



HARVARD Kennedy School

BELFER CENTER

FOR SCIENCE AND INTERNATIONAL AFFAIRS

Preventing Nuclear War in a Multipolar Era of Great-Power Hostility and Evolving Technology

Matthew Bunn

James R. Schlesinger Professor of the Practice
of Energy, National Security, and Foreign Policy

Norwegian Intelligence School, Oct. 26, 2023

http://scholar.harvard.edu/matthew_bunn

Nuclear dangers are changing...

2

❑ Geopolitics:

- ⌘ Radically increased U.S.-Russian and U.S.-Chinese hostility
- ⌘ Dramatic worsening from the war in Ukraine
- ⌘ Substantially increased Chinese power – including nuclear forces
- ⌘ Increased doubts over U.S. leadership, constancy → increased allied anxiety
- ⌘ Weakened arms control regime, uncertain future prospects
- ⌘ Dramatic expansions of North Korean nuclear, missile capabilities
- ⌘ Expanded Iranian nuclear bomb material production capacity

❑ Technology:

- ⌘ Missile defense, precision conventional, cyber, counter-space, hypersonics, artificial intelligence, disinformation, weapons autonomy...

Russia's war on Ukraine has upended much of the international order

3

- ❑ A UNSC member – charged with ensuring international peace and security – is waging large-scale aggressive war
 - ⌘ Russia using nuclear threats to protect its offensive war
 - ⌘ Weakened conventional forces likely to increase Russia's nuclear reliance
- ❑ A state that gave up the nuclear weapons on its soil in return for security assurances is being torn apart
- ❑ Impacts on security, food, energy are reverberating around the world



Source: Reuters

Little real data on the dangers of nuclear war

4

- ❑ Many assume the fearsome power of nuclear weapons will prevent anyone from using them
 - ∞ Risk of nuclear war vanishingly small
- ❑ But crises of the nuclear age – and wars of the pre-nuclear age – suggest events can spin out of control
- ❑ What data or analysis could help us understand the most important dangers and how to reduce them?



Source: DOE

Scenario 1: A Russian attack, and further threats against, Ukraine

5

❑ Imagine:

- ⌘ Ukrainian forces strike deep into lands Russia has annexed (just what Putin has warned he would “certainly use all weapons available to us” to prevent); Russian forces reeling
- ⌘ U.S. intelligence receives information that Putin is considering – but has not yet decided on – using nuclear weapons to reverse the momentum:
 - Use 1-5 nuclear weapons on military targets, few civilian casualties
 - Then threaten to destroy Kharkiv, then other cities, unless Ukraine agrees to Russia’s terms

❑ Attack purpose: tactical advantage and strategic coercion in offensive war

❑ Escalation risk: uncertain (use against non-allied non-nuclear-weapon state – but with the West heavily concerned, explicit U.S. threats of “catastrophic” response)

Scenario 2: Conflict on the Korean peninsula

❑ Imagine:

- ⌘ A major North Korean provocation
- ⌘ South Korea insists on striking back harder, to reestablish deterrence
- ⌘ North Korea uses ~6 conventional missiles against a U.S. airbase
- ⌘ ROK, U.S., begin an air campaign to destroy the DPRK's missiles
- ⌘ DPRK faces “use them or lose them” pressures – and an air campaign they might mistake for a prelude to invasion

❑ Purpose of possible use (say, against U.S. airbases and ports): defensive, regime survival

❑ Escalation risk: high



Source: Reuters

Scenario 3: Escalation in South Asia

7

- ❑ Imagine:
 - ⌘ Major terrorist attack in India – India blames Pakistani-supported group
 - ⌘ India launches air strikes in response
 - ⌘ Pakistan replies with air strikes
 - ⌘ India launches limited conventional invasion
 - ⌘ Pakistani forces with short-range nuclear missiles are about to be overrun – do commanders fire?
- ❑ Purpose of potential use: avoiding defeat, avoiding seizure of nuclear weapons
- ❑ Escalation risk: high



Source: Wikimedia Commons

Scenario 4: “Entanglement” in a U.S.-China conflict over Taiwan

8

□ Imagine:

- ∞ China launches blockade of Taiwan
- ∞ U.S. sends ships to supply the island and get supplies
- ∞ China attacks the U.S. ships – 1000s killed
- ∞ U.S. responds against Chinese ships
- ∞ China begins attacking all U.S. naval forces in the region with ballistic and hypersonic missiles
- ∞ U.S. attacks missile bases – also bases for nuclear missiles
- ∞ China perceives the United States is trying to destroy its nuclear deterrent



Source: PopSci

Scenario 4: “Entanglement” in a U.S.-China conflict over Taiwan (II)

9

- ☐ In that circumstance, does China use some nuclear weapons – to damage U.S. forces and deter further U.S. attacks?
- ☐ Potential use purpose: “use them or lose them,” deter attacks
- ☐ Escalation risk: medium



Source: US Navy via ReutersW

All such conflicts likely to be complex, multi-domain affairs -- possibly multi-player

10

- ❑ Future conflicts likely to involve many domains – land, air, sea, space, cyber
 - ⌘ "Integrated," "multi-domain" deterrence still poorly understood
 - ⌘ Will asymmetric responses – e.g., conventional strikes in response to devastating cyber – increase escalation risks?
 - ⌘ A lesson of past crises: fog of crisis, misperception, events no leader intended...
- ❑ In multi-polar nuclear world, will others join in, or stay out?



Source: CSIS

What are U.S. nuclear planners worrying about?

11

- ❑ Deterring two nuclear peer adversaries – Russia and China – at the same time (as well as North Korea)
 - ⌘ Does the United States need capability to “deter and defeat” both at once?
 - ⌘ World is more threatening than in 2010, when U.S. designed modernization
- ❑ Many potential enemy actions to be deterred, and if necessary responded to – need to provide many options to the President
 - ⌘ Perceived need to “tailor” options to particular leaders, circumstances
- ❑ U.S. is committed to helping to defend far-flung allies and partners – in Europe, in Asia...
 - ⌘ Russia already waging aggressive war in Ukraine – threats to NATO?
 - ⌘ China might move on Taiwan
 - ⌘ North Korea might move on South Korea
- ❑ Adversaries might believe they could deter the United States from responding seriously to limited nuclear use

How might deliberate leadership decisions to use nuclear weapons happen?

12

- ❑ Leaders might reach for the nuclear button when they believed they or their country would be better off after nuclear use
 - ⌘ Use against a non-nuclear state without a nuclear ally
 - ⌘ Use against a state whose forces were so vulnerable the leader believed a damage-limiting strike was possible
 - ⌘ Use believing that the adversary would be deterred from a devastating response (e.g., “escalate to deescalate”)



Source: USAF

Categories of incentives for leaders to use nuclear weapons first

13

- ❑ Preemptive – leader believes an attack is coming, strikes first
- ❑ Preventive – leader believes adversary is getting dangerous capabilities, strikes to prevent that
- ❑ Defensive – leader believes nuclear use is needed to protect the survival of the state/regime, or another vital interest (such as an important ally)
- ❑ Offensive – leader believes nuclear use will help secure an offensive victory
- ❑ Coercive – leader believes nuclear use will force an adversary to take a desired action
- ❑ Force protective – leader faces “use them or lose them” pressure

Actions in each category have been planned or considered in the nuclear age...

Beyond deliberate leadership decisions...

- ❑ Unauthorized use
 - ⌘ Field commanders might believe use was essential
 - ⌘ Authority or capability might be pre-delegated to them
- ❑ False alarm
 - ⌘ Deliberate decision, but mistake
- ❑ Escalation from accident
 - ⌘ E.g., accidental detonation, accidental launch
 - ⌘ More likely to lead to escalation if occurs in a major crisis or conflict – and more likely to occur then (Sagan, “Limits of Safety”)



Damage from accidental explosion in Beirut, 2020

Source: Mehr News Agency

A story to highlight the risks: Cuban Missile Crisis, sub B59

15

- ❑ Unbeknownst to the U.S. Navy enforcing the “quarantine,” Soviet *Foxtrot* subs were carrying nuclear weapons
- ❑ U.S. Navy began dropping “signalling” depth charges to force them to the surface
- ❑ On Sub B59, officers thought war had begun
 - ⌘ No ability to communicate to Moscow, thought war had begun
 - ⌘ Temperature >>100 degrees, men passing out from lack of oxygen...
 - ⌘ Captain ordered nuclear torpedo prepared for launch – Captain Vasili Arkhipov stopped it



Source: Olga Arkhipova

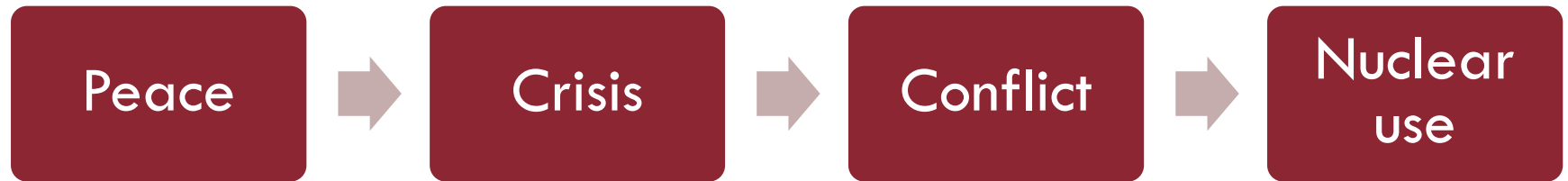
A current Russian nuclear debate

16

- ❑ Sergei Karaganov, a senior Russian analyst and Putin advisor, has provoked a debate with articles advocating steps to lower Russia's nuclear threshold – and if that doesn't work, nuclear strikes on “several” NATO countries
 - ⌘ Many Russian articles disagreeing; Putin told Karaganov he'd read his ideas
- ❑ Karaganov argues this would reduce the risk of all-out nuclear war
 - ⌘ The “unhinged” elites of the West are bent on defeating Russia, weapons to Ukraine only accelerate a long-term trend
 - ⌘ If this continues, a Third World War is “inevitable”
 - ⌘ Only way to prevent such a war is to renew the West's fear of Russia's nuclear weapons
 - ⌘ So: lower stated threshold; pull out of CTBT; put forces on alert; carry out “demonstration” nuclear explosion
 - ⌘ If West still doesn't back off, launch limited nuclear strikes
 - ⌘ Russia can deter the U.S. from striking back – U.S. promises are a “bluff”

We need risk-reduction action on each step on the pathway to nuclear war

17



- ❑ Key step: preventing crises. Any militarized crisis between nuclear-armed states is dangerous – “fog of crisis” raises risks
 - ⌘ Avoiding crises is partly deterrence – but mainly foreign policy
 - ⌘ A more modest foreign policy for a dangerous nuclear era?
- ❑ Preventing escalation from crisis to conflict
 - ⌘ Partly deterrence – partly de-escalation, reassurance
- ❑ Preventing escalation to nuclear use
 - ⌘ Similar issues – but heavier emphasis on deterrence
- ❑ How to reassure, reach resolutions, in the midst of crisis or conflict?

Need to consider what adversary responses U.S. actions will provoke

18

- ❑ Bismarck: very dangerous to play chess one move at a time
 - ⌘ Need to think through plausible adversary responses, what they mean for security
- ❑ Example: What the ROK and the United States see as deterrent and defensive, North Korea may see as an offensive threat – provoking a dangerous North Korean response
- ❑ To maximize security, for each weapon purchase, military plan, action in crisis, need to assess (a) defense-deterrent value; and (b) provocation risks



Source: DOE

The difficulties of de-escalation

19

- ❑ Clausewitz: Conflict tends to escalate
 - ⌘ Winning: victories create new opportunities that may lead a party to escalate
 - ⌘ Losing: Defeats may lead a party to escalate to defend its interests
 - ⌘ Stalemate: This may also lead a party to escalate to break the deadlock
- ❑ Offering reassurance, compromise may be seen as a sign of weakness
 - ⌘ Adversaries may exploit, escalate their demands or their steadfastness
 - ⌘ Domestic audiences may oppose
 - ⌘ Allies and others may adjust view of a country's strength, determination
- ❑ De-escalation efforts will happen in an environment of fear, hatred, misperception, disinformation, time pressure...
 - ⌘ And in democracies, there will be many voices calling for blood

The difficulties of de-escalation (II)

20

- ❑ How to credibly reassure – signal that you do not intend to challenge an adversary's vital interests?
 - ⌘ Hostility, mistrust, vulnerability to attack, pace of events, environment of disinformation, make it difficult for reassurance to be believed
- ❑ How to reach credible accords that permit an end to fighting?
- ❑ Between nuclear-armed states with survivable forces:
 - ⌘ Total victory – one path to war termination – is not an option
 - ⌘ Greater fear of catastrophe may intensify search for ways out
- ❑ Despite the obstacles to de-escalation, many militarized crises end without war, many wars end with some form of compromise
- ❑ What approaches can maximize the chance of de-escalation?
What preparatory steps in peacetime are important? Can “peace games” – exercises to explore de-escalation – help?
 - ⌘ Rich area for research – understudied

We have very little data...

“General, I have fought just as many nuclear wars as you have.”

-- Alain Enthoven

Some data could be collected, analyzed

22

- ❑ Frequency of militarized crises between nuclear-armed powers, and between them and non-nuclear-armed powers
- ❑ Frequency, given militarized crisis, of escalation to conflict
- ❑ Key items without much real-world data:
 - ⌘ Probability, given conflict between nuclear-armed powers, of escalation to nuclear use
 - ⌘ Probability, given an initially limited use of nuclear weapons, of escalation to major strategic nuclear conflict
 - ⌘ Probability, given conflict between nuclear-armed and non-nuclear-armed powers, of nuclear-armed power using nuclear weapons

“Data for deterrence” – some sources

23

- ❑ “Near-miss” data – past incidents
 - ⌘ What factors made and incident more or less dangerous? How have those factors changed, how might they change in the future?
 - ⌘ What policies might change these factors toward greater safety?
- ❑ “Synthetic data” – war games
 - ⌘ Many important games classified, some unclassified
- ❑ Non-nuclear historical data
 - ⌘ Past failures of deterrence – causes
 - ⌘ Past escalation to high levels of violence – causes
 - ⌘ Risks, benefits, of multipolar vs. bipolar orders
 - ⌘ Need to be very careful in considering how these non-nuclear analogies apply with nuclear weapons in the picture

Another source of insight:

Psychology and decision science

24

- ❑ Psychology and decision science have advanced substantially in recent decades, and can surely offer some insight
 - ⌘ What factors likely to be present during a crisis or conflict would increase or decrease the danger of rash gambles?
 - ⌘ How will speed of decisions, torrent of information, suggestions from AI systems, other elements of the modern decision environment, affect the decisions that might be made – including at conflict levels well below “pushing the button”?
- ❑ Example: Loss aversion
 - ⌘ Military leaders sometimes take desperate gambles to avoid a defeat
 - ⌘ But how would “loss of country” aversion play into decisions?
- ❑ Can we design experiments that realistically capture key elements of the likely decision environment, or not?

In short: we'll never really know, but there is potential to make some progress

25

- ❑ Combination of all these methods can help build understanding of where the greatest dangers lie, how they might be reduced
- ❑ Pathway analysis and applied history, in combination, are likely the most important contributions
- ❑ But need to take insights and use them to better inform explorations of the implications of changing technologies and changing geopolitics

But -- good news about nuclear weapons

- ❑ No nuclear attacks for 78 years – remarkable success
- ❑ >80% of the world's nuclear weapons have been dismantled
- ❑ <5% of world's states have nuclear weapons – same as 35 years ago
 - ⌘ No net increase in 3.5 turbulent decades – amazing success
- ❑ >50% of the states that started nuclear weapons programs gave them up
 - ⌘ Efforts to prevent proliferation succeed more often than they fail
- ❑ >50% of the states that once had potential nuclear bomb material on their soil have eliminated it
- ❑ Nuclear material around the world is far more secure than it was 25 years ago – harder for terrorists to get
 - ⌘ Most egregious weaknesses fixed – but more to be done

The importance of presidential judgment

27

- ❑ Cuban Missile Crisis:
 - ⌘ Initially, Kennedy's advisors called for air strikes followed by an invasion
 - ⌘ Kennedy pushed back, asking for another option
 - ⌘ The recommended course might well have led to nuclear war
- ❑ Kennedy: Key lesson was always to offer the adversary a face-saving way to back down
- ❑ The world relies on sober judgment by the leaders of nuclear states



Source: JFK Library

Further reading...

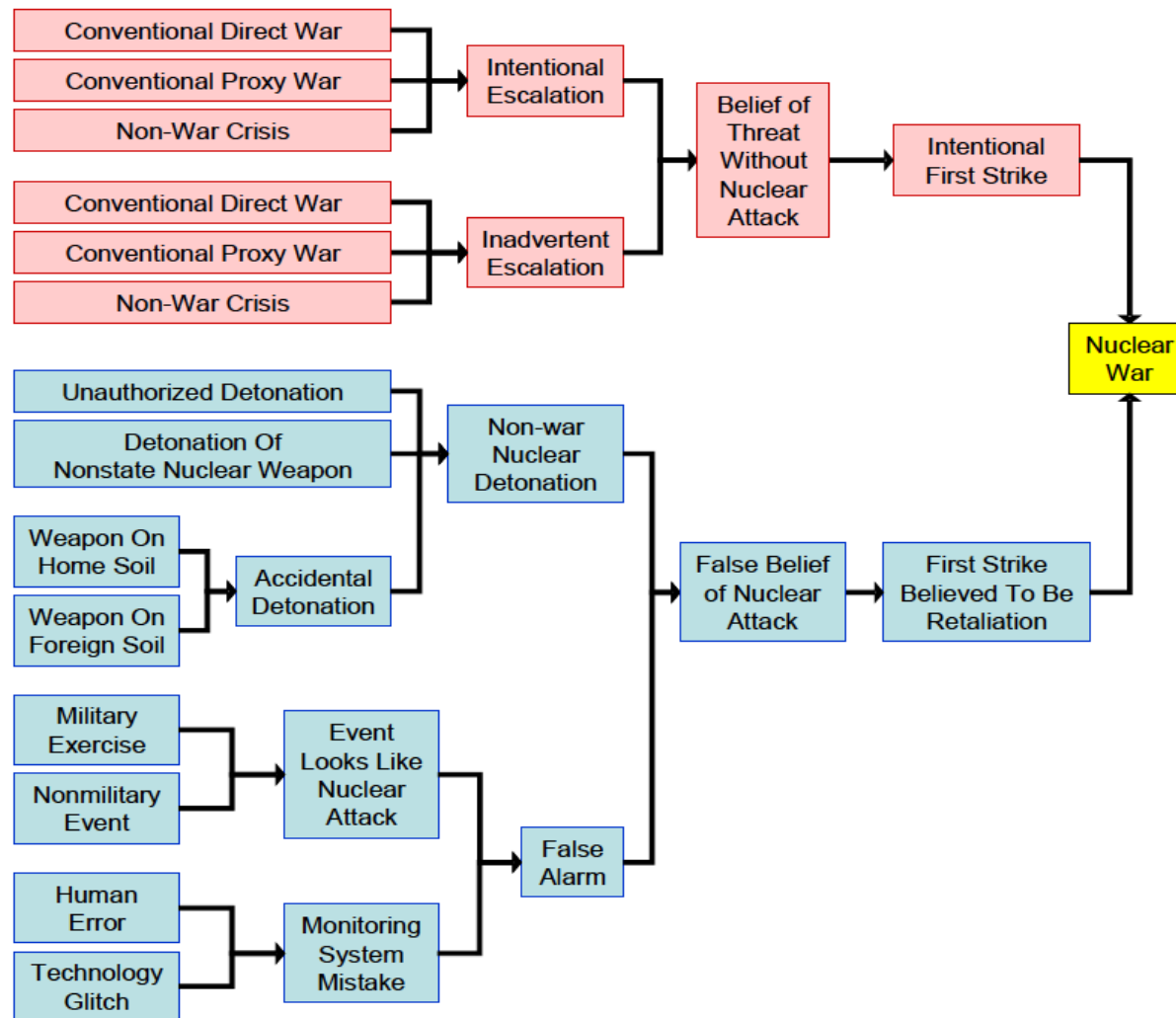
28

- ❑ Full text of Managing the Atom publications:
<http://belfercenter.org/mta>
- ❑ Full text of Bunn publications and presentations, by topic:
https://scholar.harvard.edu/matthew_bunn
- ❑ “Pathways to Disaster: How Might a Nuclear War Start?”
presentation, Oak Ridge National Laboratory, 2022
<https://tinyurl.com/ypz7osd8>
- ❑ *The Iran Nuclear Archive: Impressions and Implications*, 2019
<https://tinyurl.com/2o7gqcm3>
- ❑ *Revitalizing Nuclear Security in an Era of Uncertainty*, 2019
<https://www.belfercenter.org/NuclearSecurity2019>
- ❑ “For Security’s Sake: Saving U.S.-Russian Arms Control,”
presentation, Oak Ridge National Laboratory, 2018
<https://tinyurl.com/y5u4p7xh>

Backup slides if needed...

Using pathway analysis to structure our thinking...

30



Seth D. Baum, Robert de Neufville, and Anthony Barrett, "A Model for the Probability of Nuclear War," Global Catastrophic Risk Institute, 2018

Questions we'd like data to help answer

31

- ☐ What are the most dangerous pathways by which a nuclear war might start? What could we do to reduce their dangers?
- ☐ What characteristics of nuclear forces and policies (alert rates, command approaches, policies on when and how nuclear weapons would be used...) can provide deterrence with minimum risk of nuclear war?
- ☐ How can nuclear deterrence be “extended” to allies while maintaining minimum risk of nuclear use?
- ☐ What actions, done for deterrence or defense, might actually PROVOKE an adversary to use nuclear weapons?
- ☐ How will changing technologies, geopolitics, and a more multipolar world affect the various potential pathways to nuclear war?

Another story highlighting the risks:

1961 Berlin Crisis, 1st Strike Plan

32

- ❑ Khrushchev threatened to seize West Berlin
- ❑ Berlin could not be defended with conventional weapons alone
- ❑ If nuclear weapons were used, it seemed likely to escalate to strategic nuclear war – and the U.S. would be much less damaged if it struck first
- ❑ Carl Kaysen and Henry Rowen drafted a plan for a nuclear first strike – could destroy most Soviet nuclear forces with a limited strike, try to deter any retaliation
 - ⌘ Discussed with Kennedy, JCS
 - ⌘ “Fair probability” of a “substantial measure of success”



Sources: MIT, New York Times

First-use threats are not just an abstract issue – U.S. has used repeatedly

33

U.S. Nuclear Threats, 1945-2019

1945: Hiroshima and Nagasaki	1969-70: Deterring Soviet attack on China
1948: Nuclear bombers to UK over Berlin	1969-72: Threats to North Vietnam
1950: Threat to respond to China in Korea	1971: Threats in Indian-Pakistani war
1953: Threat to force deal in Korea	1973: Nuclear alert in Arab-Israeli war
1954: Offer to French for Dien Bien Phu	1976: Threats to DPRK over fatal incident
1954-55: Threats to Chinese over Quemoy	1980: “Carter Doctrine” incl. nuclear threat
1956: Threat to deter Soviet action in Suez	1980: Threat to deter Soviet move into Iran
1958: Preparation to protect Kuwait oil	1981: Reagan reaffirms ME nuclear threat
1958-59: Threats over Berlin crisis	1991: Threats to Iraq
1961-62: Threats over Berlin crisis	1994: Threat to N. Korea
1962: Cuban missile crisis	1996: Public threat to Libya over CW
1968: Discussion of using for Khe Sanh	2017: “Fire and fury” threats to DPRK

Source: Ellsberg, *The Doomsday Machine*

A first cut: 2 dangerous pathways

34

- ❑ In a moment of intense crisis or conflict:
 - ⌘ False alarm or major accident suggests nuclear war already underway
 - ⌘ Conflict creates pressures to escalate to nuclear use
- ❑ The danger of escalation to nuclear use is higher if:
 - ⌘ Leaders believe nuclear war is nearly inevitable
 - ⌘ Leaders believe their country would be better off if they struck first
 - ⌘ Leaders believe survival/sovereignty of their country (or their alliance system) is at stake in the conflict (even without nuclear use)
 - ⌘ Leaders believe nuclear use could be controlled, all-out war avoided
 - ⌘ Many fingers are potentially on the button
 - ⌘ The conflict creates “use them or lose them” pressures
 - ⌘ Decisions are made under extreme stress, with little time, with confusing (or wrong) information, by an individual or very small group