

# A Systems Approach to Nuclear Security, Non-proliferation, Deterrence and Disarmament



British American Security  
Information Council  
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## Introduction

BASIC hosted a series of workshops in 2015-16 throughout the United States and United Kingdom employing holistic and soft systems tools to frame discussions on nuclear security and non-proliferation with experts, young people and individuals less familiar with nuclear weapons from a variety of cultural backgrounds and levels of experience.

We were seeking innovative, collaborative and future-focused approaches to escape the polarising traps that have characterised the public and political debate in the space up until now.

We were looking for new narratives and approaches to nuclear security, based upon attitudes towards uncertainty, emerging technologies and links with other salient international concerns.

On 25 May 2016, BASIC and the NSquare Collaborative brought together nuclear weapons experts and funders, students of international relations and security studies, and innovators in various industries for a full-day workshop to discuss issues associated with nuclear security, deterrence and strategic relations in new ways.

## Our work on this issue was intended to:

- Assess understanding of the nuclear security and non-proliferation agendas, and common elements that underpin concern around the issue, and to surface the barriers to wider engagement and understand why they exist.
- Work with individuals from sectors outside the nuclear field that might share a concern or stake in addressing these barriers (and their root causes) and identify opportunities for sustainable collaboration or building incentives to engage with greater energy.
- Diversify the discussion and consider how best to stimulate a culture shift in the way individuals and organisations both inside and outside the nuclear weapons 'community' think about and engage with the nuclear discussion as a larger global issue that we all have a shared stake in addressing.



*One of the 'soft systems' workshops led by BASIC*

The popularity of Donald Trump and Bernie Sanders in the 2016 US Presidential race, and the result of the EU referendum in the UK demonstrate a strong underlying antipathy to the status quo, to established ways of 'doing politics' and to attempts to reach pragmatic compromise within the political system. They also show a deep hostility to outsiders or 'the other', and what might be seen by liberals as a regressive trend towards tribal emotions. We wondered how this might end up impacting upon the nuclear community.

## Nuclear security and weapons: The context & response

Nuclear security is an essential aspect of nuclear operations, whether in the power industry, food, medicine or military applications. It involves measures to ensure that sensitive materials and technology do not end up in the hands of unauthorised people or organisations, particularly those that might then use their access to for threat or destruction.

Nine countries possess nuclear weapons, five of which are signed up to the Nuclear Non-Proliferation Treaty with commitments to work towards disarmament in good faith. But lack of progress on this front, due to the preserve of deterrence and nuclear weapons as core elements of national security postures, a continued attachment to a set of assumptions that underpin approaches to national security and the status that nuclear weapons bring, has led to frustration on the part of many of the world's non-nuclear weapon states. This in turn has undermined their willingness to engage in collaborative measures to tighten nuclear security.

Meanwhile, and there should be no surprise here, the international community has had to manage several proliferation challenges, particularly North Korea and Iran. These remain alongside growing threats of miscalculation, escalation, accident and theft of nuclear materials, the latter of which the Obama Administration prioritised addressing on the global stage. These issues tend to feature in the media, shaping public perception often framed in terms of risk and fear.

## Employing a systems approach to nuclear security

The dominant mode of thinking in our culture is (we imagine) based upon an evidence-based scientific approach. This simplifies complex problems by focusing down on the detail, a strategy known as reductionism. It presumes that the whole can be grasped by understanding the parts. This discounts two well established features of many social situations. The first is that the issues of interest often lie in the relationships between the parts. The second is that whole systems have characteristics that cannot be explained in terms of the parts; these characteristics are known as emergent properties.

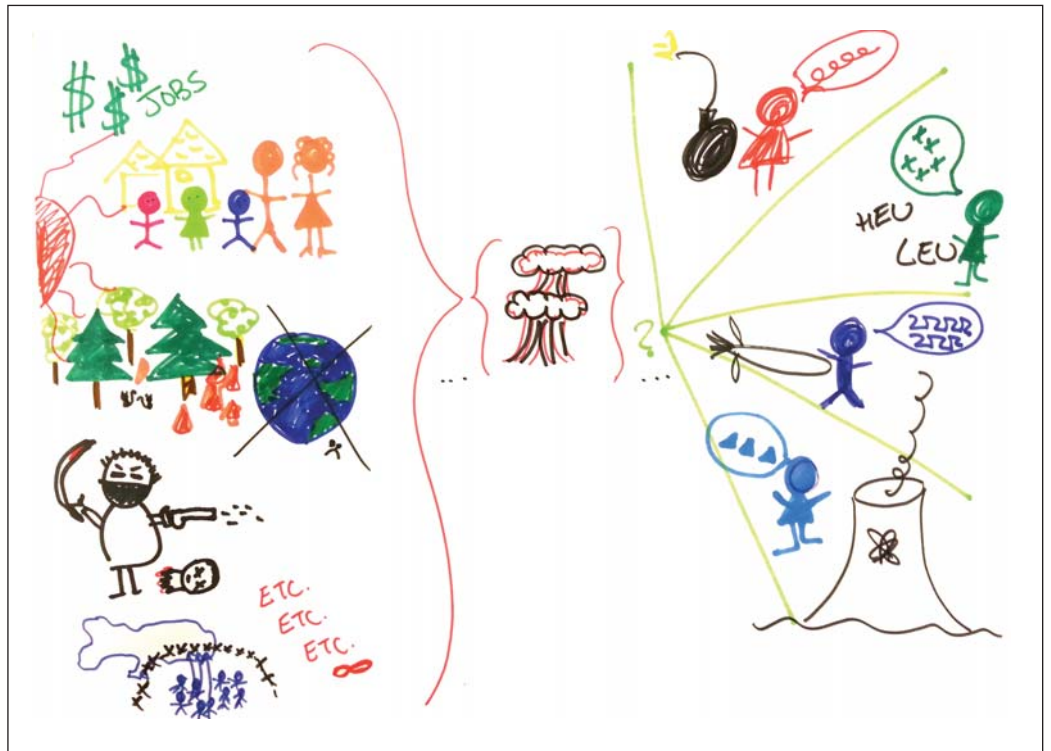
Systems thinking goes up a level of abstraction by discarding detail. This retains the connections and relationships between the parts: it is therefore a holistic approach, recognising the significance of emergent properties. It also adopts a pluralist approach to gathering evidence explicitly recognising the importance of different perspectives or worldviews in understanding systems, particularly social systems. These perspectives are inevitably and heavily influenced by identity and experience, emotional attachments and relationships with others. Surfacing these and acknowledging them is essential to any policy recommendations that come out of this process.

In human activity systems (organisations) the interactions between autonomous agents means that the overall behaviour is essentially unpredictable and largely uncontrollable, or to predict with accuracy the impact of a particular intervention.

A systemic approach appreciates the significance of different perspectives or world-views held by the various agents and agencies within the overall system. These differences contribute to the unpredictability of the system and have to be taken into account if effective change is to be managed. Sometimes, when power shifts, those previously marginalised can have a big impact on outcomes (the outcome of the Brexit referendum is a good example, or the shift in power from generation to generation).

In traditional political approaches to policy, an individual might decide what s/he wants, marshal arguments and gather evidence, establish interests and appeal to allies to strengthen resources, put forward a case, discredit opponents, 'win' the argument and then execute the change. In the systems approach to policy an individual might decide a starting point, gather issues, perspectives and representatives of those diverse perspectives and actively listen to them, pull together protagonists and model processes, explore traps, assumptions and structure the conversation to surface similarities and differences, then finally agree limited intervention, evaluate and discuss.

In the nuclear security field, from perspectives within states that have a developed nuclear power industry, and particularly nuclear weapon states, there can appear to be some level of consensus on the need for control and the effective operation of systems. The purpose of the systems is to lock out outsiders (terrorists, rogue states, etc.), and that it is a challenge of awareness and ensuring people pull together to deliver the purposes of the system. However, conflicts in interest and perspective sit below the apparent consensus as second level issues, which can frustrate collaboration and harm the prospects of action.



*We used rich pictures in all of our workshops to surface perspectives on nuclear security and non-proliferation*

In the nuclear deterrence and disarmament field, where opinions are so often polarised and inflexible, traditional policy approaches appear to have failed in moving the debate on. Arguments and positions repeat over time, and individuals settle into their favoured perspective, aware of the arguments on both sides but open really only to one. Of course this inflexibility could end in revolution, but that holds significant dangers.



## Genesis from previous BASIC workshops and activities

BASIC has for the last decade been applying and developing systems approaches when bringing together people to engage on the nuclear weapons debate. In 2014 BASIC launched its Next Generation project in order to engage with a broader cross-section of next generation policy makers about nuclear weapons in a way that resonates with this demographic. We began to think about nuclear weapons differently, invoking innovation and holistic links with broader geopolitical issues such as climate change, the global economy, and human rights. Our Next Generation project evolved into this broader investigation using systems thinking tools to encourage fresh less boundaried thinking amongst participants, many of whom were new to the debate.

## Broad approaches

We found that people's attitudes toward these issues involve a heightened sense of threat, boundary and identity. It is perhaps intrinsic to the issue that conceptions and debate over nuclear weapon involve a greater awareness of risk and some element of fear. The weapons themselves are profoundly disturbing, and they are deployed in order to manage existential threat. We sought through our enquiries to better understand the nature of this and how this shaped policy making and the public debate. There were particular challenges around assessing levels of risk and appropriate and effective responses to that risk.

In the case of nuclear security, it was clear that mainstream framing of this by considering risk mitigation was understood generally to be responsible, but relatively techno or bureaucratic, and therefore not particularly relevant to individuals not directly involved. It meant that attitudes and recommendations were generally targeted on official actions or regulation, rather than more holistic or radical solutions. This included strengthening controls on nuclear technology to prevent unauthorised access, or the leakage of technologies to states that might threaten international stability.

This involves several assumptions, including:

- Actions should focus on preventing outsiders acquiring technologies that deliver highly destructive or disruptive capabilities;
- the agenda is generally one of maintaining safety, attached to the status quo; and
- security means use of barriers, boundaries and force to achieve these objectives.

We wondered whether this says more about how we approached the subject (reflecting its framing in the mainstream media), or more about the participants' world views more generally, though of course these two are closely related. We would expect to have had a very different set of responses had we been conducting our research in states associated with revisionist foreign policies (such as Russia or Iran).

In general, amongst those in the next generation we found greater alignment with established thinking when discussing nuclear security than we did with nuclear deterrence. Deterrence elicited a much greater sense of division, and a weaker attachment to established nuclear deterrence practice (or an acceptance of mutually assured destruction as a means to achieve stability). This has implications that are uncertain, reflecting the wider instability in politics today. Nuclear weapons postures that are less rooted in stable, well-established deterrence attitudes are scary and less predictable; yet the suspicion of established practices also means there are more chances to escape the intractable debate between those deeply convinced of their position. There is a greater potential for innovative thinking.

In any case, evolving strategic dynamics (nuclear proliferation, shifting alliances, emerging disruptive technologies, developing global threats for which nuclear weapons are irrelevant) also mean that nuclear deterrence may be less relevant than it was (or perhaps than it is perceived by those within the nuclear community). The increasing vulnerability of nuclear weapon systems also means that strategic deterrence could become highly unstable, and that alternative means to achieve stability are needed.

Some of our participants were aware of a revolution in military affairs under way that will favour small and nimble, networked, autonomous or semi-autonomous, modular, cheap, numerous and expendable platforms operating with emerging technologies such as robotics, nano-tech, cyber algorithms and quantum computing. Traditional concepts of deterrence, crisis stability and arms control have to evolve to account for these transformations in capabilities and approach if they are to remain relevant.

In other words, there are signs of transition which makes it very challenging to clearly predict the future, and the reactions of the next generation outside of the established nuclear community to those world-views that have until now dominated strategic discourse.

Meanwhile we witness a continuing commitment to the nuclear weapon enterprise by state bureaucracies engaged in huge nuclear modernisation programmes updating expensive platforms. This largely as a result of domestic political objectives, interest groups and a lack of imagination or analysis, bolstered by deteriorating international relationships and an apparent growth in nationalism. Many within the community of 'millennials' and 'post-millennials' see these commitments to nuclear systems and the narratives around nuclear deterrence as less relevant to them and their daily lives than previous generations. Some of the opinions and beliefs we encountered included:

- 'Nuclear weapons are irrelevant': these weapons seem connected to a by-gone age, a legacy rather than live issue; post-Cold War nuclear disarmament in the 1990s appeared to take nuclear weapons out of the public equation, and they have not featured explicitly in public signalling between states until recently.
- 'Nuclear weapons are not dangerous': the belief that there is little immediate danger of nuclear weapons use as we have experienced seven decades of non-use in more dangerous times, suggesting deterrence is stable (awareness of the safety and security risks appears limited).
- 'Nuclear weapons don't make sense today': conceptions of nuclear deterrence in a multipolar world break down and present greater dangers and unpredictability than in a bipolar confrontation.

- 'Nuclear advocacy is confused': the debate commonly hinges on uncertainty, ambiguity, complexity and a loss of control, with claims that nuclear weapons bring certainty and guarantees of security which plainly do not pertain.
- 'Nuclear weapons are distant': younger people cannot see how their engagement might affect change.

Our point of departure in engaging people in the issue was nuclear security and non-proliferation, reflecting mainstream motivations for media and policy interest in the nuclear field. However, many participants quickly reframed the question in a manner that took account of the broader context, and strategic relationships between states and non-state actors. One of the reasons for this may have been a desire to find a way to see direct (political) engagement in an issue that might otherwise appear rather dry and technical, the preserve of regulatory authorities. In other words, participants sought relevance through controversy, and sometimes a prior relationship with a position within the debate.

Participants quickly discovered that the broader issues involve:

- Preventing disruptive and angry 'outsiders' acquiring highly dangerous, destructive technologies currently used by 'insiders' to maintain stability and the status quo, and thereby retain power;
- the deployment of technical systems that combine surveillance, verification, coercion and compliance;
- unintended consequences in a complex environment where control is extremely challenging, which requires broad social collaboration that goes beyond simple consent, and involves choices between the values we aspire to promote; and
- societal change, identity and the emergence of disruptive technologies that undermine or strengthen traditional forms of control and coercion.

There is was a strong awareness that the field of nuclear security and non-proliferation demands innovation and collaboration, but participants remained unclear how we identify the best approach: to remain limited with a focus upon stronger national and international controls on the technology, or to tackle the problem in the context of bigger picture changes of thinking considering technology alongside political, diplomatic and social factors.

## Rich Pictures

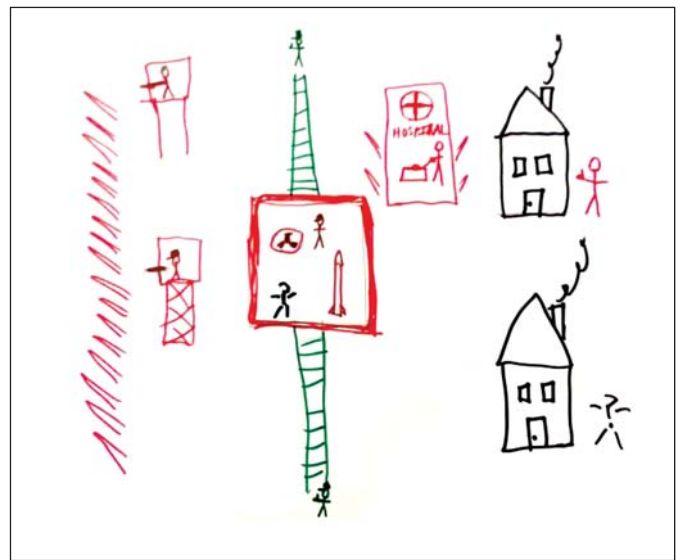
Rich Pictures are used by systems analysts to surface and express perspectives, encourage participants to convey explicit and hidden impressions, and to explore internal awareness. Active listening is a core element to the rich picture exercise as individuals are asked to share what they have drawn and interpret what others have. We began with pictures expressing perspectives over nuclear security (bounded by security of nuclear civil facilities, materials, and military nuclear facilities and systems) and nuclear non-proliferation (bounded by new nuclear armed states and non-state actors).

Symbols of optimism and a belief in progress through scientific discovery alongside non-proliferation efforts were mirrored by symbols representing barriers to progress or the non-transparency on the political and technical side. The split between ‘haves’ and ‘have-nots’ was often seen as a major barrier to progress, made worse by a tendency to take a coercive security approach to nuclear security that simply fed back into the sense of injustice.

Dual use of nuclear technology was a key issue of contention. Many acknowledged the importance of nuclear technology, science, and energy as a public service benefits whilst seeing the unintended consequences and risks of proliferation, theft, accident and miscalculation of weapons grade nuclear technology.

As we had expected, nuclear security and non-proliferation were overshadowed by the fear of potential destruction, symbolised by images of large mushroom clouds and desolate land masses.

The method encouraged a recognition of the immense global interconnectedness and complexity of structures and international frameworks intended to govern these systems and the language used to describe them.



*Pictures including fences, guards and barriers between insiders (which generally included the perspective of the participant) and outsiders (marginalised ‘terrorists’) were very common.*

Unfortunately, many felt these systems had become the cause of conflict, and fuelled a lack of understanding or feelings of vulnerability and confusion, leaving people daunted and depressed by the scale of the tasks ahead. This complexity affects an individual’s personal connection to the issue; many people did not draw themselves into the picture and could not explain how they fit into it, except perhaps as an observer.

Many pictures suggested frustration at the amount of money and politics that seem to distort these issues, a desire for more action and less talking. Genuine education (as opposed to propaganda) of young people and general public was seen as critical to turning this around, and generally communicating more effectively about these issues in media and public conversations. Several participants pointed to the fear mongering in headlines that can help to raise awareness but tends to block constructive responses. This triggered discussion on positive narratives and models of change.

Whilst participants were somewhat reluctant in starting their pictures, by the end of the exercise there was a near universal praise for the process. Many were surprised what they ended up drawing, surfacing subconscious feelings towards the issue, and building trust between them. Others were pleased with the fresh and creative approach to something they had worked on for many years. Reflection on the process exposed the power and importance of framing and going through all of the steps of the process to get to the conclusions and interpretations.

## Soft Systems Method

Our earlier workshops involved a process starting with Rich Pictures and moving into a collective soft systems method. This would involve the group choosing a particular problem theme arising from their rich pictures, and working together through a guided process to build an ideal model describing related steps stakeholders could take to improve the situation by tackling that theme. In our experience this often led to relatively generic, conceptual approaches that were not conducive to drawing out important general themes, though was helpful to the participants in demonstrating to them how a holistic approach can help in creating strategy.

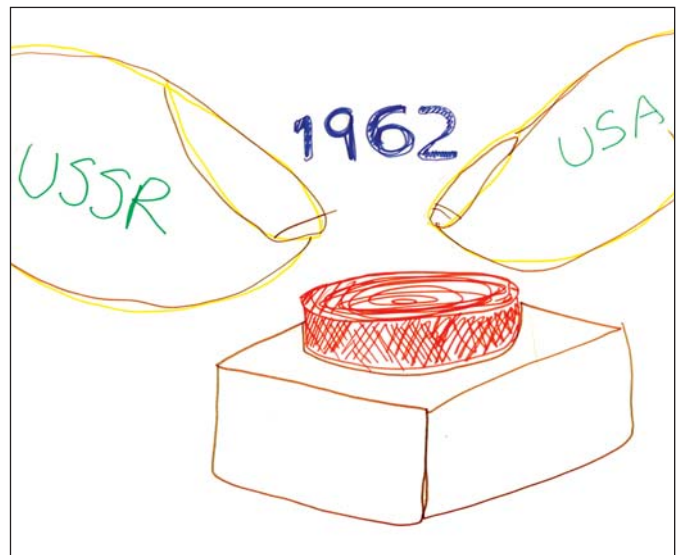
## Scenarios

Today's decisions have effects that continue well into the future. But the future has strong elements of chaos because of the complexities at play. Conceptualising the future and subsequent global contextual trends and advancements is an important way of considering the role that nuclear weapons will play. Predicting the future, particularly the longer term future, is fraught with challenge, and great care is needed. However, thinking in the future can hugely help to contextualise trends, consider their relationships, and structure discussions which otherwise can be rather too determined by past experience or present day political controversy. In our final day-long San Francisco workshop, working in three groups, participants were asked to identify social trends over the next 25 years, with a focus on the year 2041.

### The five key trends identified were:

#### Ecological & biological

Groups predicted that climate change will exacerbate competition for scarce resources, including water, land and energy sources. With this comes species loss and less diversity. There will be an increase in global pandemics due to migration and rising temperatures, and the possibility of deliberate release.



#### Social

Groups predicted that humans will live longer and migrate more between countries and between cities and suburban or rural areas. The family structure will change, and there will be greater gender equality. Families will likely have fewer children, though population will continue to grow at an exponential rate (lower mortality). The nature of careers and jobs will change with robotics and artificial intelligence, more remote working and new roles emerging. People will engage in hybrid learning from an early age. Retirement of the baby boomer generation means relying on the following generation working longer.

## Technology

Groups predicted that privacy will become a commodity (it will be scarce, and therefore its value will increase). The risks of cyber threats will increase. Transportation infrastructure, and sustainable food and energy production and consumption, will improve. Biotechnology will drive healthcare advancements and life extension.

## Economic

Groups predicted that prosperity will increase, but the wealth gap will worsen, with further accumulation at the top 1%. More consolidation and regulation of financial institutions and currencies, leading to more interdependent global markets.

## Geopolitical

Groups predicted more friction (and conflict) at all levels (traditional military stand-off, cyber-attacks, financial punishments, etc.). Religion will continue to play a role as a political driver and motivator, and there will be greater radicalisation and polarisation between societies.

## Implications for nuclear weapons and managing future risk

Increased global complexity and interconnectedness, with emerging technological uncertainties, will lead to more strategic instability but also greater strategic equality. This may increase the risk of nuclear exchange when considered alongside multipolar nuclear deterrence relationships and likely hedging strategies that will become ubiquitous. On the other hand, there may be a reduction in the utility of and a shift away from nuclear weapons as other technology associated with security and defence develops. This may contain proliferation threats effectively, but the drivers of possession -- regional tension and conflict or deterrence from an aggressor -- will not disappear.

Many people were pessimistic about the prospects of negotiating nuclear weapons away or progressing on the disarmament agenda on its own terms without a shock event, replacement weapon or major exogenous changes in the attitudes towards the fiscal, human and environmental costs of nuclear weapons.

The threat from nuclear weapons will require careful legacy management alongside other emerging global existential threats. Future debates over national and global nuclear security and non-proliferation strategies could calcify politically and in public conversations.

The management of threats and relationships is likely to be more advanced than it is now, with the application of new technologies to verification, transparency and disarmament. This could work alongside changing conditions in terms of relations between state entities to reduce the attraction of nuclear weapons, but it was difficult to be specific around how this would happen.

## Evaluation and Next Steps

In our feedback evaluations, people responded positively to the creative process and our attempts to structure meaningful dialogue and active listening in areas often characterised by conflict and inflexible opinion. The structures we had developed definitely helped participants to relax their attachments to existing beliefs and the need to focus on advocating for their existing perspectives.

Many participants saw the importance and benefit of bringing diverse groups of people together. We achieved this by including people of different ages, levels of experience and sector background, though cultural, political, and religious and international diversity was limited. Each group was able to push each other to think a little differently and to understand the scope of the issue area, and associated problems. It was noted, however, that we could have furthered this through greater diversity.

We intend to continue to frame the nuclear weapons discussion within a broader set of existential threats and multi-layered global cooperation on geopolitical issues, not least in order to involve a wider audience. Those of us working on nuclear weapons issues benefit approaches that others take on a variety of issues.