

Geopolitical Lens

AI FUTURES: PEACE AND WAR

Contribution to the 2024 GESDA Science Breakthrough Radar

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Introduction

Geostrategic security is in crisis at a time when urgent action on humanity's intertwined environmental, technological and infrastructure systems is critical to long-term sustainability. The natural world, energy, food, water, raw materials, health systems and digital information networks are all in volatile transition. Scientific discovery and invention bring revolutionary progress, yet often generate unanticipated systemic risks.

Artificial intelligence (AI) amplifies the challenges of the next decade and beyond, threatening to undermine security. Yet specialist applications promise to bring solutions, not just to address the root causes of conflict, but to transform governance. We make a distinction between AI systems as a force multiplier in conflict and war and AI as part of a set of methods and tools that will transform early warning and governance and, in turn, create the system conditions and pathways to peace.

We argue that novel ways of thinking about imagined, possible futures – together with a new generation of knowledge engineering and AI-based simulation methodologies – have the potential to bridge gaps in understanding that are both systemic and strategic, spanning governance, stewardship and diplomacy.

To put what follows in context, it is commonplace to frame multiple interrelated factors impacting resilience and peace, including AI systems, as if they are well-defined future "risks" and "opportunities". Yet none can be seen in isolation. They emerge in an ocean of possibilities. They are best viewed as a fluid set of ill-defined system variables, with multiple interconnections and uncertain outcomes that change over time. Put simply, food, water and energy crises may lead to social unrest and vice versa, but system failures are not linear, as this suggests. This is a world characterised by latent and hidden tipping points and non-linear cascading events.

In this essay, we first draw some lessons from history. We illustrate some critical, highly contested system-level uncertainties, the outcomes of which will shape future outcomes, before outlining a scenario-based vision of one of many possible futures.

History, Understanding, Imagination



There are many theories of how peace turns to conflict and war and how war ends and brings peace. This is not the place to describe them or to suggest that crises are the same, or even similar.

There are, however, some lessons to be learned that have particular relevance to the decades ahead and the urgency of reinventing governance and how we think about the future.

Historians often talk about overarching narrative threads: failures of understanding and failures of imagination.

There are many variations on these themes. In his book *The Earth Transformed* (Bloomsbury, 2023), Peter Frankopan makes the case that "Much of human history has been about the failure to understand or adapt to changing circumstances in the physical and natural world around us."

The expression "failure of imagination" dominates the narrative in reviews of catastrophic events over the last few decades, surrounding everything from 9/11 to hurricane Katrina and the 2007-8 financial crisis. Many security and governance crises are collective failures by multiple protagonists. They are also rooted in methodological gaps and tools to explore risk and opportunity within a shared, forward-looking, adaptive framework. They are, in a sense, systems failures.

In *The Sleepwalkers: How Europe Went to War in 1914* (Penguin, 2013), Christopher Clark examines leadership behaviour in the lead-up to World War One and concludes that the protagonists were:

"...sleepwalkers, watchful but unseeing, haunted by dreams, yet blind to the reality of the horror they were about to bring into the world...

They were not sleepwalking unconsciously, but all constantly scheming and calculating, plotting virtual futures and measuring them against each other... I was struck by the narrowness of their vision."

The paradox is that humanity's defining talent is that consciousness is characterised by constant simulations of possible futures, as the latest models of neuroscience tell us. We are knowledge-seeking. Curious. We innately project our actions forward, looking for sources of surprise and shock to anticipate and adapt, in advance, to changing worlds.

In this context, imagined futures are cultural realities. They shape decisions in the here and now. They are also contested and, therefore, a defining feature of uncertainty, driving everything from rivalry over "industries of the future" and risks of misjudgement and misunderstanding in crises, to competing visions about the future of AI.

We have yet to scale our talent to meet the challenges ahead. We argue that this is where specialist methods, supported by AI systems, have transformative potential. Methods where human imagination and ingenuity are enhanced, not replaced by, AI systems.



In our view, policy navigational models should focus on early anticipation of events, ultimately in real-time – beyond the conventional, static scenarios models that have constrained agenda-setting governance for decades.

Inter-Systemic Uncertainty and Risk

These perspectives have growing relevance. Never before has humanity been faced with such a convergence and acceleration of scientific capabilities - for example in AI - and related risks. As interconnections in a system increase, so do complexity and uncertainty. Systems become more difficult to understand.

Creating a shared social sense of reality – critical to political authority, trust and social stability – becomes increasingly difficult. Growing uncertainty feeds public feelings of disorder and threatens to undermine culturally embedded trust in accepted leadership norms and institutional authority.

Social media, which has transformed politics, global security and the wider media environment, is the most obvious example of a technology contributing to siloed realities within societies. At worst, for all its benefits, it has become the theatre for cross-border intelligence interventions, conflict and disorder, but more importantly, a driver of uncertainty and instability.

With the acceleration of digital information and communication technologies, automated systems and robotics, the number of interconnections between people, places and things will continue to grow at exponential rates.

Against this background, we should reconsider the important and often ignored distinction between risk and uncertainty originally made by economist Frank Knight in 1924. Risk is best defined as situations where we can describe the possible future events and their probabilities. This view dominates governance and policy, despite the limitations. The reality is crises are, at root, the product of what Knight called true uncertainty, where "we may not even be able to imagine all future events." In the modern era, this is framed as "radical uncertainty".

The problem is that, a century after Knight, ways of thinking about governance and policy are not keeping pace with ever-increasing complexity, uncertainty and, above all, speed.

Critical Variables and Possible Futures

This brings us to some of the critical system-level variables and uncertainties, each with multiple outcomes over time. These outcomes and many more will shape the landscape of AI, peace and security over the next decade. To take a simple example, action on climate change may turn out to be "too little, too late", or alternatively, exponential, system-level innovation in green technologies may create drastic cuts in emissions and herald the emergence of a secure, sustainable world.

The variables and uncertainties illustrated here form the basis of the scenarios that follow. They range from geostrategic competition to climate security and power. They



extend to the emergence of new generations of distributed, agent-based and autonomous AI systems, breakthroughs in quantum computing, and simulationbased predictive modelling.

If complexity, radical uncertainty and speed overwhelm the strategic governance agenda, then in some scenarios, AI systems themselves will widen the "sphere of misjudgement" in political and security systems, in part because they are opaque. Social media, generative AI, quantum computing and new cyber offensive weapons threaten to destabilise states, creating the system conditions for societal breakdown.

Looking ahead, geostrategic disorder and chaos may become the new norm, with pervasive conflicts in cyberspace and over supply chains and natural resources. Integrated AI, quantum, neurocomputing and cyberwar technologies may become the defining source of tension and drivers of conflict between major powers. In a world of multiple, easily accessible and cheap AI-driven weapons, inventive non-state actors may add to the volatility.

The pivotal uncertainty is whether complexity, uncertainty and speed overwhelm global leaders and governance institutions at national and international levels. In the absence of a widely shared sense of vision and purpose, a world of unintended consequences may perpetuate conflicts of interest between political, public, humanitarian, security and well-financed technology companies.

Power relations between states, non-state actors and the major technology companies are in the midst of a volatile contest, as illustrated by the Geopolitical lens released in the 2023 edition of the GESDA Science Breakthrough Radar. At the heart of the uncertainty is how states and international institutions find workable governance solutions. Might we see the development of distributed digital worlds, regulated within global norms but controlled at state level, with "sovereign" data and Al systems managed within boundaries?

As the digitisation of core infrastructure systems – energy, food, water, transport and media – gathers pace, the unresolved threats to security and social stability may grow. Core infrastructures may become part of the volatile and widening digital "theatre of conflict" that extends from media and communications networks to command and control, all enveloped in a web of semi-autonomous AI systems that threaten to create their own realities, transcend boundaries and elude security and governance systems.

In some conflict scenarios, infrastructures may be seen as legitimate targets. Hybrid conflict – from propaganda and mind-control, to clandestine sabotage "below the threshold of war" – may gain momentum.

Another critical uncertainty is whether AI will amplify the risks of misinterpretation, miscalculation and misjudgement, particularly in the world of military decision-making, peacekeeping, and intelligence.

At multiple levels, Als are opaque. Transparency, explainability, provenance, authenticity and trust in current mass-market Al products and services are elusive. They may remain so.



In the wider context of open media, AI applications are – barring solutions to the challenges of large-scale real-time curation – a pervasive technology that threatens to undermine the foundations and fabric of society through the manipulation of language and amplification of false narratives. This is deeper than conventional debates about misinformation and disinformation. To quote George Orwell's 1946 essay *Politics and the English Language*.

"In our age there is no such thing as "keeping out of politics". All issues are political issues, and politics itself is a mass of lies, evasions, folly, hatred and schizophrenia. When the general atmosphere is bad, language must suffer."

This is all the more important because distinctions between machine intelligence and human intelligence are easily blurred. Machines can deliver human-like output, yet cannot be explained in human terms, even by their designers. We are vulnerable to treating Als as if they were human, with human ethics, emotional motives and intentions. This is critical: we share meaning through language, image and story, and so risk ceding control to machines.

This stretches to mind and social control. At the intersection of social media, generative artificial intelligence, national elections and global security, there have been many warnings, but policy and regulatory responses have lagged the rate of innovation.

The interplay between policy, regulation and these critical uncertainties may be resolved in many different ways over time. In the face of growing climate crises, governments may take draconian steps to secure access to food, water and core infrastructures, curbing the development of high-energy AI systems. The fragmented risk landscape may again be dominated by geography.

In parallel, specialist high-trust AI and data networks may dominate "mission-critical" areas such as finance, insurance, infrastructure, aviation, shipping, health and security communications. Internationally agreed "guardrails" may embody rules about AI, cross-border cyberwar and disinformation.

Resilience, Simulation and Hedging

There are thousands of possible scenarios that may emerge over the next decade. We illustrate just three: dark ages, walled gardens and renaissance. In renaissance, we explore a future in which the system conditions and pathways to peace might emerge. To be sure, these are three caricatural and extreme outcomes. By illustrating possible futures, they aim to spark a reflection around what direction is desirable, and consequently, what course of action to adopt today.

In this positive vision, AI systems have the potential, deployed with human expertise, imagination, inventiveness and a shared sense of purpose, to transform governance, policy-making and diplomacy at national and international levels and, in turn, prospects for peace.

To put what follows in context, any viable organisation must be able to cope with the dynamic complexity and uncertainty of its future environment. The same applies to



states, multilateral agencies, non-profit organisations, corporations, and humanitarian agencies most concerned with creating the system conditions for peace.

The starting point is a shared understanding of possible futures. We define resilience as adaptive policy that works in even the most extreme possible scenarios. In practice, "adaptive" does not mean rapid responses to events, but collective action on simulations and foresight in anticipation of crises. The alternatives lead inevitably to "too little, too late".

Towards 2035: Dark Ages

Dark Ages is a world of chaos, deepening regional conflicts over natural resources, pervasive wars in cyberspace, tensions in technology supply chains, crises in military security and radical innovation.

This is a world driven by unresolved geostrategic conflict, inequality, austerity, cultural division, escalating trade wars and economic stagnation. Overstressed financial markets are in continual crisis, pervaded by hidden complexity and denial of the looming impacts of climate and biosphere failures on asset values and stability. The destructive power of state-backed propaganda, proxy wars, mass-scale manipulation and secret cyberwar fuels the fire, amplified by machine intelligence.

Amidst the chaos, power is fragmented amongst the major states and growing numbers of autocratic, isolationist regimes, corporate power and finance. Malign actors, from criminal networks and other non-state as well state proxies and fastmoving virtual terrorist groups, leverage freely available AI models and open social media networks. This is a world where inter-systemic failures are pervasive, transforming the conflict landscape. Intelligence and hybrid wars escalate.

Open, unregulated social media, waves of generative Als, quantum computing and new cyber offensive weapons destabilise the major powers. Integrated Al, quantum, neurocomputing, "cognitive war" technologies, disinformation and cyberwar emerge as the primary sources of tension and drivers of conflict between major powers. The digital environment generates ever-greater complexity, uncertainty and speed, increasing the "sphere of misjudgement" in security systems.

Towards 2035: Walled Gardens

After the wars in Europe and the Middle East, political turmoil in the West and amidst growing tensions in Asia and Africa, the world steps back from the brink, averting further conflicts and open war. Yet conflicts beneath the threshold of war remain. Intelligence and military security frame relations. "Everything wars" fall short of open conflict, shifting to intelligence and battles over high-end chips, raw materials and key "technologies of the future".

Self-reliance reframes trade. Walls go up. While core internet-based infrastructures remain, national security and the deepening threats of cross-border cyberwar and propaganda limit digital collaboration.



Data and AI-based services are defined by state and regional ideologies and cultures. Over time, the dominance of global media and technology service providers wane. The world is divided between the digital haves and have-nots.

As growing heat, food and water shortages disrupt industry and global supply chains, and amidst more frequent major climate events, states withdraw behind strong borders. Virtual, albeit fragmented and much diminished digital cross-border trade remains.

The crises give way to a new narrative: green, post-industrial nationalism, and relative calm, at least for some. The combination of localised, fully electric microgrids, solar, wind, and battery storage creates self-sufficiency and resilience at all levels – from small rural communities to cities. Energy costs drop. The transformation improves prospects in the global south and reduces the threats of conflict.

The emergence of what becomes known as walled gardens concentrates power in states capable of managing the dual transition to green infrastructures and digital systems. The threats of inter-systemic, cross-border and climate-induced conflict give way to a world of islands of relative stability and oceans of crisis.

Towards 2035: Renaissance

Picture this. As the security, climate and digital systems infrastructure crises crystallise, the major powers find common ground through a mutual understanding of the scale and severity of the situation facing humanity.

Shared views and interests around the "planetary commons" – the biosphere, oceans, polar regions and space – drive cooperation on climate, bio-security, and around humanitarian principles. Healthcare moves centre stage. International institutions find new influence and authority.

As fears of the weaponisation of AI and autonomous systems crystallise, a new generation of multilateral control mechanisms emerge. New rules for trade, finance, data and strategic technologies support collaboration on AI, particularly in early warning systems around environmental systems and threats to peace.

In the face of accelerating climate change, governments take urgent and radical steps to secure access to food, water, and energy. Digital systems transform health and core infrastructures, and national and global mass migration shapes resilient havens.

The fragmented risk landscape is defined by geography: impacts of climate and biosphere risk are local, and so are the solutions. The use of high-energy AI systems is restricted as high-security decentralised, and ultimately distributed digital platforms and AI models gain traction.

Power structures mirror the emerging digital landscape – globalised, distributed and decentralised – driving a collaborative era of alignment between leading technology companies and states. Despite tensions, the system conditions emerge for "good Al".



The era of "one-size-fits-all" search and evolutions of generative AI co-exists, but the shift marks a turning point. Intelligent, inter-operable autonomous agents, screened for safety and licensed, emerge at multiple levels. They both learn and adapt to community and state-level cultural norms. Embedded within the new generation of agents, sets of rules cover everything from national laws to ethics. Humanitarian principles of impartiality, neutrality and independence form the backbone of new systems. The so-called "Spatial Web" — in which digital information is integrated with physical objects, interconnecting people, places and things (see https://vision.hipeac.net/the-next-computing-paradigm-ncp--the-spatial-web.html) — gains momentum.

The system conditions for AI evolve, bringing AI applications and services to the global south and small communities alike. An immersive world of predictive modelling shifts the emphasis from data extraction and surveillance to early warning of food, water, energy, health and environmental threats, transforming biophysical systems and contributing to creating the conditions for peaceful co-existence.

At national, regional and international levels, governance is aligned around early warning and policy interventions at system levels, framed by long-term strategic frameworks and sustainable development principles. The focus shifts to anticipation of possible crises and to pre-emptive multi-lateral action, based on shared understanding and transparency.

Nowhere is the impact of the shift in the culture and intentions of states and technology companies towards sustainable values more marked than in humanitarian support for the poor, the displaced and the victims of conflict and climate crises. From an era often characterised by the "de-humanising" influence of technologies, the focus turns to protecting the interests of victims in crisis situations and to delivering early warning to avert crises. Long driven by security applications and priorities, technology is turned to sustainable development and humanitarian principles – to creating the conditions for peace and to save lives, reduce suffering and improve health and well-being.

Conclusions

Renaissance describes one of many possible pathways to a more sustainable world at peace. Humanity has many choices between multiple alternative futures.

To change systems of governance, the challenge is to change cultures of governance. We must introduce new ways of thinking about the future and simulate everything from future cascading systemic risks to scientific discovery and breakthrough invention. This must focus not only on historical data, specialist research, or on scientific models, but also on possible futures – secret worlds where there is little evidence, but infinite possibility and potential.

As we suggested earlier, the challenge is to frame governance and policy as systemlevel interventions, set in long-term, scenario-based strategic frameworks. In our view, policy navigational models should focus on early anticipation of events, ultimately in real-time – beyond the conventional, static scenarios models that have constrained agenda-setting governance for decades.