

# **Nuclear Weapons in the World:**

**Where are we, how did we get here, and what might  
the future hold?**

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# Overview

- Basic terms and history of proliferation
- How many nuclear weapons are there, and where are they?
- What is an “official” nuclear weapons state? What other kinds of states are there?
- What countries have sought nuclear weapons but changed course?
- What proliferation concerns exist today? How are nonproliferation and disarmament related?



*The Davy Crockett:  
smallest U.S. nuclear  
weapon built (23.2 kg)*

# Living in the Nuclear Age

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- Nuclear weapons are old technology
  - First built in 1945 - Long before PC's or cellphones!
- But still hard to build and deliver on a target
  - Need “fissile materials”: HEU or Plutonium
  - Engineering challenges to weaponize & miniaturize
- And remain world's most destructive
  - Greater blast than conventional explosives
    - Kilotons of TNT for atomic (fission) bomb
    - Megatons possible for hydrogen (fusion) bomb
  - Plus intense heat & radiation

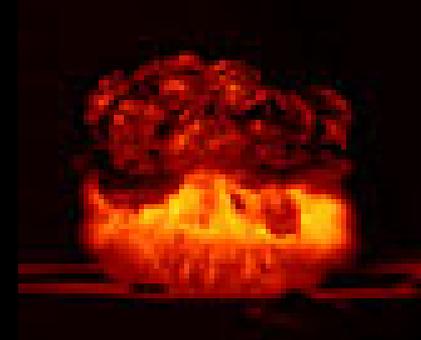
# Key Terms

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- Horizontal vs. Vertical Proliferation
  - Vertical: Increases in arms in states that have them
  - Horizontal: Spread to (acquisition by) new actors
- Arms Control, Nonproliferation, & Disarmament
  - Arms control: limits on weapons
    - Numerical or operational (e.g., test ban)
  - Nonproliferation: efforts to prevent spread to new actors
  - Disarmament: eliminate & ban whole category of arms
  - Other approaches, like cooperative threat reduction, also exist to address nontraditional problems

# The Spread of Nuclear Weapons: Dates of First Nuclear Test

- United States – 1945
- Soviet Union – 1949
- United Kingdom – 1952
- France – 1960
- China – 1964
- Israel – 1<sup>st</sup> assembled 1967?; suspected test 1979
- India – 1974 (“peaceful nuclear explosion”)
- Pakistan – 1998
- North Korea – 2006
- **NOTE: RATE OF PROLIFERATION HAS SLOWED**



1954 Bravo test

# How Many Weapons Are There?

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- The most the world ever had:

**1986: about 65,000**

- How many there are today:

**about 17,000**

- Another hopeful sign?

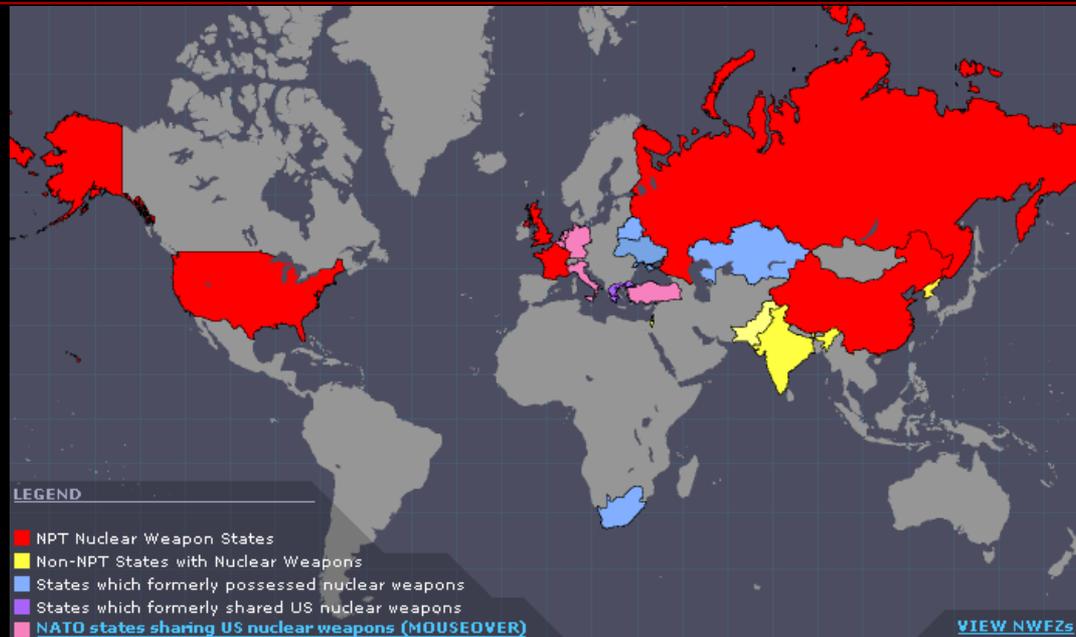
**numbers going down ...**

**but will cuts go fast enough & far enough?**



Sources: *Bulletin of the Atomic Scientists*, “Global Nuclear Weapons Inventories, 1945-2013”; Ploughshares Fund, “World Nuclear Stockpile Report”

# Where are Nuclear Weapons Today?



<http://www.nti.org/db/disarmament/map.html>

# “Official” Nuclear-Weapon States (NWS)



- In 1968, Treaty on the Non-Proliferation of Nuclear Weapons (NPT) was signed
- Article IX, paragraph 3, recognizes states that detonated a nuclear device prior to **January 1, 1967**, as nuclear-weapon states
- All other treaty members are Non-Nuclear Weapon States (NNWS)
- *Note: there are 3 states that have not joined the treaty & one that says it withdrew*



# Arsenals of the Official Nuclear-Weapon States

Data sources: "Nuclear Notebook," *Bulletin of the Atomic Scientists*; "Nuclear Weapons: Who Has What at a Glance," Arms Control Association; "Status of World Nuclear Forces," Federation of American Scientists

- **China:** About 250 warheads.
- **France:** About 300 warheads.
- **Russia:** About 8,500 warheads, of which about 4,500 are in the military stockpile (about 1,500 deployed strategic, the rest a mix of tactical warheads & reserve strategic warheads); the rest are retired awaiting dismantlement.
- **United Kingdom:** 225 warheads.
- **United States:** About 7,700 warheads of which 4,700 are in the military stockpile (about 1,700 deployed strategic and 500 nonstrategic operational warheads).

Photo of Titan missile (all Titans have been decommissioned)

Source: [www.nuclearwinter.com/titan/](http://www.nuclearwinter.com/titan/)



# Other States with Nuclear Weapons

- **Israel:** “Opaque nuclear proliferation.” By late 1966, had completed R&D on first nuclear device BUT did not openly test nuclear weapons or declare itself a nuclear weapon state; alleged test series off South Africa coast in 1979; never joined NPT; estimated 75-200 warheads
- **India:** “peaceful nuclear test” in 1974, series of weapons tests in 1998; never joined NPT; estimated 80-110 warheads
- **Pakistan:** nuclear tests 2 weeks after India in 1998; never joined NPT; estimated 90-120 warheads
- **North Korea:** withdrew from NPT in 2003 (according to Pyongyang); 1<sup>st</sup> tested nuclear device 2006 (likely a “fizzle”), second test in 2009, third in 2013; estimated 4-18 warheads (most estimate less than 10)



# Four States Gave Up Nuclear Weapons

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- South Africa
  - Built 6 nuclear weapons in 1980s
  - Dismantled them and joined NPT in 1991
- Three former Soviet republics
  - Ukraine, Kazakhstan, and Belarus “inherited” former Soviet nuclear weapons
  - Never had operational control
  - All 3 agreed to have weapons removed and join NPT as NNWS

# Nuclear Arms Control: Numbers Going Down, But How Far?

## ■ 2010 New START Treaty

- United States and Russia required to reduce to 1,550 deployed strategic warheads by 2018
  - *Obama in Berlin, June 2013: Proposes to cut by another one-third, to 1,000-1,100 warheads*
  - There are signs of significant domestic US opposition to further cuts
  - Russia signaling it's not interested in any more AC treaties
- The other three NWS (UK, France, China) so far are not participants in nuclear arms control process



# Some 20+ Countries Have Sought Nuclear Weapons

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*Programs ending before NPT began: Australia, Egypt, Sweden, Canada*

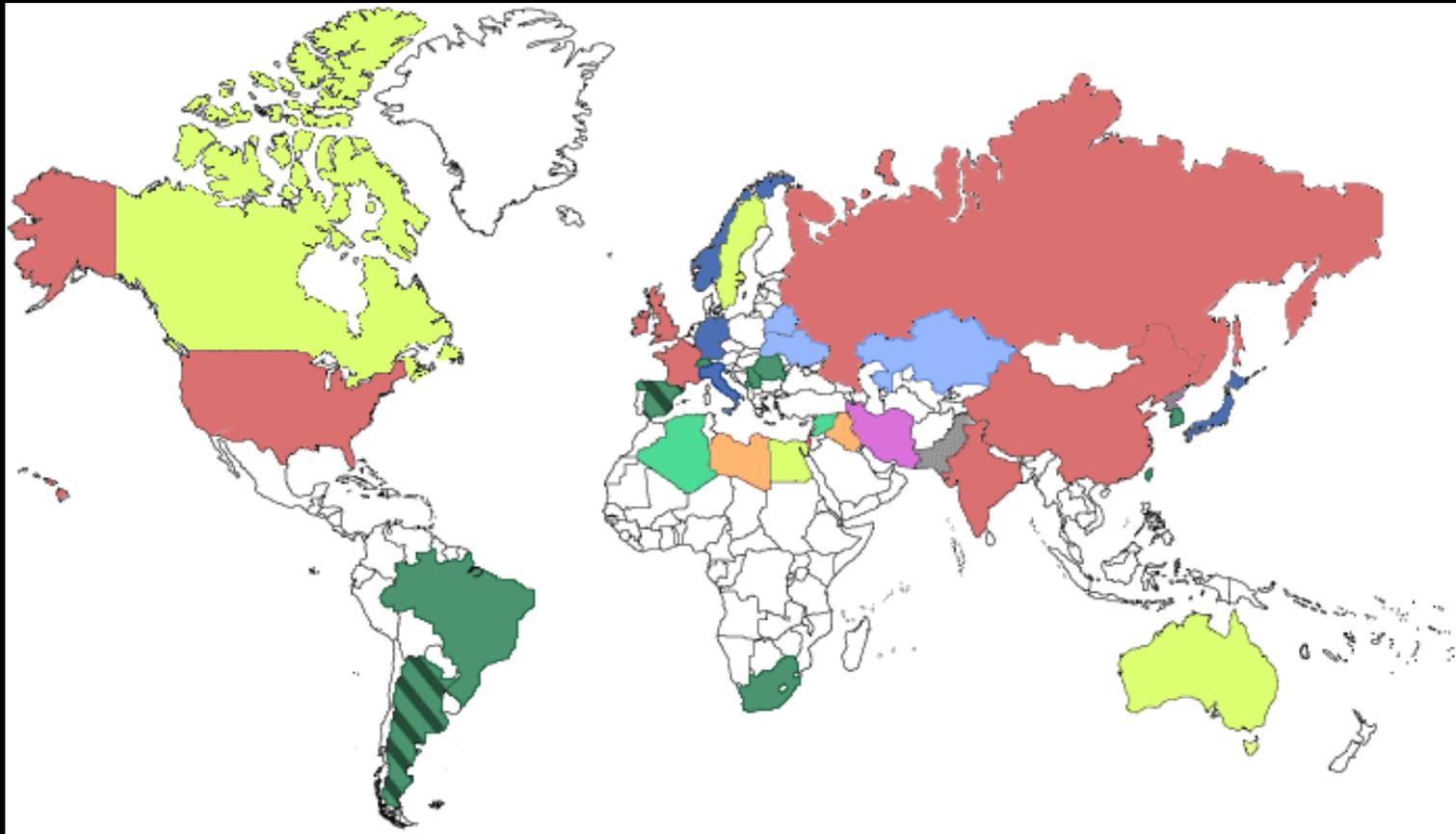
*Factions Within Advocated for or Sought Nuclear Weapons, but these Ambitions Ended by the Time NPT Started: Italy, Japan, Germany, Norway*

*Programs that Ended After 1970: Brazil, South Korea, Switzerland, Taiwan, Yugoslavia, Romania, and South Africa (others would add Argentina)*

*Programs that began after 1970, but have been given up: Iraq and Libya*

*Suspected of nuclear intentions : Iran, Syria (effectively ended by Israeli airstrike in 2007), Algeria (suspected in 1990s but not today)*

*Inherited Nuclear Weapons, but Now Non-Nuclear Weapon States Party to the NPT: Belarus, Kazakhstan and Ukraine*



- Nuclear weapons programs that began before 1970 when the Nuclear Non-Proliferation Treaty (NPT) came into force, succeeded, and are still ongoing
- Programs that ended after 1970
- Ongoing, successful programs that started after 1970
- Inherited nuclear weapons, but now a non-nuclear weapon state party to the NPT

Source: <http://isis-online.org/mapproject/introduction.html>

# Recap

	First Nuclear Test	# Nuclear Weapons	Status
US	1945	7,700 (4,700 active, 1,700 deployed strategic)	NPT NWS
Russia	1949	8,500 (4,500 active, 1,500 deployed strategic)	NPT NWS
UK	1952	225	NPT NWS
France	1960	300	NPT NWS
China	1964	250	NPT NWS
Israel	N/A (1979?)	75-200	Non-NPT NWS
India	1974	80-110	Non-NPT NWS
Pakistan	1998	90-120	Non-NPT NWS
North Korea	2006	4-7, some say up to 18	?
Iraq, Libya, Syria	None	0, program stopped	NPT NNWS
Iran	None	0, suspected dual-use program	NPT NNWS
SA, Ukr, Kaz, Belarus	N/A	0, gave up NW	NPT NNWS
About 15 Others	None	0, gave up NW programs	NPT NNWS

# Today's Proliferation Concerns

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- 3 NPT “Holdout” States
  - No mechanism to bring them in as NWS
  - Israel nukes reduce willingness of other Middle East states to commit fully to nonproliferation
  - India-Pak conflict creates fears of nuclear war
- New proliferators from within NPT: North Korea & Iran
- Non-state actors: Terrorists & illicit trafficking networks
- Status of NWS disarmament pledge
  - NPT Article VI commits NWS to “good faith” effort to get there
  - There have been deep cuts, but many NNWS still not happy
  - Might cause eventual treaty collapse?

# What About Disarmament?



- **NPT Article VI:**
- Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.

# Are NWS Complying?

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- They say yes
  - Point to deep cuts since Cold War peak
- Some NNWS say no
  - NWS defense plans envision holding on to nuclear weapons
  - No time-bound commitment to achieve disarmament

# Does This Affect Nonproliferation?

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## ■ Maybe Yes

- Some NNWS feel threatened, seek own nukes?
  - North Korea, Iran?
- Some NNWS decide not to cooperate any more with strengthening or enforcing NPT? E.g., Brazil?

## ■ Maybe No

- Other reasons matter more for decisions about acquiring or rejecting nuclear weapons?

## ■ Bottom Line

- Hard to believe inequality can be sustained forever without damaging NPT “bargain”

# Concluding Observations

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- Total nuclear weapons in world going down...but still very high and there are barriers to more arms control
- Pace of nuclear proliferation has slowed...but not stopped
- New cases of state proliferation must come from within NPT non-nuclear weapon states
- Acquisition by non-state terrorist groups has become a major concern
- Actual danger of nuclear war or use probably low, but real
- Better security of nuclear materials + nuclear weapons abolition with strong verification = possible paths to safer world...but no pathway guarantees peace & security – We can't uninvent the knowledge of how to make the bomb