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The Future of Warfare

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SUMMARY

Warfare is shaped by geopolitical, societal, technological, economic and military trends:

Geopolitical: The multipolar relations between ever bigger political entities with overlapping spheres of influences are defined by surpise and uncertainty. Smaller political entities will be weaker and proxy wars more common in the future. Detterence will be reinterpreted, vulnerable states more prone to aquire nuclear weapons and international norms weakened. Megacities will be central battlefields that leave ground forces vulnerable.

Social: Warfare will shift to the internet, it will be uncontrollably 'open-source', live and shocking, with ever more spectacular terror. Armies will be more network-centred, waging more personalised wars and will have to find new ways to interact with democratic societies. Women in combat and the disappearance of world war veterans change the way people think about war.

Technological: Mankind becomes more powerful over time, with non-state actors possessing capabilities currently restricted to super-powers. It will struggle to outlaw technological advances and wage war without violence. The West will lose its technological superiority and will have even bigger problems in knowing how and what to research. Both inferior and highly developed armies will develop new ways of engaging the enemy. Artificial intelligence (AI) will mean that democratic armies have to balance the 'human in the loop' policy against effectiveness.

Economic: The economy of the opponent will be a bigger target than in the past, with commercial and dual-goods becoming more important, and the environment a more widely used weapon.

Military: Possible future military situations will be more diverse then ever. Western armies will be vulnerable to cheap weaponry. The idea that wars will be easy to win will make the world more dangerous.

Key uncertainties are China, the cyber-dimension, robotics, autonomous systems and artificial intelligence, paradigmatic breakthroughs such as quantum computing, general AI and anti-ballistic systems, nuclear detterence and nuclear bargaining. **Ten key questions for policy-makers** focus on strategic autonomy, adaptation, balancing reserves, R&D, cooperation and export, interventions, China, weakening norms, anticipation, communication and procurement.

In this Briefing

- Defining warfare
- Geopolitical, social, technologic, economic and military trends
- Key uncertainties
- Questions for policy-makers

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Introduction

This ideas paper first highlights the most important global geopolitical, social, technological, economic and military trends that are influencing warfare today and are likely to do so in the future. It then looks at possible key uncertainties surrounding the future of warfare, and ends with ten questions for policy-makers.

> *In preparing for battle I have always found that plans are useless, but planning is indispensable.*

Dwight Eisenhower[1]

Thinking about the future of warfare is a hard, some say pointless, task. Most analysis is focused on the issues of today and does not include the unexpected changes in society, technology or politics and shies away from analysing the improbable. The many estimates in this paper are not predictions, but a provoking basis for discussion for experts and decision-makers alike.

> *So why bother thinking about the future of war at all? The answer, for better or worse, is that there is no other choice. If bureaucracies do not carefully consider possible future scenarios, they will make choices that merely reflect their implicit or explicit assumptions about what kinds of wars they will fight. Worse yet, they may simply carry on doing what they know how to do with no regard for the future. (...) Policymakers must be able to choose among alternative ideas.*

Stephen Peter Rosen (Professor of National Security and Military Affairs, Harvard University)

Defining warfare

According to Merriam-Webster, warfare can be defined as 'military operations between enemies'. Consequently, this paper does not look at the general causes of war or at the strategic ambitions of states or alliances that might lead to a conflict. Instead, it focuses on the long-term trends that decide how conflicts are and will be fought and won.

However, the classic dictionary definition of warfare is insufficient. Is not terrorism a kind of warfare? What about cyber-warfare? Is large-scale violence for the sake of economic gain, or due to the breakdown of order, also warfare? The implication is that any definition of warfare is not natural, but dependent on factors of time, place, background, framing and motivation. Here are a few common definitions of war and warfare highlighting this feature:

The classical definitions of warfare:

> *War is nothing but a duel on an extensive scale. If we would conceive as a unit the countless number of duels which make up a war, we shall do so best by supposing to ourselves two wrestlers. Each strives by physical force to* **compel the other to submit to his will**: *his first object is to throw his adversary, and thus to render him incapable of further resistance.*

Carl von Clausewitz (Prussian general, 19th century)

> *Hence to fight and conquer in all your battles is not supreme excellence; supreme excellence consists in* **breaking the enemy's resistance without fighting**.

Sun Tsu (Chinese general, 5th century BC)

Twentieth century definitions:

> *The* **power to hurt is bargaining power**. *To exploit it is diplomacy — vicious diplomacy, but diplomacy.*

Thomas Schelling[2] (US economist and strategist, 1960s)

> *New Wars are the wars of the era of globalisation. Typically, they take place in areas where authoritarian states have been greatly weakened as a consequence of opening up to the rest of the world. In such contexts, the distinction between state and non-state, public and private, external and*

*internal, economic and political, and even war and peace are breaking down. Moreover the **breakdown of these binary distinctions** is both a cause and a consequence of violence.*

Mary Kaldor (Professor of Global Governance, LSE, 1990s)

One contemporary challenger to these traditional definitions:

*Violence, like Twitter, is a **means of communication** [and] future wars will be determined by '**whose story wins**'.*

T.S. Allen based on political scientists Joseph Nye and John Arquilla

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Underlying mega-trends

- ⋗ **People** are becoming more powerful and more peaceful.
- ⋗ The **world** is becoming smaller.
- ⋗ **States** are becoming politically weaker and other actors, foremost cities, stronger.
- ⋗ There are generally **more actors** in politics, raising complexity in all policy areas.
- ⋗ **Military innovation** is mirroring advances in technology, society and politics.
- ⋗ **Existing weapons** are becoming ever more powerful and expensive.

Geopolitical trends

'If you are not at the table, you are on the menu'

Ever **bigger political entities** will interact in a potentially fragile, multipolar balance. Only they - huge countries, alliances and unions of states - will have the economies of scale to research, develop and maintain the full spectrum - land, sea, air, space, cyber - of military power to deter others from interfering in their spheres of interest. For a few countries it will be uncertain whether they belong to that group: mid-sized countries, such as Japan, France and the UK, already now have difficulties in fielding a sufficiently large number of important capabilities, such as aircraft carrier groups, submarines, jets, helicopters, airlift and main battle tanks.

All of these entities will have many overlapping **spheres of interests**. The level of violence used to influence these spheres will probably depend to a lesser extent than today on geography, and to a greater extent on the political ideology guiding those major entities (e.g. India, the EU, China, Russia and the US).

Violence between these entities will be defined by **surprise and uncertainty**. First, big powers have not fought each other directly since the Korean War. Some of their material and some of their tactics are as old as this conflict. Second, nuclear postures are ambiguous when it comes to fighting any wars but those for survival. Third, due to the larger number of powers, conflicts might escalate and progress very unpredictably. Military planners make assumptions on a daily basis about how a twenty-first century war might turn out. These assumptions can be wrong and they cannot easily be tested.

One implication is that **smaller political entities**, such as small and medium sized countries, might be unable to defend themselves alone, except with extreme measures and at great economic and social cost (e.g. Israel, Pakistan, Iran, North Korea).

In such a world of big powers, and their global or at least semi-global interests, most conflicts would be - after some time - at least partly transformed into proxy wars. This in turn means that war would not cease until internal *and* external powers decide it should. Therefore, these wars would be less

likely to be concluded early on at the negotiating table, but would rather be dragged out to see who would dominate militarily, before settling.

Due to this multipolar future, big and small powers are likely to reform and reinterpret their nuclear and conventional **deterrence**. In theory, this means dealing with more ambiguity, aggressive behaviour and shifting alliances. In practice, it may mean huge new investments in nuclear forces; surveillance, warning and command and control in space and on earth; and reformed armed forces that have to be scalable - at times transferable, small and professional, at others dug-in, big and resilient.

Nuclear deterrence will also be high on the agenda of seemingly **vulnerable states**. Some argue that the fates of countries that have developed/kept their nuclear weapons and those that have not - say Libya, Ukraine and Iran, as opposed to North Korea, Israel and Pakistan - might affect the thinking of other states in the future.

This in turn might weaken international norms even more than today. Most of the important **laws on and in war** have recently been broken in Ukraine and Syria, if not before. Several treaties on conventional and nuclear weapons have been either ignored, circumvented or cancelled. We might see a further weakening of the pillars of a peaceful world, including the UN system, the Nuclear Non-proliferation Treaty and human rights norms.

Concrete jungles

Non-state actors like **terrorists, organised criminals or insurgents**, who are trying to replace or weaken the nation state, mostly thrive in cities. Cities, and especially megacities, will be the focal point of future conflicts. In 2030, 60 % of the global population will live in cities. Even more than today cities will be the refuge, as well as the main battleground, for all kinds of anti-state actors. As seen in Mumbai, Paris, Mogadishu and Baghdad, terrorist and insurgent attacks are potentially easier to plan and more devastating in urban areas. Terrorists and insurgents cooperating with criminal networks, or becoming criminals themselves, benefit from many advantages in these modern jungles, as it is easy to make money, buy or smuggle weapons, and stay in contact with worldwide networks of like-minded groups and supporting powers.

In such settings, air power will be less effective and **ground forces vulnerable**. States will need to invest in (AI supported) intelligence and targeting networks, using all available sensors to their advantage. They are likely to develop ever-more precise weaponry, and reinforce their soldiers with mini-drones and vehicles, non-lethal weaponry, facial recognition, biometric and biochemical sensing systems, counter-sniper, counter-IED, and counter-drone technologies. They will also need to develop new organisational structures – using smaller, more modular but better protected units surrounded by a perimeter of electronic eyes and ears.

Social trends

War by bit and bot

Warfare goes where people go. This is not only true with regard to cities, but also the internet. Much of our social life is now virtual. Warfare will be on our screens, and the content on these screens will influence the outcome of the media war. New concepts, such as hybrid war and weaponised narrative, build on a long history of propaganda war. Its heightened importance is underscored by the speed at which all sides of the Syrian conflict have built up their communication capabilities and by the importance they attach to it, including the many lives lost on both sides. Winning the media war does not mean winning the actual war. This will still depend on the threat of or actual use of violence.

Similarly, war will be more **uncontrollably 'open-source'**, even if the conflict actors are capable of controlling media. Recent examples are the citizens' media networks in Syria and Ukraine and the

analysis by the same people and platforms such as Bellingcat, who provided the world with, among other things, the most detailed open-source analysis on the downing of flight MH17. This also means that camouflage and deception will be much harder. Already today, it seems that intelligence services struggle to build fake identities due to the missing data trail, military units give away their positions when soldiers post photos online, and collaborative or AI-guided commercial satellite image analysis makes it difficult to hide any larger piece of equipment in the field.

The world will be even smaller in 2030 than it is today. The fighting is more likely to be **live and shocking**, and no one can be guarded from seeing the horror that is war. This will accentuate pressure to end such wars, but it may also desensitise people to what is going on. Western societies have already become more resilient towards violence. This process of emotional blunting could in turn drive the cycle of **ever more spectacular terror attacks**. Terrorist groups are already dedicating considerable efforts to finding more despicable ways to kill humans and this cycle will increase their effort to use weapons of mass destruction (WMD). The same goes for war: one might argue that 'deliberate gruesomeness' has always been a strategy in the toolbox of war, but the deliberate use of precision guided bombs to target hospitals in Syria or Yemen, or the burning of enemy pilots, suggests new forms of such strategy in the future.

The black mirror of society

The way our societies live is also the way they will fight. Armies and other institutions engaged in warfare will be more **network-orientated** and group-focused. Hierarchies will always be important, but the balance will shift towards networks, especially in newer sectors of the military, such as cyber-command, as well as in policy circles, intelligence and anti-terror and organised crime policing.

As individuals become more important by comparison to the group or the state, warfare will become more **personalised**. We already see the widespread use of assassinations as a tool in warfare. In the future, weapons such as drones will be loitering or chasing and killing pre-targeted enemies on the basis of personal markers such as physique, DNA or behavioral patterns.

The interaction between **democracies and war** is very complex. Opponents of democracies have recently been better in using democratic sensibilities and peaceful instincts against them. A prime example is the Russian hybrid approach: its disinformation campaigns simultaneously flood the information sphere with pseudo-plausible alternatives, use (sometimes unaware) sympathisers in both pro- and anti-war movements, and threaten, corrupt or eliminate opposing political actors. Luckily, democracies are also fast learners: there are signs of overshooting by the Russians and of a wearing-off effect. This does not mean we should not be better prepared in the future.

There are many signs of a new acceptance in Western societies of seeing **women in combat**. In addition, most experts believe that this increases the effectiveness and legitimacy of armies. This has effects on the ethos of the military, which went from patriotic duty to post-patriotic heroism, underpinned by the standards of modern society, such as moral worth, humanitarian goals and professionalism. This normalisation of women in combat will pose questions to states using military conscription or still retaining limits to combat roles for women.

With the **disappearance of** World War Two **veterans and survivors**, Europe - like many other regions - has no more societal knowledge of big conventional wars. This will change the way people think about war and how politicians, militaries and experts will deal with war. Finally, it will make highlighting the horrors of war more difficult at a time when both glorified and trivialised depictions of war are prevalent.

Technological trends

Superman

Mankind becomes **more powerful over time**, both in terms of the knowledge of individuals and the potency of technology. Technology can give people the power that only states possessed a couple of decades ago, such as reaching a world-wide audience and killing thousands of people in one attack. In addition, technology diffusion is virtually unstoppable.

Although there will be fewer fully independent military powers, we will have to anticipate smaller states and **non-state actors having capabilities now possessed by super-powers**, potentially including WMD and delivery capability, and AI-powered offensive cyber capabilities. Israel needed a couple of decades to build a nuclear weapon and ballistic missiles, and received a lot of help from friendly powers. North Korea developed the same capability mainly by itself and found the parts it could not build on the global second-hand Soviet technology market. Nuclear weapons might even become a weapon of the poor, used against adversaries' superior conventional forces. This behaviour by smaller entities comes at a price - the risk of escalation against one of the big powers, isolation and great social and economic (environmental?) costs – but, for some, it may be worth it.

Two caveats. First, it is still an open question as to how far we will be able to **outlaw technological advances** that might be used for warfare, and thus block their use. Recent examples of chemical warfare show that even if international law increases the costs for actors to aquire or hold on to certain arms, they often retain measures to quickly redevelop and re-arm, if they deem it necessary or opportune.[3]

Second, the idea that **war** can be **free of violence**, thanks to technology, is dangerous and probably wrong. Wars are often less violent because it is in the interest of the parties to seem reasonable. Many more can be killed in short time-periods than ever before, if warfare escalates or runs out of control, as it sometimes does. We see current examples of that in Syria, Yemen or with Islamist terrorism. Also, even if both sides fight with robots and drones, the goal will always be to show the other side that you can harm them, and to do so, the targets will always be humans and the things they need or cherish.[4]

The West and the rest

Western military power was for a very long time - probably hundreds of years - based on **technological superiority**. Even though the Soviet Union was a technological peer competitor, it lost nearly all technological races against the West (nuclear weapons, electronics, and precision weaponry). In the last twenty years, after the highpoint of the West's military dominance in the 1990s, peer competitors reacted with different strategies (anti-access, hybrid war or aggressive nuclear deterrence) and reformed their armies and increased their military research. While the West for the most part did not rethink its fundamental military goals and structures, the others did and now have the upper hand in some fields. For example, Russia has recently produced a main battle tank that has some of the improvements Western engineers talked about for close to thirty years, but none of the leading Western nations have produced new models since then. China is producing anti-ship ballistic missiles that are unique and very dangerous to Western navy task-forces. China especially sees itself forced to react to antiquated but battle-proven US tactics and weaponry, by both mimicking and coming up with new ideas.

The West has an issue with **research and development** that goes beyond just complacency and (for some) not spending enough money. Some of the West's recent projects have been overpriced, one-size-fits-all solutions that lack creativity. Critics say hopes and money are put into projects that might not be at the core of modern warfare, such as AI and cyber-war. Others note that there is a good case to be made for these advances being the foundation of the next generation of weaponry, promising superiority for another generation.

In coming decades, **western armies** will probably **encounter** intelligent mines and guided munitions, directed energy and electromagnetic weapons, and swarming and automated and autonomous weapons of all sorts. Also important for both inferior non-state actors and states will be advances in nano-technology and in improving the body and mind, internally or externally.

Highly developed armies will counter opponents by focusing on space and high-altitude platforms, automation, remote-controlled and autonomous machines in all domains, AI-supported real-time analysis, and communication and control, autonomous disruption of enemy networks through offensive electronic warfare and cyber capabilities. In addition, they will develop new ways of engaging enemies with even more speed, power and precision, such as with scramjet engines, railguns and lasers.

'I'm sorry, Dave, I'm afraid I can't do that'

Finally, we will be dealing with a lot of **artificial intelligence** (AI) related issues, as will all other areas of mankind. Overarching questions will be how quickly AI will develop and in what form: evolutionary or revolutionary; how we will master our interaction with AI when it gives advice and decides; how quickly others use AI solutions, pressuring us to do so too, even though neither they nor we have adequately figured out what we are doing.

It seems that Western democracies are more at ease with the AI-augmentation of humans, the teaming of unmanned systems with manned ones (e.g. formations of drones and planes, where the pilot decides for all), and AI in an advice instead of a command role. We have to be aware that preferring AI in a supportive role to purely AI-controlled weapons might be a price we pay in combat losses at some point. It would be a price that we might be willing to pay for keeping to our ideals. This is also not new: Soviet weaponry cared less about the survivability of their crews, so long as they were efficient, while Western countries prioritised safety. This sometimes put the West in weaker positions, but it was deemed worth it. The US military has already decided on having an AI-policy of a **'human in the loop'** in all operations that involve harming someone, but as always, the devil is in the detail.

Economic trends

Targeting the opponent's economy is a favourite tool to avoid war, by using sanctions, but also a strategy in conflict. Industries that might be especially in danger are those which are new or had exponential growth (e.g. biometrics, robotics), which are important for the functioning of the overall economic system (raw materials, transport, finance), the disablement of which could hurt people (industrial ICT, energy, food supply), or which could discourage people (media, arts). The more interconnected the world will be, the more vulnerable economies will be to attacks, but this might also create more unforeseen second-order effects on both sides.

Commercial or dual-use goods will be used even more in warfare than before. Commercial solutions might be less effective than military ones, but they can also be cheap. This is especially the case if they are produced en masse (for example through 3D printing), if they counter very valuable weaponry of the opposing force (e.g. drones against jets), if they are used for simpler tasks (e.g. bombing an enemy without air-defence) or if they are fill-ins for weapons that cannot be otherwise afforded (e.g. naval ships built to commercial standards). In the cyber domain, commercial software and hardware (e.g. the internet of things) will become both weapons and targets. It will be very hard to detect what to put on the growing list of possible dual-use goods and technologies before they get into the hands of terrorists or opposing states. If there is a decision to make open AI a public good, it will be difficult to bar its use in war.

As suggested in Mary Kaldor's definition of war, the **environment** has the potential to spark conflict and to frame the fighting. Human suffering from nature is already used as a weapon and this might become more pronounced. This could include the starving of cities and land and limiting enemy

movement by generating man-made disasters. In the future, there might be even more ways for the military to shape the environment it wants to fight in.

Military trends

The range of possible future situations where force is used will be **more diverse** than today. The EU's famous 1992 Petersberg Tasks started with only three possible deployment scenarios (excluding collective defence). The Lisbon Treaty expanded them to six. NATO, in its most recent Framework for Future Alliance Operations, envisages 15 different 'instability situations'.[5] This makes preparation harder and the need for reserves and only seldom-used capabilities bigger.

One challenge that Western armies face is the possible insecurity of main weapon systems, such as aircraft carriers (to missiles) or main battle tanks (to IEDs, missiles). They are very expensive and very specialised, and they might be overly **vulnerable to cheap weaponry**. Like the knights of the Middle Ages, are we protected behind expensive weaponry that might suddenly become outdated and vulnerable?

The **example of the F-35** highlights the problem and the possible solution. This fifth-generation stealth fighter jet might be more vulnerable to more specialised jets, certain radars, swarms of drones, and missiles than previously thought. However, it is the first plane to focus on the novel concept of operating as a system of systems, directing forward drones to detect and attack targets. So here, at least, the risk of betting on an old and expensive idea is balanced with a new concept of using such a weapon and countering new threats.

One might be tempted to think that **war might be more winnable quickly** today than in both the Cold War or the time of US dominance, due to recent developments such as the use of cyber warfare to disrupt defences, the power of stand-off and precision-guided weapons, the multipolarity that might create powerful alliances, the ambiguity of hybrid tactics, the breakdown of verification regimes and international norms, the belief in 'shock and awe' decisiveness and recent examples of conflict, such as the invasion of Crimea. Such an assumption could be a serious mistake, however, and over-confidence in this regard is a dangerous recent trend.

Key uncertainties

- Is **China** going to surpass the West in military innovation? It needs a lot for this to happen in all areas, but they have the capabilities and the will to catch up. Will China try to build up a defence alliance that could project power globally?

- What are the dangers and the potential of the **cyber-dimension in warfare**? Much will depend on vulnerabilities in the future, the development of the internet of things and possible international control and verification.

- What will be the future in the research and application of **robotics, autonomous systems and artificial intelligence**? Much depends on how fast technologies will develop, how cheap they will be as weapons systems, if potential arms races and dangerous early adoption can be avoided, and if the potential for these weapons in subduing civilian populations and lowering the threshold of conflict becomes true.

- What could be unlikely **paradigmatic technological breakthroughs**? Quantum computing, defensive weapons such as lasers rendering even hypersonic, ballistic missiles useless and leaps in artificial intelligence are current favourites. Quantum computing and a general AI would revolutionise the whole world, and with it warfare. Making all kinds of missiles useless would change the nature of deterrence and could open a new age of limited warfare.

> How far will **nuclear deterrence** limit and shape big power conflict? While most believe that major war between nuclear powers is still impossible, <u>others</u> point out that (to a certain extent) crippling wars could be fought in the knowledge that the use of nuclear weapons would be seen as breaking a taboo and would have grave consequences for the user.

> What will happen to the idea of using **nuclear weapons** as deterrents or bargaining chips? Important here will be the future trajectory of the North Korea conflict, which could signal options to others. The future of the Non-Proliferation Treaty (NPT) is another uncertainty, as are the decisions of NPT non-signatories, such as India, Pakistan, Israel, and potential nuclear weapon states, such as Japan, Saudi Arabia and Iran.

Questions for policy-makers

1   How should the goal of **strategic autonomy** change our defence planning and defence innovation over the next ten years?

2   How can we be **quicker in the adaptation** of our forces?

3   What is the right **balance** between:
   o   an **efficient** lean force and having sufficient **reserves** to deal with the unexpected?
   o   going many ways in **defence R&D** and unifying our strength?
   o   producing our own material and **cooperating** with other friendly nations?
   o   **exporting** to those who are like us – democratic and at peace - and those who are fighting for their lives or important to us strategically?

4   How in the future can we better discuss the possible consequences of **intervening** or not intervening and come up with a unified and strong European position?

5   How should we see the **rise of China** and the emerging multipolar world?

6   What can we do to counter the **weakening of norms** and the increasing brutality of war now and in a future that includes AIs?

7   How can we get better at anticipating important **new concepts** in defence?

8   How can we better **anticipate conflicts** and deal with them earlier? What is the military's role in such a process?

9   How confident are we that the EU Member States, institutions (but also the wider society) would still be able to **communicate, cooperate and plan securely** with each other and with others in the case of heightened tensions with a high-tech opponent?

10   How can we adapt our **armaments industry** and procurement to function properly in the age of dual-use, cheap swarm weapons, mostly private industry research, global supply-chains and fragmented strategies and concepts by Member States?

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ENDNOTES

[1] Based on a saying by US President Eisenhower in 1950 who might have attributed it to an unknown soldier. This version is found in: Nixon, Richard. *Six crises*. Simon and Schuster, 2013

[2] Schelling, Thomas C., *Arms and Influence*. Yale Univ. Press, 1966

[3] For a deeper look into this subject see Liivoja, R. 'Technological change and the evolution of the law of war'. *International Review of the Red Cross*, *97*(900), 1157-1177, 2015

[4] For a basic understanding of what constitutes the goal of war and where to strike to achiev it, look at the discussion on the Clausewitzian concept of 'Center of Gravity' as well as the previously mentioned definitions of war.

[5] WMD proliferation/threat/use, conventional war, hybrid war, irregular war, terrorism, global commons disruption, critical infrastructure attack, information warfare, cyber-attack, governance challenges, endangerment of civilian populations, mass migration, pandemic disease, natural/mad-made disasters.

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