scary possibility
• Black market for nuclear technology and expertise is bigger than we thought six months ago
• Traditional nuclear strategy not much good against terrorists - new approach required