# NATO Disease Aff – UTNIF 2022

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## 1AC – Disease

### Advantage

#### NATO’s response to COVID-19 was helpful but insufficient – modernization now is key to preventing the next superbug

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COVID-19 took the world by surprise: for the first time in living memory, the entire globe was under attack. Although the pandemic was quickly understood to be a global challenge, international cooperation was initially put under severe stress, with uncoordinated travel bans, competition over acquisition of medical equipment, and authoritarian powers trying to take advantage of the crisis to push forward their geopolitical agendas. The North Atlantic Treaty Organization (NATO) was also impacted by COVID-19: exercises and operations were scaled down and some countries repatriated their militaries to redeploy them at home.1 There were initially few reasons to be optimistic about either the role of the political-military alliance in supporting the fight against COVID-19 or the future of the organization. Less than a year ago, French President Emmanuel Macron had referred to NATO as “brain-dead,” lamenting the lack of shared strategy between its members vis-à-vis the most pressing challenges facing the alliance.2 Furthermore, for the past four years, U.S. President Donald J. Trump has consistently undermined the importance of NATO, treating security as transactional and casting doubts on U.S. commitment to the Article 5 mutual defense clause at the heart of the North Atlantic Treaty.3 Despite this backdrop and amidst negative propaganda from China and Russia, NATO established a dedicated COVID-19 Task Force. Leveraging its experience in crisis management and disaster relief along with its massive logistical apparatus, the alliance was able to offer a decisive response through transporting medical aid and equipment across the globe, fighting against disinformation, and ultimately preventing the public health crisis from leading to a traditional security crisis. The goal of this essay is to provide a critical assessment of NATO’s preparedness and response to COVID-19. By exploring the mechanisms in place, the support offered, and the measures taken by NATO to avert a security crisis, it provides reflections on how lessons learned from this pandemic could help to manage and prevent similar future crises. In conclusion, this report argues that the alliance has proved capable of overcoming political tensions and has given an important sign of resilience and solidarity at a crucial moment for its member states. However, more could have been done with better preparedness in managing health risks and most importantly with better political coordination between member states. Despite the disruptive effect COVID-19 had on global economy and international relations, the virus’s impact on the future of the alliance will be marginal. NATO’s survival and success in responding to global challenges will ultimately be contingent on a relaunch of trans-Atlantic relations.

#### Existential disease is imminent – current frameworks fail, but international mitigation efforts are the only hope

Nicholas Studzinski 2020. MA, Visiting International Research Fellow at the Policy Institute of King’s College London. “Managing existential risks of pandemics: a systems approach.” 2-14-20.

The world is generally not prepared for a severe pandemic, whether natural or bio-engineered to evade known variants of vaccines and medical countermeasures. According to the Global Challenges Foundation, pandemics are among the key likely causes of the collapse of human civilisation, defined as a “drastic decrease in human population size and political, economic/social complexity, globally and for an extended time.” A recent estimate by the Bill and Melinda Gates Foundation suggests that an outbreak of a magnitude similar to the Great Influenza of 1918, could result in 360 million deaths, despite modern vaccines, antivirals and antibiotics. According to a report by the RAND Corporation, “the spread of infectious disease can be worse than world wars.” The complete costs of a severe pandemic are difficult to estimate, given the potential array of social, political, agricultural, and economic impacts. A World Bank analysis put the minimum cost of the recent Ebola crisis in Liberia, Guinea and Sierra Leone at $2.8 billion in GDP. But a subsequent analysis of the total economic and social costs of the same outbreak was estimated at $53.19 billion. In a new paper, I explore the nature of pandemic risk as a threat to human and civilisational security and discuss the shortcomings of the currently accepted international strategy for pandemic preparedness. In its place, I propose a comprehensive pandemic risk management system (CPRMS), including a practical roadmap for its institutional implementation. The current system Academic and public assessments confirm a lack of global preparedness. In May 2018, the Johns Hopkins Centre for Health Security conducted a pandemic simulation called “Clade X”, in which a bioengineered microbe ended up killing 150 million people within 20 months and producing devastating impacts across the US. The exercise found that many vulnerabilities, including leadership challenges, were “hardwired into the American system.” Established in the wake of the early 21st century crises with avian influenza, SARS and Ebola, the current international pandemic strategy aims to improve preparedness by strengthening the capacity of national public health systems. This is pursued via appeals to compliance with the standards of the International Health Regulations, as part of an emergency framework designed to prevent outbreaks with infectious disease from becoming international health crises. While such efforts are appropriate and necessary, they are centred primarily on the health sector, with less focus on the global multisectoral, multidimensional risks and impacts of pandemics. The current strategy also remains primarily country-focused and reactive, and as such is not cost-effective, allocatively efficient, or sustainable for preventing and managing the large-scale impacts of severe pandemics. A comprehensive pandemic risk management system (CPRMS) A new cost-effective system is needed to manage the spectrum of multisectoral pandemic risk to both national and global security. Such a comprehensive pandemic risk management system (CPRMS) would constitute a genuine global public good. As a complex-systems-based paradigm, the strategy would help prevent and manage both the direct human security risks to health and ensure a critical continuity in the flow of essential services and infrastructure, sustaining interconnected global socio-economy, on which human security depends. Characteristics of an effective CPRMS Human security: The conceptual grounding of the approach includes but transcends the currently dominant, state-oriented framework of global health security, in favour of a multidimensional concept of human security. Full-spectrum risk management: The CPRMS assumes an integrated system of prevention, preparedness, response and mitigation, with universal, pre-emptive vaccine protection against prioritised microbes that threaten the human genome. It must also mitigate the drivers of cross-species contagion within human society and secure the functional continuity of essential services and infrastructure critical to global human security. Principal characteristics: As a strategically coherent system, the CPRMS must be risk-based and grounded in evidence derived through the emerging discipline of complexity science. The approach must be long-term and multisectoral, integrating prevention, preparedness and response in health, essential public services and enabling critical infrastructure. It needs to be financially and politically sustainable to meet 21st century challenges at national and global levels. Organisational framework: Institutionally, a CPRMS would also be structured as an organised operational system whose structure and functions embody the six critical elements of all institutional systems: harmonised leadership and governance; sustainable financing; information systems management; requisite human resources; essential commodities and related logistics; and a capacity for operational interventions and service delivery. Crucially, governance of the CPRMS must be envisioned in the broader, increasingly urgent context of managing a growing complex of existential risks.

#### Without mitigation, disease causes extinction

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A pandemic (from Greek πᾶν, pan, “all”, and δῆμος demos, “people”) is an epidemic of infectious disease that has spread through human populations across a large region; for instance several continents, or even worldwide. Here only worldwide events are included. A widespread endemic disease that is stable in terms of how many people become sick from it is not a pandemic. 260 84 Global Challenges – Twelve risks that threaten human civilisation – The case for a new category of risks 3.1 Current risks 3.1.4.1 Expected impact disaggregation 3.1.4.2 Probability Influenza subtypes266 Infectious diseases have been one of the greatest causes of mortality in history. Unlike many other global challenges pandemics have happened recently, as we can see where reasonably good data exist. Plotting historic epidemic fatalities on a log scale reveals that these tend to follow a power law with a small exponent: many plagues have been found to follow a power law with exponent 0.26.261 These kinds of power laws are heavy-tailed262 to a significant degree.263 In consequence most of the fatalities are accounted for by the top few events.264 If this law holds for future pandemics as well,265 then the majority of people who will die from epidemics will likely die from the single largest pandemic. Most epidemic fatalities follow a power law, with some extreme events – such as the Black Death and Spanish Flu – being even more deadly.267 There are other grounds for suspecting that such a highimpact epidemic will have a greater probability than usually assumed. All the features of an extremely devastating disease already exist in nature: essentially incurable (Ebola268), nearly always fatal (rabies269), extremely infectious (common cold270), and long incubation periods (HIV271). If a pathogen were to emerge that somehow combined these features (and influenza has demonstrated antigenic shift, the ability to combine features from different viruses272), its death toll would be extreme. Many relevant features of the world have changed considerably, making past comparisons problematic. The modern world has better sanitation and medical research, as well as national and supra-national institutions dedicated to combating diseases. Private insurers are also interested in modelling pandemic risks.273 Set against this is the fact that modern transport and dense human population allow infections to spread much more rapidly274, and there is the potential for urban slums to serve as breeding grounds for disease.275 Unlike events such as nuclear wars, pandemics would not damage the world’s infrastructure, and initial survivors would likely be resistant to the infection. And there would probably be survivors, if only in isolated locations. Hence the risk of a civilisation collapse would come from the ripple effect of the fatalities and the policy responses. These would include political and agricultural disruption as well as economic dislocation and damage to the world’s trade network (including the food trade). Extinction risk is only possible if the aftermath of the epidemic fragments and diminishes human society to the extent that recovery becomes impossible277 before humanity succumbs to other risks (such as climate change or further pandemics). Five important factors in estimating the probabilities and impacts of the challenge: 1. What the true probability distribution for pandemics is, especially at the tail. 2. The capacity of modern international health systems to deal with an extreme pandemic. 3. How fast medical research can proceed in an emergency. 4. How mobility of goods and people, as well as population density, will affect pandemic transmission. 5. Whether humans can develop novel and effective anti-pandemic solutions.

#### The aff would strengthen the NATO Science for Peace and Security Programme – that boosts science diplomacy and international mitigation effectiveness

NATO ESCG 2019. The Emerging Security Challenges Division. “THE NATO SCIENCE FOR PEACE AND SECURITY SPS PROGRAMME.” NATO OTAN. 2019. IZP)

Now in its seventh decade of existence, the NATO Science for Peace and Security (SPS) Programme remains a key vehicle for engaging NATO partners in practical cooperation in the areas of civil science, technology, innovation and capacity building. Based on the Overarching Guidance provided by the North Atlantic Council (NAC), it develops and supports key flagship projects in line with NATO’s Strategic Objectives and fosters regional cooperation among partners. As demonstrated over decades, the Programme is very flexible and versatile in its response to changing security environments and to Allied guidance. SPS top-down flagship activities in particular are demand- driven responding to Allies’ and partners’ priorities for practical cooperation, reflecting NATO’s balanced and 360 degree approach. While SPS staff is monitoring the implementation of its activities on a daily basis, Allies in the Partnerships and Cooperative Security Committee (PCSC) approve applications following review and recommendation from the Independent Scientific Evaluation Group (ISEG). In addition the PCSC is regularly presented with updates on the progress and results of SPS activities. A 2014 audit by the Independent Board of Auditors of NATO (IBAN) confirmed the strong alignment of SPS with the political priorities of the Alliance, and underlined the effective management of the SPS Programme. It also provided a number of recommendations that have been addressed over the last five years to further streamline the Programme, including efforts to systematically analyze the results of SPS activities. In 2019, this included the organization of a SPS cluster workshop on Advanced Technologies. SPS activities bring together experts and scientists from NATO and partner countries through several grant mechanisms, including Multi-Year Projects (MYP), Advanced Research Workshops (ARW), Advanced Training Courses (ATC), and Advanced Study Institutes (ASI) that lead to tangible outputs with a concrete impact and a high public diplomacy value for NATO. This well-established partnership programme is an integral part of NATO’s Emerging Security Challenges Division (ESCD), and, over the years, has helped to forge important international expert networks and build capacity while addressing a wide range of security concerns as identified in the SPS key priorities. These priorities include counter-terrorism, cyber defence, energy security, CBRN defence, the development of advanced technologies with security applications, mine and unexploded ordnance (UXO) detection as well as human and social aspects of security. At the same time, the SPS Programme has grown to include projects that encompass capacity-building, hybrid threats and the implementation of UNSCR1325 on Women, Peace and Security. In order to achieve its goals, SPS works in close coordination with other relevant NATO Divisions and Bodies. STRONG ALIGNMENT WITH NATO’S STRATEGIC OBJECTIVES AND POLITICAL GUIDANCE All SPS activities have a clear link to security and help to address NATO’s Strategic Objectives. The Programme closely follows guidance received from Allies, and has repeatedly demonstrated its flexibility and versatility to adapt to the changing political and security context. The PCSC is directly overseeing the implementation of the SPS Programme by approving SPS activities, the annual SPS Work Programme and the nominations received from Allies for the Independent Scientific Evaluation Group (ISEG). At the same time, SPS follows the strategic and political guidance resulting from NATO Meetings and Summits, such as the July 2018 Brussels Summit and the December 2019 Leaders’ Meeting in London. This has been reflected in the development of SPS activities to support NATO-wide priorities such as the Defence and Related Security Capacity Building (DCB) Initiative, NATO efforts to project stability, the fight against terrorism, and the strong cooperation with partners in the South, the Western Balkans and East. SPS has also continued its strong engagement with Ukraine, including through the 16th annual meeting of the NATO-Ukraine Joint Working Group Scientific and Environmental Cooperation (JWGSEC) in March 2019. WORKING WITH KEY STAKEHOLDERS ACROSS NATO AND THE INTERNATIONAL COMMUNITY The SPS Programme relies heavily on its close and well-established cooperation and coordination with various NATO stakeholders, including Allied and partner Delegations, NATO Agencies, Divisions, and Offices, such as the Office of the Secretary General’s Special Representative on Women, Peace and Security. The Programme has established longtime coordination and cooperation with the Science and Technology Organization (STO) and the Office of the Chief Scientist, with one expert from each being an ISEG member. The Senior SPS and Partnership Cooperation Advisor is an ex-officio member of the Science and Technology Board (STB) for the ESC Division. Where appropriate, SPS draws on the expertise of the network of NATO Centers of Excellence to deliver specialized, modular training activities, tailored to the needs of partner nations. The SPS Programme is also engaging with other International Organizations, including with the United Nations (UN), the Organization for Security and Cooperation in Europe (OSCE), the European Union (EU) and, since 2019, the African Union, to identify synergies, forge networks and avoid duplication. SPS PROGRAMME IMPLEMENTATION FACTS AND FIGURES Over the last year, the SPS Programme received a total of 130 applications in response to three calls for proposals throughout the year. Of these, 112 passed the eligibility screening and were peer-reviewed by the Independent Scientific Evaluation Group (ISEG) during two meetings. 52 proposals were recommended by the ISEG. The NATO Partnerships and Cooperative Security Committee (PCSC) met on eight occasions throughout 2019 to discuss the SPS Programme, and during these meetings approved new SPS activities. Out of these, 25% were top-down activities that had been developed in close cooperation with the NATO and partner countries involved, to respond to their needs and priorities. While SPS activities cover a wide range of security-relevant topics, cyber defence, CBRN defence and the development of advanced technologies were the top three SPS key priority areas addressed by new activities in 2019. 22 partner countries from all NATO partnership frameworks are leading last year’s newly approved SPS activities. Multi-Year Projects and Advanced Research Workshops were the most popular SPS grant mechanisms in 2019. A total of 32 SPS Multi-Year Projects were completed in 2019. They helped to build capacity through the provision of modern equipment and specialized training. They supported young scientists as they began their careers, and resulted in new insights, technologies, prototypes and policy recommendations that can be further developed and applied by end-users. A full list of SPS projects completed in 2019 can be found in Annex 3. In addition, in 2019, 31 advanced training courses and research workshops were carried out, involving approximately 2700 experts, researchers and young scientists. An exhaustive overview of the SPS events organized in 2019 may be found in Annex 2. The SPS Programme fully executed its budget of EUR 11.8 M in 2019, maintaining a linear spending curve. A substantial part of the budget remains allocated for new and ongoing large-scale MYPs. MODERNIZATION The SPS Programme continues to foster the development of scientific and technological innovation by applying specialized know-how to address emerging security challenges. In particular, cluster workshops and special calls for proposals maintain the SPS Programme’s position at the leading edge of innovation and modernization. In this light, the Programme issued two Special Calls for Proposals in 2019. The Special Call for Proposals on Advanced Technologies focused on four clusters of topics: communication systems, advanced materials, sensors and detectors, and unmanned systems, proving the Programme’s dedication to innovating in security-related civil science. This Special Call was developed following a cluster workshop on Advanced Technologies in September, which was in line with the IBAN recommendation to cluster activities in order to increase networking amongst scientists, to stock-take, and to ultimately enhance results. In 2019, the Programme also launched a Special Call for Proposals in the field of Explosives Detection, specifically in the areas of multi-sensor systems, data analysis, new or rapidly developing technologies, preparation for actual field conditions, and dissemination and capacity building. The Programme also continued to support the Women, Peace and Security (WPS) agenda through concrete activities, closely coordinated with the office of the NATO Secretary General’s Special Representative on Women, Peace and Security, and following the guidance provided by the 2018-2020 NATO/EAPC Policy Action Plan on WPS. Notably, in 2019, SPS completed a MYP that conducted the first organizational climate assessment of the Georgian Armed Forces. The MYP addressed the topics of gender equality and discrimination, with the goal of understanding and enhancing the conditions of women and men in the armed forces. PROJECTING STABILITY Projecting Stability with MD and ICI partners continued to be a priority in 2019. This included new initiatives and progress in ongoing activities in support of the DCB initiative with key partners such as Tunisia and Jordan. Highlights included the completion of the SPS tailor- made training package at the NATO-ICI Regional Centre in Kuwait; the launch of a MYP with Morocco and Jordan to study emerging security challenges in NATO’s southern neighborhood; the development of a C-IED project under the DCB package for Tunisia; and the kick-off of a mobile CBRN laboratory (DIMLAB) with Tunisia and Morocco. Building on a recently completed MYP, which established a Computer Emergency Response Team within the Jordanian Armed Forces (JAF), in 2019 SPS delivered tailored intermediary and advanced-level cyber security training for the JAF. In 2019, on the occasion of the 25th anniversary of the Mediterranean Dialogue partnership framework, SPS celebrated its active cooperation with MD partners, which has resulted in 528 activities since 1994. NATO also recognized its engagement with Istanbul Cooperation Initiative partners during the 15th anniversary of the partnership framework in 2019. The ICI anniversary coincided with the completion of a package of ATCs delivered at the NATO-ICI Regional Center in Kuwait. In light of these anniversaries, 2019 was a defining year for NATO’s partnerships in the South, marked by NAC visits to Ankara and Kuwait city to commemorate the occasions. SPS cooperation with partners in the East was also highlighted through a number of flagship activities. For instance, cyber defence remained at the core of SPS contributions to the DCB package for the Republic of Moldova, which addressed the Moldovan Armed Forces Incident Response Capability Centre’s need for adequate hardware and software. SPS also maintained its strong relationship with Ukraine, which remains the largest beneficiary of the Programme. In 2019, Ukraine was involved in 28 ongoing activities, a number of them being flagship projects, such as the DEXTER programme. On November 21, the SPS Programme held an Information Day in Kyiv to reflect upon the achievements of the partnership since 1991, and to invite Ukrainian scientists and experts to continue to contribute to scientific cooperation for peace and security. COOPERATION WITH PARTNERS ACROSS THE GLOBE Aligning with NATO’s 360 degree approach, the SPS Programme remained open to cooperation with all partners in 2019. A number of SPS activities involved NATO’s Partners across the Globe (PaG). 2019 saw the first ever practical activity with NATO’s newest partner nation, Colombia, under the key priority of counter- terrorism. Experts and scientists from the Republic of Korea and Pakistan were also involved in ongoing SPS flagship projects in counter-terrorism, respectively the “Microwave Imaging Curtain” project under the umbrella of the DEXTER programme, and the MYP “Public Safety Communication in Context Related to Terror Attacks”. SPS also furthered NATO’s cooperation with Japan through the Cyber Defence Workshop ‘Assessing Risk and Building Cooperation in Cyber Defence’, which took place in October in Tokyo. SPS ACTIVITIES IN SUPPORT OF THE FIGHT AGAINST TERRORISM The SPS Programme has been a platform to engage partners in practical cooperation on counter-terrorism, supporting NATO’s wider efforts in this area. In line with the 2017 Action Plan on Enhancing NATO’s contributions to the International Community’s Fight against Terrorism, SPS continued to address a wide range of CT-related topics throughout 2019. CT capacity building activities were built on existing cooperation and frameworks, particularly the DCB initiative. SPS pursued the implementation of activities that were kicked-off as a result of the Special Call for Proposals on Counter-Terrorism, which closed in 2018. In July, a Consortium Agreement was signed by eight NATO and partner nations, thereby launching the DEXTER (Detection of Explosives and Firearms to Counter Terrorism) programme. This flagship activity aims to develop an integrated system to detect explosives and firearms in a mass-transit environment, without disrupting the flow of pedestrians. Another highlight of the CT agenda in 2019 included the first cooperative activity with the African Union with a focus on counter-terrorism capacity building. Going forward, there is potential for increased cooperation with a number of stakeholders contributing to the international fight against terrorism.

#### Independently, science diplomacy solves regulation of emerging biotech

K. Ravi Srinivas 2019. Consultant, RIS. He is a doctorate in Intellectual Property Law from National Law School, Bangalore. “Global Governance of Emerging Biotechnologies and Role of Science Diplomacy” In SCIENCE DIPLOMACY REVIEW, Vol. 1 | No. 3 | July 2019, https://www.ris.org.in/sites/default/files/2021-09/SDR%20July%202019%203-min.pdf IZP)

In the early 1970s concern was expressed over threats and impacts of advances in biology, particularly on the impacts of genetic engineering, and Issues related to biosafety and regulations were discussed. As genetic engineering was getting established as a novel technology that had huge potential to benefit and harm, scientists themselves were concerned about biosafety and issues arising out of recombinant DNA research. So in the Asimolar Conference, convened by scientists themselves a Declaration was adopted and scientists decided that they would adopt self-regulation as at that time there was no national level legislation/regulation in the USA. The rules adopted by the scientists laid the foundation stone for modern biotechnology regulation. Over the next few years, it became clear that fears were exaggerated and recombinant DNA research was crucial in biotechnology research. Today about four decades and a half have passed. Still the Asimolar conference is regarded as a pioneering conference, not just for the technical issues discussed there, but also for the decision to adopt self-regulation and minimize potential risk. Scientists thus responded to public concerns and concerns within the scientific community. What was novel once often turns out be routine and an ordinary matter over a period of time. The same has happened to the techniques and technologies discussed in Asimolar Conference, as recombinant DNA research soon became a routine affair in biotechnology. It became clear that fears were exaggerated and technology resulted in applications, many of which were not envisaged then. A criticism of the Conference was that it ignored ethical, legal and social impacts (ELSI) of the technology and focused solely on technical issues and concern for environment and health. Yet the key lessons from Asimolar were that developing consensus was critical and prudent action in light of uncertainty was important.1 Today, we have technologies/ applications such as synthetic biology that confer to scientists far more power than genetic engineering or recombinant DNA technologies did.2 But they have such a wide-ranging impact that discussion on ethical, legal and social implications are part of the debate among scientists, National Academies of Science and regulators. In case of human genome project, a specific percentage of money as allocated for ELSI research and governments and scientists made efforts to reach out to the public and allay their fears as well as to learn from the public about their concerns, values, fears and expectations. But governing human genome mapping was relatively easier as the number of countries was limited and they had come to an understanding among themselves. So, except for a few issues like intellectual property rights and data management models, human genome mapping did not emerge as a challenge for governance at the international level. At the national level, countries had revised their regulations based on regulation of biotechnology/genetic engineering. In case of human reproductive cloning while there was a UN declaration on banning human reproductive cloning, progress could not be made on a binding international treaty on human reproductive cloning. Although efforts were made to build a consensus and move towards a binding treaty it did not go beyond a point, because consensus did not emerge. Thus while. In 2005, the United Nations adopted Declaration on Human Cloning, a binding treaty is nowhere is sight. Still it is suggested that a global governance framework may still be possible. Synthetic biology is not governed by any international treaty or convention. In the last few years it has been discussed in Convention on Biological Diversity and many studies have been done. The forthcoming COP-MOP to be held next year in Kun Ming, China is likely to make some progress on this. But given its implications for biosafety and biosecurity, whether the Convention on Biological Diversity (CBD) is the right forum is a question. At the same time as it has ramifications for other sectors ranging from health to agriculture, its governance at the global level raises new challenges. These range from whether the precautionary principle is the right principle to govern synthetic biology to whether products of synthetic biology are treated as Genetically Modified Organisms (GMO) / Living Modified Organisms (LMO) or their equivalent. In December 2017 the ad-hoc technical experts group created by Parties to the Convention on Biological Diversity , decided that organisms developed or being developed under current methods of synthetic biology , including the ones containing gene drives will fall under the category of LMOs. LMOs are regulated under Cartagena Protocol on Biosafety (CPB). CPB has been ratified by most countries in the world and has 171 Parties to it. CPB has an elaborate mechanism to handle LMOs and invokes the Precautionary Principle. So negotiating further under CBD/CPB seems to be a better option but some of the countries that are innovators in Synthetic Biology and Gene Drives are not Parties to CBD or CPB. For example, USA is not a Party to CBD while Australia, and, Canada are not parties to CPB. Noting that broader shifts in global biodiversity governance are happening, Rabitz points out that a broader package deal with specific provisions on Gene Drive Organisms (GDO) can be arrived at the forth coming COP-MOP (Rabitz, 2019; P.9). But in the case of Synthetic Biology there is a strong and growing Do It Yourself Biology (DIY Bio) movement that has become global and the DIY Bio community is also an important contributor in terms of innovation and events like iGEM incentivize students to work on Synthetic Biology. This diffusion of technology among those who do not work under the typical biosafety regulatory regime and the diversity in their uses and applications is a challenge to governing Synthetic Biology. Most of the DIY Bio groups are aware of biosafety concerns and adopt safety procedures and take precautionary measures. How to regulate and govern DIY Bio is a key issue because DIY Bio promotes citizen science and enables better understanding of science and hence has to be supported but as it raises questions on biosecurity, biosafety and bioterrorism, it cannot be left entirely to DIY Bio groups. Will self- regulation combined with monitoring by a government agency is enough or should this also be regulated as a regular scientific activity? Genome Editing is a novel technology that has emerged since 2012 or so, and is revolutionizing the way scientists handle and manipulate genomes. While human genome mapping enabled scientists to explore and understand the genome better, Genome Editing, offers them tools and protocols to edit the Genome, or, ‘to rewrite the genetic code’. There are some common features among Synthetic Biology, Genome Editing, Gene Drives and GM Mosquitoes from a governance perspective: • There is no clarity on applicability of any convention/treaty for their governance globally • Although nations have been trying to develop frameworks and regulatory norms, there are many unresolved issues ranging from categorization/ classification to identifying appropriate governance principles. For example should Gene Drives be classified as LMOs? Should Genome Edited Crops be treated as similar to crops bred in traditional plant breeding programs or as GMOs for regulatory purposes. • Are principles like precautionary principle adequate to develop regulatory regimes • Traditionalriskassessmentsmaynotbe sufficient to fully understand the long terms environmental impacts of these • Given the gaps in knowledge about impacts, issues on impact assessment methodologies, there are uncertainties on assessing their impacts • They raise concerns about biosafety and biosecurity and some of these are new and arise out of their unique and novel features, and, this includes concerns about DIY bio.3 • Given the wide-ranging applications in different sectors, is it possible to develop coherent governance frameworks, which can adapt in tune with technological developments. The good news is that different stakeholders are aware of these and are trying to understand the implications. Thus, whether it is National Academies of Sciences or WHO or professional bodies representing scientists or Parties to different Conventions/Treaties there are many initiatives on debating about governance issues and to develop a common understanding, if not a consensus. For example WHO has established a “expert advisory committee on Developing global standards for governance and oversight of Human Genome editing” and it has started functioning. Parties to The Biological and Toxin Weapons Convention (BTWC) are discussing the implications of advancements in science and technology, including genome editing for BWTC. A paper submitted by Switzerland states (BWTC, 2018): “CRISPR technology can reasonably be expected to surprise us with new twists and turns impossible to predict. This is likely also true for many other areas, including the above discussed nucleic acid origami, but also for synthetic biology or the neurosciences. In this context, it will be important to keep track of scientific and technological advances, and their potential bearings on the Convention. At the upcoming MX2, we should hold a technical discussion on genome editing technologies, and especially CRISPR technology, to then take the next step towards an assessment of their implications for the Convention by putting them into the broader context of the ‘new era of biology’. In doing so, we should broaden our traditional focus of ‘pathogens causing disease’ to the wider prospects and implications that developments in the biosciences as a whole may have. Furthermore, technical discussions should also take into account any intangible aspects (e.g. ‘tacit knowledge’) of advances in science and technology, which may significantly shift initial perceptions about benefits and risks. All of this will allow for a holistic and more realistic understanding of the benefits and risks to the Convention” The figure 1 illustrates some of the concerns on the potential of recent developments in science and technology. (figure 1 omitted) According to Diane DiEuliis and James Giordano (2017): “‘Neurohacking’ will increase, and biotechnology, such as CRISPR/ Cas and novel gene editors, will provide tools to realize production of novel neuroagents with dual-use potential. Simple acknowledgment of these facts, however, is insufficient. It will be essential to pursue and obtain a deeper and fuller understanding of the ways that genetic pathways to human cognitive and behavioral modification can be engaged for dual and direct use as neuroweapons, to formulate policies based on this level of understanding, and to engage surveillance of the use of these technologies in various silos of development and application, so as to afford both preventive and more preparatory capabilities” (Pp. 300-301) For obvious reasons, ‘creating’ babies through genome editing with enhanced traits or similar application have created a mixed feeling, from awe and wonder, to repulsion and shock. Even as nations struggle to regulate genome editing in health sector, the absence of international norms for governance can result in tricky situations and unanticipated turn of events. While giving an example of such a tricky situation, Dounda and Sternberg (2017), suggest that international governance is a better solution, by pointing out: “A cautionary tale on the risks of inaction can already be seen with a related assisted reproductive technology known as mitochondrial replacement therapy, which is being developed but is not yet clinically approved in the US. In a recent case, however, a New York physician exported genetically modified embryos to Mexico for implantation, specifically to evade US restrictions. Imagine the type of industry that might result if the intent were not to produce an embryo free of genetic disease, but an embryo with a genetic enhancement enabled by CRISPR. Robust international governance could discourage this kind of medical tourism, assure equal protection for the citizens of all nations, set international gene editing standards for scientists and companies, and help prevent trade disputes with gene-edited foods. The challenge is determining what mechanism of international convergence is actually possible, given the substantial legal differences that are already in place across the globe on issues like GMOs and genetic modification of human embryos.” Given the challenges in developing governance norms and principles for these emerging technologies is there a role for Science Diplomacy in helping countries to develop governance frameworks and arrive at commonly agreed principles, if not a consensus? The answer is YES. Science Diplomacy can play key role as ‘Science for Diplomacy’ and ‘Diplomacy for Science’ can play a vital role in bringing together scientists, regulators and policy makers by acting as interfaces and help in building bridges. It is not important that countries should start with a common understanding or with shared objectives. But through deliberations, countries can at least find out points they agree fully, points they totally disagree and points they agree and disagree with a give and take attitude. Science diplomacy can help countries in identifying these points and identify how their respective positions are shaped by these points. For example with respect to human genome editing for reproductive purposes, countries can at least agree on what they want to prohibit at all costs and how they will ensure that, In arriving at such a common position, science diplomacy can play a vital role when scientists and diplomats work together towards this. While scientists can rely on positions taken by National Academies and ethical guidelines in vogue in the respective countries, diplomats can negotiate on developing flexible positions and norms that are beyond any bargain or compromise. Mutual interactions among them will enable a better understanding that can be used to arrive at a shared understanding for further deliberations. Through track II diplomacy, other stakeholders can contribute to further progress on developing such an understanding. On the other hand Science Diplomacy can be part of track II diplomacy although it may not be very visible. If we conceptualize that Science Diplomacy is a broad activity that goes beyond closed doors of forums for negotiations, and, activities of scientists and diplomats, then we have to consider the role of, inter alia, non-state actors, and, civil society in activities related to developing norms for governance. Given the importance of public engagement and public participation, Science Diplomacy can facilitate that by engaging with other stakeholders directly or indirectly. For example while in many of the Conference of Parties and Meeting of Parties (COP- MOP) , civil society groups and others that are recognized, can participate as observers , their influence among the public and their role in shaping public opinion also has to be taken into account. Science Diplomacy can be useful in engaging with them as observers as well as interfaces between public on one hand, and, scientists and policy makers, on the other hand. Obviously the tasks are not easy and there are many challenges. Although there can be a consensus translating that into a binding agreement or treaty is not easy. As these technologies have biosafety and biosecurity concerns, it is likely that Parties to BWTC will address those concerns as far as BWTC is concerned. Similarly some of the concerns relating to environmental impacts, long term impacts, and risk assessment can be addressed through deliberations by Parties of CBD/ CPB, which might result in changes/ additions/revisions in CBD/CPB. The WHO’s expert advisory committee can develop guidelines to regulate genome editing for health/population related purposes. Dounda and Sternberg have identified some relevant initiatives in governance of genome editing. Thus there is scope for using health diplomacy, environmental diplomacy and perhaps innovation diplomacy in moving towards governance norms for these technologies. But this will not happen on its own. Until countries realize that Science Diplomacy is essential to address tricky questions in international governance of these technologies and understand that some nudging including persuasion is required through Science Diplomacy and create forums and spaces for diplomats and scientists to interact and work together, Science Diplomacy will not have an effective role in this. As many of the Science Academies are active in addressing issues relating to governance, in each country, a small team from representatives of these Academies, negotiators can be formed to develop a coherent negotiating strategy across different forums, COP-MOPs etc. One hopes that the countries will seize the opportunities for Science Diplomacy to play a positive role and give it the importance it deserves in this challenging task. Having said that, we should not expect that Science Diplomacy will be the saviour or a factor that could override all other factors in moving towards a consensus. Perhaps developments in this year and the next few years will indicate the directions in which the world is moving in governing these technologies.

#### Absent that, bioterrorism causes extinction – that infinitely outweighs

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How worthwhile is it spending resources to study and mitigate the chance of human extinction from biological risks? The risks of such a catastrophe are presumably low, so a skeptic might argue that addressing such risks would be a waste of scarce resources. In this article, we investigate this position using a cost-effectiveness approach and ultimately conclude that the expected value of reducing these risks is large, especially since such risks jeopardize the existence of all future human lives. Historically, disease events have been responsible for the greatest death tolls on humanity. The 1918 flu was responsible for more than 50 million deaths,1 while smallpox killed perhaps 10 times that many in the 20th century alone.2 The Black Death was responsible for killing over 25% of the European population,3 while other pandemics, such as the plague of Justinian, are thought to have killed 25 million in the 6th century—constituting over 10% of the world's population at the time.4 It is an open question whether a future pandemic could result in outright human extinction or the irreversible collapse of civilization. A skeptic would have many good reasons to think that existential risk from disease is unlikely. Such a disease would need to spread worldwide to remote populations, overcome rare genetic resistances, and evade detection, cures, and countermeasures. Even evolution itself may work in humanity's favor: Virulence and transmission is often a trade-off, and so evolutionary pressures could push against maximally lethal wild-type pathogens.5,6 While these arguments point to a very small risk of human extinction, they do not rule the possibility out entirely. Although rare, there are recorded instances of species going extinct due to disease—primarily in amphibians, but also in 1 mammalian species of rat on Christmas Island.7,8 There are also historical examples of large human populations being almost entirely wiped out by disease, especially when multiple diseases were simultaneously introduced into a population without immunity. The most striking examples of total population collapse include native American tribes exposed to European diseases, such as the Massachusett (86% loss of population), Quiripi-Unquachog (95% loss of population), and the Western Abenaki (which suffered a staggering 98% loss of population).9 In the modern context, no single disease currently exists that combines the worst-case levels of transmissibility, lethality, resistance to countermeasures, and global reach. But many diseases are proof of principle that each worst-case attribute can be realized independently. For example, some diseases exhibit nearly a 100% case fatality ratio in the absence of treatment, such as rabies or septicemic plague. Other diseases have a track record of spreading to virtually every human community worldwide, such as the 1918 flu,10 and seroprevalence studies indicate that other pathogens, such as chickenpox and HSV-1, can successfully reach over 95% of a population.11,12 Under optimal virulence theory, natural evolution would be an unlikely source for pathogens with the highest possible levels of transmissibility, virulence, and global reach. But advances in biotechnology might allow the creation of diseases that combine such traits. Recent controversy has already emerged over a number of scientific experiments that resulted in viruses with enhanced transmissibility, lethality, and/or the ability to overcome therapeutics.13-17 Other experiments demonstrated that mousepox could be modified to have a 100% case fatality rate and render a vaccine ineffective.18 In addition to transmissibility and lethality, studies have shown that other disease traits, such as incubation time, environmental survival, and available vectors, could be modified as well.19-21 Although these experiments had scientific merit and were not conducted with malicious intent, their implications are still worrying. This is especially true given that there is also a long historical track record of state-run bioweapon research applying cutting-edge science and technology to design agents not previously seen in nature. The Soviet bioweapons program developed agents with traits such as enhanced virulence, resistance to therapies, greater environmental resilience, increased difficulty to diagnose or treat, and which caused unexpected disease presentations and outcomes.22 Delivery capabilities have also been subject to the cutting edge of technical development, with Canadian, US, and UK bioweapon efforts playing a critical role in developing the discipline of aerobiology.23,24 While there is no evidence of state-run bioweapons programs directly attempting to develop or deploy bioweapons that would pose an existential risk, the logic of deterrence and mutually assured destruction could create such incentives in more unstable political environments or following a breakdown of the Biological Weapons Convention.25 The possibility of a war between great powers could also increase the pressure to use such weapons—during the World Wars, bioweapons were used across multiple continents, with Germany targeting animals in WWI,26 and Japan using plague to cause an epidemic in China during WWII.27 Non-state actors may also pose a risk, especially those with explicitly omnicidal aims. While rare, there are examples. The Aum Shinrikyo cult in Japan sought biological weapons for the express purpose of causing extinction.28 Environmental groups, such as the Gaia Liberation Front, have argued that “we can ensure Gaia's survival only through the extinction of the Humans as a species … we now have the specific technology for doing the job … several different [genetically engineered] viruses could be released”(quoted in ref. 29). Groups such as R.I.S.E. also sought to protect nature by destroying most of humanity with bioweapons.30 Fortunately, to date, non-state actors have lacked the capabilities needed to pose a catastrophic bioweapons threat, but this could change in future decades as biotechnology becomes more accessible and the pool of experienced users grows.31,32 What is the appropriate response to these speculative extinction threats? A balanced biosecurity portfolio might include investments that reduce a mix of proven and speculative risks, but striking this balance is still difficult given the massive uncertainties around the low-probability, high-consequence risks. In this article, we examine the traditional spectrum of biosecurity risks (ie, biocrimes, bioterrorism, and biowarfare) to categorize biothreats by likelihood and impact, expanding the historical analysis to consider even lower-probability, higher-consequence events (catastrophic risks and existential risks). In order to produce reasoned estimates of the likelihood of different categories of biothreats, we bring together relevant data and theory and produce some first-guess estimates of the likelihood of different categories of biothreat, and we use these initial estimates to compare the cost-effectiveness of reducing existential risks with more traditional biosecurity measures. We emphasize that these models are highly uncertain, and their utility lies more in enabling order-of-magnitude comparisons rather than as a precise measure of the true risk. However, even with the most conservative models, we find that reduction of low-probability, high-consequence risks can be more cost-effective, as measured by quality-adjusted life year per dollar, especially when we account for the lives of future generations. This suggests that despite the low probability of such events, society still ought to invest more in preventing the most extreme possible biosecurity catastrophes The Impact Spectrum of Various Biothreats Here, we use historical data to analyze the probability and severity of biothreats. We place biothreats in 6 loose categories: incidents, events, disasters, crises, global catastrophic risk, and existential risk. Together they form an overlapping spectrum of increasing impact and decreasing likelihood (Figure 1). (Figure 1 omitted) The historical use of bioweapons provides useful examples of some categories of biothreats. Biocrimes and bioterrorism provide examples of incidents.† Biological warfare provides examples of events and disasters. These historical examples provide indicative data on likelihood and impact that we can then feed into a cost-effectiveness analysis. We should note that these data are both sparse and sometimes controversial. Where possible, we use multiple datasets to corroborate our numbers, but ultimately the “true rate” of bioweapon attacks is highly uncertain. Biocrimes and Bioterrorism Historically, risks of biocrime‡ and bioterrorism§ have been limited. A 2015 Risk and Benefit Analysis for Gain of Function Research detailed 24 biocrimes between 1990 and 2015 (0.96 per year) and an additional 42 bioterrorism incidents between 1972 and 2014 (1 per year).36 This is consistent with other estimates of biocrimes and bioterrorism frequency, which range from 0.35 to 3.5 per year (see supplementary material, part 1, at http://online.liebertpub.com/doi/suppl/10.1089/hs.2017.0028). Most attacks typically result in no more than a handful of casualties (and many of these events include hoaxes, threats, and attacks that had no casualties at all). For example, the anthrax letter attacks in the United States in 2001, perhaps the most high-profile case in recent years, resulted in only 17 infections with 5 fatalities.37 The 2015 Risk and Benefit Analysis for Gain of Function Research detailed only a single death from the recorded biocrimes.\*\* Only 1 of the bioterrorism incidents in the report had associated deaths (the 2001 anthrax letter attacks).36 Based on this data, for the purposes of this article, we assume that we could expect 1 incident per year resulting in up to tens of deaths. Biological Warfare Academic overviews of biological warfare†† detail 7 programs prior to 1945.38 A further 9 programs are recorded between 1945 and 1994.39 For most of the last century, at least 1 program was active in any given year (Table 1). (Table 1 omitted) The actual use of bioweapons by states is less common: Over the 85 years covered by these histories (1915 to 2000), 18 cases of use (or possible use) were recorded, including outbreaks connected to biological warfare (see supplementary material, part 2, at http://online.liebertpub.com/doi/suppl/10.1089/hs.2017.0028). Extrapolating this out (dividing 18 by 85), we would have about a 20% chance per year of biowarfare. It is worth noting the limitations of these data. Most of these events occurred before the introduction of the Biological Weapons Convention and were conducted by countries that no longer have biological weapons programs. Since many of these incidents occurred during infrequent great power wars, we revise our best guess to around 10% chance per year of biowarfare. We use 2 sets of data to estimate the magnitude of such events. The first dataset was Japanese biological warfare in China,40 where records indicate a series of attacks on towns resulted in a mean of 330 casualties per event and 1 case in which an attack resulted in a regional outbreak causing an estimated 30,000 deaths (see supplementary material, part 3, at http://online.liebertpub.com/doi/suppl/10.1089/hs.2017.0028). The second data set came from disease events that were alleged to have an unnatural origin.41 In one case study, a point source release of anthrax resulted in at least 66 deaths. In a second case study, a regional epidemic of the same disease resulted in more than 17,000 human cases. While these events were not confirmed as having been caused by biological warfare, contemporary or subsequent analysis has suggested that such an origin was at least feasible. Combined, these figures provide an estimated impact of between 66 to 330 and 17,000 to 30,000. For the purposes of this analysis, we are assuming the lower boundary figures from biological warfare are indicative of events, with a likelihood of 10% per year and an impact ranging between tens and thousands of fatalities. The upper boundary figures from biological warfare are indicative of disasters, with a likelihood of 1% per year and an impact range of thousands to tens of thousands of fatalities.‡‡ Go to: Global Catastrophic and Existential Risk Unlike standard biothreats, there is no historical record on which to draw when considering global catastrophic or existential risks. Alternative approaches are required to estimate the likelihood of such an event. Given the high degree of uncertainty, we adopt 3 different approaches to approximate the risk of extinction from bioweapons: utilizing surveys of experts, previous major risk assessments, and simple toy models. These should be taken as initial guesses or rough order-of-magnitude approximations, and not a reliable or precise measure. Model 1: Survey of 2008 Global Catastrophic Risk Conference An informal survey at the 2008 Oxford Global Catastrophic Risk Conference asked participants to estimate the chance that disasters of different types would occur before 2100. Participants had a median risk estimate of 0.05% that a natural pandemic would lead to human extinction by 2100, and a median risk estimate of 2% that an “engineered” pandemic would lead to extinction by 2100.42 The advantage of the survey is that it directly measures the quantity that we are interested in: probability of extinction from bioweapons. The disadvantage is that the estimates were likely highly subjective and unreliable, especially as the survey did not account for response bias, and the respondents were not calibrated beforehand. We therefore also turn to other models that, while indirect, provide more objective measures of risk.§§ Model 2: Potentially Pandemic Pathogens Recent controversial experiments on H5N1 influenza prompted discussions as to the risks of deliberately creating potentially pandemic pathogens. These agents are those that are highly transmissible, capable of uncontrollable spread in human populations, highly virulent, and also possibly able to overcome medical countermeasures.44 Previous work in a comprehensive report done by Gryphon Scientific, Risk and Benefit Analysis of Gain of Function Research,36 has laid out very detailed risk assessments of potentially pandemic pathogen research, suggesting that the annual probability of a global pandemic resulting from an accident with this type of research in the United States is 0.002% to 0.1%. The report also concluded that risks of deliberate misuse were about as serious as the risks of an accidental outbreak, suggesting a 2-fold increase in risk. Assuming that 25% of relevant research is done in the United States as opposed to elsewhere in the world, this gives us a further 4-fold increase in risk. In total, this 8-fold increase in risk gives us a 0.016% to 0.8% chance of a pandemic in the future each year (see supplementary material, part 4, at http://online.liebertpub.com/doi/suppl/10.1089/hs.2017.0028). The analysis in Risk and Benefit Analysis of Gain of Function Research suggested that lab outbreaks from wild-type influenza viruses could result in between 4 million and 80 million deaths,36 but others have suggested that if some of the modified pathogens were to escape from a laboratory, they could cause up to 1 billion fatalities.45 For the purposes of this model, we assume that for any global pandemic arising from this kind of research, each has only a 1 in 10,000\*\*\* chance of causing an existential risk. This figure is somewhat arbitrary but serves as an excessively conservative guess that would include worst-case situations in which scientists intentionally cause harm, where civilization permanently collapses following a particularly bad outbreak, or other worst-case scenarios that would result in existential risk. Multiplying the probability of an outbreak with the probability of an existential risk gives us an annual risk probability between 1.6 × 10–8 and 8 × 10–7.††† Model 3: Naive Power Law Extrapolation Previous literature has found that casualty numbers from terrorism and warfare follow a power law distribution, including terrorism from WMDs.46 Power laws have the property of being scale invariant, meaning that the ratio in likelihood between events that cause the deaths of 10 people and 10,000 people will be the same as that between 10,000 people and 10,000,000 people.‡‡‡ This property results in a distribution with an exceptionally heavy tail, so that the vast majority of events will have very low casualty rates, with a couple of extreme outliers. Past studies have estimated this ratio for terrorism using biological and chemical weapons to be about 0.5 for 1 order of magnitude,47 meaning that an attack that kills 10x people is about 3 times less likely (100.5) than an attack that kills 10x–1 people (a concrete example is that attacks with more than 1,000 casualties, such as the Aum Shinrikyo attacks, will be about 30 times less probable than an attack that kills a single individual). Extrapolating the power law out, we find that the probability that an attack kills more than 5 billion will be (5 billion)–0.5 or 0.000014. Assuming 1 attack per year (extrapolated on the current rate of bio-attacks) and assuming that only 10% of such attacks that kill more than 5 billion eventually lead to extinction (due to the breakdown of society, or other knock-on effects), we get an annual existential risk of 0.0000014 (or 1.4 × 10–6). We can also use similar reasoning for warfare, where we have more reliable data (97 wars between 1820 and 1997, although the data are less specific to biological warfare). The parameter for warfare is 0.41,47 suggesting that wars that result in more than 5 billion casualties will comprise (5 billion)–0.41 = 0.0001 of all wars. Our estimate assumes that wars will occur with the same frequency as in 1820 to 1997, with 1 new war arising roughly every 2 years. It also assumes that in these extreme outlier scenarios, nuclear or contagious biological weapons would be the cause of such high casualty numbers, and that bioweapons specifically would be responsible for these enormous casualties about 10% of the time (historically bioweapons were deployed in WWI, WWII, and developed but not deployed in the Cold War—constituting a bioweapons threat in every great power war since 1900). Assuming that 10% of biowarfare escalations resulting in more than 5 billion deaths eventually lead to extinction, we get an annual existential risk from biowarfare of 0.0000005 (or 5 × 10–7). Perhaps the most interesting implication of the fatalities following a power law with a small exponent is that the majority of the expected casualties come from rare, catastrophic events. The data also bear this out for warfare and terrorism. The vast majority of US terrorism deaths occurred during 9/11, and the vast majority of terrorism injuries in Japan over the past decades came from a single Aum Shinrikyo attack. Warfare casualties are dominated by the great power wars. This suggests that a typical individual is far more likely to die from a rare, catastrophic attack as opposed to a smaller scale and more common one. If our goal is to reduce the greatest expected number of fatalities, we may be better off devoting resources to preventing the worst possible attacks. Why Uncertainty Is Not Cause for Reassurance Each of our estimates rely to some extent on guesswork and remain highly uncertain. Technological breakthroughs in areas such as diagnostics, vaccines, and therapeutics, as well as vastly improved surveillance, or even eventual space colonization, could reduce the chance of disease-related extinction by many orders of magnitude. Other breakthroughs such as highly distributed DNA synthesis or improved understanding of how to construct and modify diseases could increase or decrease the risks. Destabilizing political forces, the breakdown of the Biological Weapons Convention, or warfare between major world powers could vastly increase the amount of investment in bioweapons and create the incentives to actively use knowledge and biotechnology in destructive ways. Each of these factors suggests that our wide estimates could still be many orders of magnitude off from the true risk in this century. But uncertainty is not cause for reassurance. In instances where the probability of a catastrophe is thought to be extremely low (eg, human extinction from bioweapons), greater uncertainty around the estimates will typically imply greater risk of the catastrophe, as we have reduced confidence that the risk is actually at a low level.48 §§§ Given that our conservative models are based on historical data, they fail to account for the primary source of future risk: technological development that could radically democratize the ability to build advanced bioweapons. If the cost and required expertise of developing bioweapons falls far enough, the world might enter a phase where offensive capabilities dominate defensive ones. Some scholars, such as Martin Rees, think that humanity has about a 50% chance of going extinct due in large part to such technologies.49 However, incorporating these intuitions and technological conjectures would mean relying on qualitative arguments that would be far more contentious than our conservative estimates. We therefore proceed to assess the cost-effectiveness on the basis of our conservative models, until superior models of the risk emerge. How Bad Would Human Extinction Be? Human extinction would not only end the 7 billion lives in our current generation, but also cause the loss of all future generations to come. To calculate the humanitarian cost associated with such a catastrophe, one must therefore include the welfare of these future generations. While some have argued that future generations ought to be excluded or discounted when considering ethical actions,50 most of the in-depth philosophical work around the topic has concluded that future generations should not be given less inherent value.51-55 Therefore, for our calculations, we include future lives in our cost-effectiveness estimate.\*\*\*\* The large number of future generations at stake mean that reducing existential risk even by a small amount may have very large expected value. The Earth is thought to be habitable for roughly another billion years;56 our closest relative, homo erectus, lasted over 1.6 million years,57 and the typical mammalian species also lasts on the order of 1 to 2 million years.58 Following Matheny,29 if we were to assume that humanity would otherwise maintain a global population of 10 billion for the next 1.6 million years, human extinction would jeopardize on the order of 1.6 × 10^16 life years.

#### It's an impact filter – strong science diplomacy solves everything – specifically interregional tensions that spiral to nuclear war

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INTRODUCTION The soft power of science has the potential to reshape global diplomacy. (Ahmed Zewail) In recent years the role and place of interna- tional science and technology (S&T) – and of science diplomacy (SD) in particular – have attracted only limited interest on the part of international affairs analysts and diplomatic practitioners alike. In part as a result, progress in addressing ‘wicked’1 global issues such as climate change, diminishing biodiversity, spe- cies extinction, resource scarcity, environmen- tal crises, and a daunting array of other epidemic threats and challenges which now imperil life on the planet, has been disappoint- ing. The capacity to apprehend and manage S&T-driven global issues has not grown suffi- ciently, and without a greater effort by govern- ments, international organizations and other SD actors, insecurity and underdevelopment will flourish. SD has been treated as a mar- ginal practice, and the damaging consequences of doing so can be reversed only through the provision of adequate resources and the eleva- tion of SD to the status of an international policy, institutional and diplomatic priority.2 UNDERSTANDING SCIENCE DIPLOMACY Learn from yesterday, live for today, hope for tomorrow. The important thing is to not stop ques- tioning. (Albert Einstein) Science, diplomacy and international policy are often regarded as uneasy bedfellows. Science is widely perceived as complex and impenetrable. Diplomacy is often viewed as elitist and ineffective.3 International policy is an ambiguous, esoteric term of which the gen- eral public is barely aware. It is little wonder, therefore, that SD remains relatively obscure and is widely ignored. Nevertheless, SD is important and is becoming more so in an increasingly heteropolar4 world order where the vectors of power and influence are charac- terized more by difference than by similarity and S&T based challenges are multiplying. At the highest level of analysis, SD can best be understood as a diplomatic technique by which S&T knowledge is freed from its rigid national and institutional enclosures, thereby releasing its potential to address directly the drivers of underdevelopment and insecurity.5 Unlike its constituent elements of science and diplomacy, the expression ‘science diplo- macy’ is a relatively new and unfamiliar term, and a consensus on its definition has yet to be forged. Nina Fedoroff, the Science Advisor to former US Secretary of State, Hillary Clinton, describes SD as: ‘the use of scientific collabo- rations among nations to address the common problems facing 21st century humanity and to build constructive international partner- ships’.6 While the phrase science diplomacy implies some sort of unified whole, the term is most commonly presented as consisting of three distinct areas: informing foreign policy objectives with scientific advice (science in diplomacy); facilitating international science cooperation (diplomacy for science); and, using science cooperation to improve interna- tional relations between countries, regions or organizations (science for diplomacy).7 These three categories, while widely accepted and used, tend to overlap and have some weaknesses as heuristic tools. Many international S&T issues cannot easily be pigeon-holed: attempts to manage climate change have involved science advice (both to governments and the UN Secretary-General), science for diplomacy (the reports of the Intergovernmental Panel on Climate Change (IPCC)) and diplomacy for science (the meet- ings of the Conference of the Parties (COP)). Other science-based issues, however, such as weapons inspections or fisheries monitor- ing and surveillance, fall more convincingly under a single heading (science for diplo- macy). For these reasons, as an umbrella term SD must be used with some care. That said, SD usefully combines inter- national political agency with the scientific method of knowledge production, and is an effective emissary of essential values such as evidence-based learning, merit, openness and sharing. As a specialized sub-set of pub- lic diplomacy (PD),8 science diplomacy is also a significant generator of soft power.9 It is this potent, and – through the increas- ing use of social and digital media – often technologically-enabled form of attraction which can intimately connect SD to national image, reputation and brand. In addition to addressing many of the planet’s most urgent challenges, SD can also contribute, through its use of neutral, non- ideological language, to the mitigation of international political differences when regu- lar diplomatic channels are strained, blocked or non-existent.10 Even at the height of the Cold War, for instance during the Cuban Missile Crisis, Soviet and American scien- tists maintained programmes of collaboration in areas such as polar, atmospheric, health and deep sea research, plus radioactive waste disposal. Similarly, Western scientists have sustained or established contact with their Cuban, North Korean and Iranian counterparts despite the existence of formidable political and economic barriers. Most recently, during the conflict over Crimea and eastern Ukraine, USandRussianscientistshavecontinuedto work closely on Arctic issues, in crewing and managing the International Space Station, and on negotiating the multilateral nuclear pact with Iran (2015) and Syrian chemical weapons disarmament (2013). Science diplomacy can also help maintain relations at times of tensions between friends. For example, in 1985 the government of New Zealand formally banned visits by potentially nuclear-armed warships.11 In response, the US government, while leaving the ANZUS treaty in place, withdrew security guarantees from its traditional ally, downgraded its dip- lomatic relations, and excluded New Zealand from the ‘Five Eyes’ intelligence sharing arrangement, which also included the UK, Australia and Canada. It was a surprisingly nasty row, and bilateral relations were not fully normalized until 2014. Still, through it all, the US base in Christchurch, which pro- vides forward supply and logistical support for American scientific research activities in Antarctica, remained fully operational, and cooperation between US and NZ scientists continued without interruption. Science diplomacy is sometimes conflated with international scientific cooperation, a mistake which has given rise to some confu- sion. The distinction, however, is clear. While the latter is sometimes commercially oriented and often occurs without direct state partici- pation, the former is animated by its direct relationship to government interests and objectives. In the case of international scien- tific cooperation, private sector or civil society partners work together to produce, for example, better medications, cleaner water, improved hygiene or more disease-resistant crops. In contrast to international science coop- eration, SD involves state interests. When these interests diverge, the outcomes may be asymmetrical, particularly if broader nego- tiations are involved. In other cases, interests and objectives converge. As regards outcomes beneficial to all parties, many examples can be drawn from a swathe of international scientific programmes and exchanges undertaken dur- ing the second half of the last century. These have included not only the extensive array of Cold War programmes, but also the highly successful US/G-8/ NATO-led efforts12 to employ members of shrinking defense science establishments and to decommission facilities used for the construction of weapons of mass destruction after the collapse of the USSR. Contemporary negotiations on issues such as the terms and conditions of resource access or environmental protection in a North–South context provide another example of success. There, however, the results have sometimes been more one-sided. Not all countries possess the same level of SD capacity. Large, rich, developed states, such as the US, UK and France, can engage in a wide spectrum of activity, but smaller states, such as Switzerland (commercial technological innovation) or New Zealand13 (agricultural greenhouse gas emissions, bio- security and phytosanitation) have wisely chosen to specialize. In general, less devel- oped countries are at a disadvantage due to limitations on S&T capacity.14 Developing countries tend to be consumers of ‘technical cooperation’ programmes, but when it comes to genuine technology transfer, successful examples are harder to come by. Also, the prospects for SD are often contextual, and thus can vary with time and place. For exam- ple, it is difficult to imagine initiating SD activity at this time with the Islamic State, or with the Taliban government of Afghanistan when it was hosting al-Qaeda. Not all science diplomacy is devoted to the achievement of pacific ends, as was illustrated by the programmes of covert collaboration involving, variously, Pakistan, Iran, North Korea, China and Libya on nuclear-explosive and missile-propulsion technologies orches- trated by Pakistani physicist Abdul Qadeer (A.Q.), Khan. Science and technology offer keys to security and development, but are also capable of generating insecurity, environmen- tal devastation and war. Nevertheless, the key assumption underlying scientific thought – that all events are caused, that misery is not fated, that the answers are out there and that all problems can eventually be solved – under- score its positive and transformative potential. Key Points • The world’s most pressing threats and challenges to peace and prosperity are rooted in science, driven by technology and immune to military solution. • Science diplomacy is well-suited to address these issues, and was prominent during the Cold War, but today has become marginal, with armed force entrenched as the international policy instrument of choice. • While science diplomacy offers a preferable way forward towards a more sustainable and resilient future, science and technology may also give rise to heightened insecurity and underde- velopment. HOW HAS SCIENCE DIPLOMACY DEVELOPED HISTORICALLY? If I have seen further it is by standing on the shoul- ders of giants. (Isaac Newton) The term ‘science diplomacy’ emerged during the 1990s. Science and diplomacy, however, may be seen to have played a criti- cal role together in shaping perceptions and dominant world views, and to have contrib- uted to the strength and durability of nations and empires throughout recorded history. Long before the Greco-Roman period initi- ated the rise of the ‘West’, great strides in medicine, astronomy, engineering and math- ematics were made in the ancient Near East, China and in India. Further scientific pro- gress continued in the Mediterranean, where mainly Greek thinkers like Pythagoras, Hippocrates, Plato, Aristotle, Euclid, Archimedes and Ptolemy made the links between science, power and politics more explicit. From the end of the Western Roman Empire, as the Dark Age enveloped Europe, and even more so after the long decline and eventual fall of Byzantium, the centre of sci- entific enquiry and experimentation shifted to the Arab/Islamic world, and remained there through the medieval period until the late Middle Ages.15 At about that time, the pendulum swung back to Europe. With the Renaissance era’s Scientific Revolution (Copernicus, Galileo, Kepler), Age of Enlightenment (Newton, Pascal, Franklin, Descartes), and the great voyages of explora- tion (Cook, Bougainville) science and tech- nology took off and innovation soared to unprecedented heights. Science and diplomacy became more explicitly intertwined when Britain’s Royal Society, founded in 1660, appointed Henry Oldenburg as its first foreign secretary in 1723.16 This preceded by 78 years the appointment of Britain’s first foreign min- ister. Benjamin Franklin, who in addition to being a founding father of the American Revolution was also a scientist and inventor, served as the first US Ambassador to France, 1776–85. Science and technology played central roles in the European imperial and colonial enterprises of the nineteenth cen- tury, and in the two World Wars and the Cold War of the twentieth. During and since those centuries, Europe, the USA, and for a half century the USSR, have dominated the world of international S&T.17 That locus of geographic leadership, as reflected in publi- cations and the pathfinding work of, among many others, Darwin, Pasteur, Mendel, and, later of Einstein, Bohr, Heisenberg and Oppenheimer,18 is gradually being eroded by discoveries originating in other parts of the world. Although by most measures still far behind, countries such as Japan and Korea have made great strides, while India, China and the ASEAN members, as well as Brazil and South Africa, are all beginning develop their capacities for leadership and innovation in S&T.19 Even if not referred to as such until rela- tively recently, SD per se and as practised by international organizations, foreign ministries and science-based agencies can be traced to the middle reaches of of the twentieth century. In 1931, for example, a number of countries decided to launch an umbrella organization for scientific organizations world-wide, the International Council of Scientific Unions (ICSU), known now as the International Council of Science.20 A second early exam- ple is the European Organization for Nuclear Research (CERN)21, which was founded in 1954 and whose work continues today with recent discoveries such as the Higgs Boson ‘God Particle’. Although managed by 20 European member states, scientists from over 600 universities and research institutes around the world are regularly offered access to CERN’s facilities. Another signature suc- cess is the 1959 Antarctic Treaty,22 with 52 signatories and a long record of achievement. In a few instances, SD has also been facilitated by well-resourced individuals, such as the American philanthropist Cyrus Eaton, who in 1957 hosted a meeting of 22 scientists23 in the village of his birth – Pugwash, Nova Scotia, Canada. The impe- tus for the first Pugwash Conference was the publication in 1955 of a manifesto prepared by Bertrand Russell and Albert Einstein, and signed by many of the leading scientists of the day. That document invited scientists of all ideological persuasions to address the threat to civilization posed by thermonuclear weapons. Over time the remit of the Pugwash meetings has broadened to include other weapons of mass destruction, and the confer- ences now attract the attention of a variety of politicians and senior government officials.24 Today, many inter- and non-governmental institutions and agencies engage in SD. The African Scientific Institute25 was cre- ated in 1967 to facilitate pan-African sci- entific cooperation. In 1996, all countries with territory and/or interests in the Arctic agreed to establish the Arctic Council,26 a body dedicated to advancing the goals of environmental protection and sustainable development. Other important – even if not always well-known – examples include: the International Institute of Applied Systems Analysis (IIASA);27 the International Atomic Energy Agency (IAEA);28 the Consultative Group on International Agricultural Research (CGIAR);29CRDF Global;30 UNESCO;31 the International Centre for Theoretical Physics (ICTP);32 The World Academy of Science (TWAS);33 the Inter Academy Council (IAC);34 SciDev.Net;35 Scientists Without Borders;36 the International Network for Government Science Advice,37 and the OECD Global Science Forum.38 Nevertheless, the creation of multilateral scientific organizations does not necessar- ily correlate with solving global problems. Indeed, there have been significant setbacks, and during the past few decades the overall frequency and intensity of science diplomacy has declined markedly. After the Cold War, many of the well-established international pro- grammes that had promoted science (and edu- cation and culture) as part of a broader public diplomacy strategy to positively influence foreign publics were wound down or drasti- cally reduced by Western countries. Post-9/11, there has since been some recovery, but there remains a long way to go to compensate for lost capacity at a time of growing demand. Ironically, compared to present levels of activity, both PD and SD, at least in the senses of science in diplomacy and science for diplomacy outlined above, enjoyed their hey- day during Cold War. During that period, PD and SD were more than anything else about winning hearts and minds in a competitive ideological and territorial context, yet there was an important distinction. While much of the mainstream PD content was highly prop- agandized, SD offered an alternative form of engagement for advancing the vital arms con- trol and non-proliferation agendas. Science was seen as a neutral, non-political milieu which could be used to mitigate ideological differences. In the early 1970s, SD played an early and central part in the restoration of US–China bilateral relations and continues to be used as a reliable way of producing con- crete results from broader negotiations. During the Cold War, SD played an impor- tant role in achieving arms control and dis- armament agreements, for example, the Non-Proliferations Treaty, the Strategic Arms Limitation Agreements, plus conventions on biological and chemical weapons. It also produced important environmental agree- ments, including the Montreal Protocol on SubstancesthatDepletetheOzoneLayerand theCanada–USacidraintreaty.TheLawofthe Sea Convention defined the rights and respon- sibilities of states with respect to their use of the world’s oceans, and established guidelines governing the environment, the management and use of marine resources, and economic exploitation. And just after the Cold War, in 1992 at the UN Conference on Environment and Development (UNCED), delegates agreed on Agenda 21, the Rio Declaration on Environment and Development, the Framework Convention on Climate Change, the Convention on Biological Diversity, and the Statement of Forestry Principles.39 As the difficulties with the Kyoto Protocol illustrate, the subsequent record has been far less impres- sive40 (see Chapter 49 in this Handbook). Disappointing and uneven progress in SD since the Cold War notwithstanding, the efforts of some countries do stand apart. US international science policy, for example, has in recent years included the Presidential appointment of Science Envoys; the expan- sion of the State Department’s American Association for the Advancement of Science41 and Jefferson Fellows programmes; enlarge- ment of the network of Science Counsellors and attaches at missions abroad; the estab- lishment of a high level of internal science advice; and the receipt of strong support from specialized, science-based NGOs.42 The UK,43 with its extensive Science and Innovation Network; Switzerland,44 with Swissnex, its public-private partnership; the EU;45 France;46 China;47 Japan;48 and; Korea,49 as well as several other countries, have also moved forward with ambitious SD programmes. Among less developed coun- tries, more could be done by making better use of existing diplomatic infrastructure, for instance by establishing mission-based net- works of international S&T representatives. Many of the principal achievements of SD continue to be in the policy domain of arms control, disarmament and monitoring. And several major states, including Germany, Russia and Canada, have demonstrated sur- prisingly little interest in SD. Key Points • Beginning in the ancient Near East, China, India, through the Greco-Roman period, and later in the Islamic world, Europe and the Americas, the combination of science and diplomacy has been present in global affairs for millennia. • Science diplomacy, and the establishment of international S&T institutions and NGOs, reached its apogee during the Cold War, but activities have diminished in the interim. • Following a striking record of achievement in areas such as arms control, disarmament and environmental conservation and protection, the pace of international progress has slowed, resources have been cut and underperformance has become the dominant theme. WHY ARE SCIENCE, TECHNOLOGY AND INNOVATION IMPORTANT TO CONTEMPORARY INTERNATIONAL RELATIONS? Science knows no country, because knowledge belongs to humanity and is the torch which illumi- nates the world. (Louis Pasteur) The need to strengthen and build SD is now greater than ever and will require a fundamen- tal re-ordering of international policy priori- ties and resources. Science, technology and innovation are now central to all aspects of our lives and are at the heart of the processes asso- ciated with globalization. The abundance of information generated through connectivity and networks is widely believed to be chang- ing everything.50 Nevertheless, at the level of social and political discourse, the profound consequences associated with S&T together with their implications for SD are accorded relatively little attention. The focus of the great powers remains on their armed forces and ‘military diplomacy’ even though there are no military solutions to the ‘wicked’ issues presented by climate change, genomics, bio- technology and the rise of cyberspace. Today, long-term, equitable and sustain- able development, rather than defence, is becoming the basis of security. Anger, resent- ment and recourse to violence and extremism often arise from exploitation, disenfranchise- ment, poverty and exclusion. Achieving secu- rity is bound up with solving these problems, and the solutions depend on SD harnessing S&T to the attainment of development objec- tives. In fields such as urbanization, public health, environmental protection and remedi- ation, agriculture, food and water, population and demographics, hygiene and energy, the impact of science and technology, combined with good governance, greater economic equality and social justice, are key. And good governance results, in part, from adopting values and procedures which enable progress in science – for example, openness, merit and evidence-based decision making. These qualities underpin the advance of democracy and human rights and enjoy a high degree of universal applicability. Through SD and the sense of cooperation, collaboration and soli- darity which its practice almost inevitably engenders, this sense of universal applicabil- ity can be communicated to others, thereby strengthening the prospects for tackling the ‘wicked issues’ identified above.51 S&T and indeed SD, as noted above, are not always on the side of the angels. They can provide tools for those who threaten peace and obstruct justice. Troubling though groups like Al Qaeda and ISIS, as well as some increasingly authoritarian states, may be, however, the threats they pose remain small compared to those which SD aspires to address. Indeed, it is mainly the militarized response presently adopted by the great pow- ers which affords religious extremism and political violence the opening to become major problems. SD, in contrast, offers the prospect of removing the sources of the legit- imate discontent which terrorists and authori- tarian regimes attempt to exploit. As a global enterprise, it is clear that sci- ence, technology and innovation are directly relevant to finding solutions to some of the world’s most pressing problems. There exists, however, a fundamental difficulty: within most international policy institu- tions, S&T issues are almost invisible. With few exceptions, foreign ministries, develop- ment agencies and indeed most multilateral organizations lack sufficient scientific and technological expertise, the cultural pre- disposition, and the R&D network access and links required to understand and man- age S&T issues effectively. And although scientists increasingly work together and share information among themselves, the scientific community seems to cherish their independence from politics and government. On the many occasions when diplomats or politicians gather to discuss international pol- icy, the substance of their discussions rarely includes S&T. When scientists get together to exchange views on topics of shared interest, their discussions rarely touch upon matters of diplomacy or international policy. The skill sets, activities, time frames and cultural ori- entations of the two groups differ markedly. Few people have managed to straddle the worlds of diplomacy and science effectively. These worlds exist almost as two solitudes. Major hurdles would remain even if scien- tists, politicians, diplomats, foreign ministries and multilateral institutions were more favour- ably disposed towards one another. When it comes to S&T, R&D and innovation, the perspectives and interests of the public sec- tor, private sector, NGOs and the academic community are not always aligned or com- plementary. More often they are competitive or contradictory. For the private sector, the over-arching goal is to maintain exclusive ownership and control over essential S&T intellectual property (patents, trademarks and copyrights limit transfer of technology and spread of innovation). For the constituent ele- ments of what President Eisenhower famously described as the Military Industrial Complex,52 the issues are budget protection, public policy advocacy and the influence over the research agenda (many governments are still spend- ing more on defence research than on health research).53 Add to that the militarization of international policy more generally,54 and the size of the problem becomes clear. Absent a shift away from defence research towards public and civic applications (for instance health, transportation, alternative energy, environmental protection, conserva- tion) and a shift in emphasis in international relations from defence to diplomacy and deve- lopment, progress will remain impossible.55 The relationship between S&T, on the one hand, and diplomacy and international pol- icy, on the other, needs to be reconstructed to produce greater areas of shared space and functional overlap. Anxiety over the unknown on the part of the diplomats, and discomfort with politics and diplomacy on the part of the scientific community, must be overcome and give way to a pattern of closer association, cross-fertilization and the habits of regular exchange and interaction. In part through the creation of connections, networks and col- laborative commons, the two solitudes must be brought together. As is happening else- where in the worlds of commerce and pub- lic administration, the lateral and the supple must replace rigid hierarchy and authoritarian interpersonal relations. By way of an instruc- tive model, Silicon Valley style skunkworks56 merit closer examination. As we have seen, science was once more deeply embedded in diplomacy than is the case today. That inti- macy should be re-instated, but on a much larger and more comprehensive scale. S&T capacity in diplomatic and multilat- eral institutions must be broadened, deep- ened and, where it does not exist, built up from scratch. This can in part be achieved through the injection of more and bet- ter expert scientific advice directly into the policy development and decision-making throughout the apparatus of government and the international governance process. Accessible, more easily intelligible sci- ence communications should be developed. Such synergistic outcomes could be further encouraged through career specialization and more purposeful use of the promotion and recruitment processes. Perhaps the fastest way to build capacity would involve the pro- vision of incentives, programmes of training and professional development, plus expanded secondments and exchanges. Unnecessary obstacles and constraints would have to be removed, and replaced by a commitment to information sharing and critical thinking, tolerance for dissent and an openness to the management of risk (as opposed to its aver- sion). After all, the goal is not the creation of failsafe systems, but to engineer a system of bureaucratic process that is safe – and can be learned from – when it fails. High dividends would accrue to the appli- cation of unorthodox thinking about how best to engineer more productive S&T teamwork through SD. Creative use could be made of open source problem solving, collaborative intelligence,57 web-based policy development and global value chains. In order to leverage international S&T cooperation, institutional linkages and public–private partnerships – between governments, corporations, think tanks, universities and NGOs – need to be bet- ter resourced and encouraged. With enhanced planning and closer coordination, interna- tional research institutions, science academies and intergovernmental science networks could play a larger role in pursuing these objectives. To that end, it would be useful to embrace dynamic new actors and forces which would go well beyond the tapping of usual suspects. This could include involving private philan- thropists and foundations, venture capital firms and small and medium sized enterprises. And, as a final element, all measures intended to improve performance in science diplomacy and international S&T would require rigorous benchmarking, monitoring and evaluation. Psychologist Hans Eysenck once remarked that: ‘Tact and diplomacy are fine in interna- tional relations, in politics, perhaps even in business; in science only one thing matters, and that is the facts’. While that may be so, it would nonetheless benefit both the scientific and diplomatic communities to recognize that they share at least some fundamental objectives: each strives to use reason and rational argument to establish norms and to bring order, structure and systemic function to their otherwise disparate and disorderly realms. That is a significant, if in large part unrecognized, commonality and represents a point of departure for strengthening SD and thus the prospects for more peaceful and prosperous international relations. What the world needs now is develop- ment and security. These two sides of the same coin are best achieved through more science, better technology and accelerated innovation internationally. Towards that end, and as a response to the negative attributes of globalization – including the tendency to socialize costs while privatizing benefits, and the abetting of polarization at all levels – SD can make an indispensable contribution. Key Points • A ‘wicked’ issue CUTS all ways; unlike terrorism, political violence or religious extremism, these threats and challenges are imperilling the planet. • In an increasingly heteropolar world order, the capacity to generate, absorb and use S&T will play a critical role in solving problems, reducing inequality, resolving differences and advancing security and development prospects. • Science and technology, on the one hand, and diplomacy and international policy, on the other, exist in floating worlds which rarely intersect. • Performance could be improved by injecting expert scientific advice into the international policy development process, by making greater use of scientific collaboration in pursuit of dip- lomatic objectives, and by better harnessing the activities of foreign ministries and multilateral institutions in support of advancing the scientific agenda.

#### Specifically, the aff boosts data collaboration – that’s critical to mitigate anti-biotic resistance diseases

Greene, 16 (Chief Digital Officer at mClinica, 6/17, The Superbugs are Coming. Data Science Can Help, http://techonomy.com/2016/06/the-superbugs-are-coming-data-science-can-help/)

As concerns mount about the growing risk of drug-resistant microbes, scientists and health professionals are scrambling for solutions. **Data science can play a central role in the fight against the looming global threat.** Since the dawn of our species, we co-evolved with bacteria, viruses, parasites, and other microbes that inhabit our bodies and environs. Many of these microbes are harmless; some are symbiotic and even essential for our health. Others are dangerous, but thanks to miraculous advances in public health and medical science over the past century, we can prevent and treat many common microbial infections. Yet some in the health industry fear that may be changing. We misuse and overuse antimicrobial drugs on a massive scale, and the bad bugs are beginning to evolve new resistance mechanisms. As the world flattens and gets more connected, drug-resistant pathogens can spread faster than ever. Meanwhile, we are not developing new medicines and upgrading global health systems fast enough to keep up with our microbial foes. The result could be new strains of “superbugs” with devastating impacts. Scientists have long warned about these risks, but a recent study by the Review on Antiomicrobial Resistance (AMR), a UK-based initiative to provide research and policy guidance on AMR, lends a new urgency to the issue. Commissioned by the UK Government and the Wellcome Trust, the study makes some frightening predictions about the scale of the threat. They estimate that drug-resistant strains of tuberculosis, malaria, HIV/AIDS, and other pathogens already kill around 700,000 people per year. By 2050, the annual toll could reach 10 million. The report advocates for an array of economic, political, and social interventions to tackle the problem. It also acknowledges the importance of data science in supporting those interventions. In fact, the report devotes an entire section to ideas for improving AMR surveillance in humans and animals. Fortunately, many organizations are already working to improve the availability and quality of AMR data. The World Healthcare Organization leads one major effort. In 2015, it launched a Global Antimicrobial Resistance Surveillance System that aims to create standards and processes for data collection and sharing. It will initially focus on clinical monitoring of eight high-risk bacterial strains, but may eventually morph into a platform for sharing AMR data of many types. Advances in bioinformatics could supercharge these efforts. Andrew McArthur, a researcher who holds the Cisco Research Chair in Bioinformatics at McMaster University, imagines a future in which clinicians can instantly sequence the DNA of a disease-causing microbe and use that data to determine the best course of treatment for the patient. That data could then be shared with global AMR surveillance networks and analyzed in real time. “We can already sequence bacterial DNA with remarkable speed and affordability,” says McArthur. “**The big challenge is creating software and protocols to make all that data useful for AMR surveillance.” Since overuse of antibiotics in humans is one of the biggest AMR risk factors, tracking their consumption is also critically important. Almost everywhere in the world, physicians routinely prescribe antibiotics when they are not needed**. In some places, including many emerging markets where the burden of infectious disease is particularly high, antibiotics are sold as over-the-counter medicines and used with virtually no discretion. My own work at mClinica, a Singapore-based health data and technology firm, involves building health data collection and patient engagement platforms in Asia’s emerging markets. Antibiotics are among the most overprescribed medicines in every country we cover, and our data shows that sub-therapeutic dosing is common. While this may be discouraging, we can also use this data to identify hotspots of antibiotic misuse and plan targeted interventions. Pharmaceutical companies, whose R&D pipelines for antibiotics have all dried up in recent years, recognize that they must be part of the solution. At the World Economic Forum in January 2016, many of the world’s top pharmaceutical, biotech, and diagnostics companies signed a declaration that called for efforts to encourage prudent stewardship of currently-available therapies, hasten drug discovery, and undertake other measures to prevent us from slipping into a post-antibiotic era. Achieving these goals will be all but impossible without smart use of lots of data. Enter the data scientists. Armed with an array of technical skills, from statistical methods to data visualization techniques, they can help bring together complex datasets from varying domains, find patterns in the noise, and develop actionable strategies for fighting AMR. Data science can provide insights that help us develop new antimicrobial medicines, prevent overuse of the ones we already have, and reshape health systems to reduce their need in the first place. It is not a silver bullet for the AMR problem, but it can turbocharge efforts to find and implement solutions.

#### Antibiotic resistant superbugs will cause extinction – traditional impact D doesn’t apply

Adams, 14 – founding editor of NaturalNews.com, the internet's No. 1 natural health news website, reaching 7 million unique readers a month (Mike, “Drug-resistant superbug infections explode across U.S. hospitals: 500% increase foreshadows 'new plague' caused by modern medicine”, July 17th, http://www.naturalnews.com/046041\_CRE\_superbugs\_drug-resistant\_infections\_modern\_plague.html#)

Drug-resistant superbug infections have reached near-epidemic levels across U.S. hospitals, with an alarming 500% increase now documented in a study just published in the August issue of Infection Control and Hospital Epidemiology (the journal of the Society for Healthcare Epidemiology of America). (1) Lead author of the study, Dr. Joshua Thaden, warned "This dangerous bacteria is finding its way into healthcare facilities nationwide... A CRE epidemic is fast approaching... Even this marked increase likely underestimates the true scope of the problem given variations in hospital surveillance practices." The study also found that an astonishing 94 percent of CRE infections were caused by healthcare activities or hospital procedures. CRE superbugs explained CRE (carbapenem-resistant Enterobacteriaceae) is an incredibly dangerous superbug causing nearly a fifty percent fatality rate once a patient is infected. The World Health Organization calls it "one of the three greatest threats to human health," and all known antibiotics are useless in treating it. CRE arose out of the systematic abuse of antibiotics by doctors, who inadvertently created the perfect breeding ground for deadly bacteria by using narrowly-targeted chemical medications that lack the kind of full-spectrum action found in nature (in herbs like garlic, for example). Because of their highly-targeted chemical approach, antibiotics encouraged bacteria to develop molecular defenses that resulted in widespread resistance to Big Pharma's drugs. The situation is so bad today that the entire pharmaceutical industry has no drug, no chemicals and no experimental medicines which can kill CRE superbugs. Even worse, there are virtually no new antibiotics drugs in the research pipelines, either. Drug companies have discovered that it's far more profitable to sell "lifestyle management" drugs like statin drugs and blood pressure drugs than to sell antibiotics which treat acute infections. Antibiotics simply aren't very profitable because relatively few people acquire such infections. Meanwhile, everyone can be convinced they might have high cholesterol and therefore need to take a statin drug for life. Drug companies, in other words, have all but abandoned the industry of treating infections. Instead, they now primarily engage in the promotion of disease symptoms while selling drugs that attempt to alter measurable markers of those symptoms such as cholesterol numbers. Even though drug companies caused the superbug pandemic that's now upon us, in other words, they have deliberately abandoned humanity in defending against those superbugs because it's simply not profitable to do so. The end of antibiotics has arrived: Humanity faces a new plague caused by modern medicine The CDC has admitted that we are now living in a "post-antibiotics era." As Infection Control Today states, "Antibiotic resistance is no longer a prediction for the future. It is happening right now in every region of the world and has the potential to affect anyone." (2) Dr. Arjun Srinivasan, associate director at the Centers for Disease Control and Prevention, went even further in a PBS interview, stating: (3) We've reached the end of antibiotics, period... We're here. We're in the post-antibiotic era. There are patients for whom we have no therapy, and we are literally in a position of having a patient in a bed who has an infection, something that five years ago even we could have treated, but now we can't. Keep in mind that doctors refuse to use natural substances to treat infections, which is why they believe no defenses against superbugs exist. Their indoctrination into the world of pharmaceuticals is so deeply embedded in their minds, in other words, that they cannot even conceive of the idea that an herb, a food or something from Mother Nature might provide the answer to superbugs. See this Natural News article on natural antibiotics that kill superbugs. The list includes honey. Hospitals are the perfect breeding grounds for superbugs By their very design, hospitals are prefect breeding grounds for superbugs for six very important reasons: 1) They put all the infected people under one roof, creating a high density infectious environment. 2) They allow doctors and medical staff to quickly and easily carry and transmit infectious diseases to new patients. Previous studies have documented how superbugs easily ride on doctors' ties, for example, or their mobile phones. 3) Medical staff still don't wash their hands as frequently as they should. The intense time demands placed on them discourage careful hand washing, causing many to skip this crucial step between patient visits. 4) Hospitals almost universally refuse to use broad-spectrum antibacterial remedies which are not drugs. Natural substances like honey and garlic show extraordinary multi-faceted antibacterial properties, as do certain metals such as silver and copper. Yet because these substances are not developed by pharmaceutical companies which dominate the field of medical practice, they are simply ignored even though they could save many lives. (And a doctor who prescribes "honey" doesn't sound as amazing and all-knowing as a doctor who prescribes "the latest, greatest laboratory breakthrough patented chemical medication.") 5) Hospital practices suppress human immune function to the point of systemic failure. Rather than boosting immune function, conventional medical treatments such as antibiotics and chemotherapy cause immune system failure. Hospitals lack sunlight and hospital food lacks key immune-boosting minerals such as zinc and selenium. On top of that, most of the drugs prescribed to patients by hospitals deplete key nutrients required for healthy immune function, leaving patients even more susceptible to superbug infections. 6) Hospital staff spread infectious diseases to their private homes. After acquiring an infection at work (at the hospital), staffers easily spread those infections to their own family members at home. The antibiotics plague is upon us We are right now living through the early stages of a global plague caused by modern medicine. The industry that created this plague is utterly defenseless against it, leaving humanity to fight for survival in a world that's now far more dangerous than the one that existed before the invention of antibiotics. Antibiotics have indeed saved millions of lives, and they forever have an important place in any medical practice. Yet their careless use -- combined with medicine's willful and foolish abandonment of natural antibiotics that work far better -- has led humanity down the path of its own destruction. Today, a simple scrape of your arm or leg might now be fatal. Infections that occur during routine medical procedures which would have once been considered minor issues are now deadly. And the worst part is that the bacteria continue to evolve more elaborate defenses against drugs while increasing their transmissibility. Human hospitals (and entire cities) are, by design, ideal pandemic hubs that rapidly spread disease. Like it or not, humanity has created the perfect storm for a pandemic decimation of the global population.

#### US involvement in international science collaboration is key to innovation – the alternative is stagnant tech that fails to account for new challenges

Elizabeth E Lyons director of the U.S. National Science Foundation’s Tokyo Regional Office in Tokyo, Japan et al. 2016 “How Collaborating in International Science Helps America” Science & Diplomacy, Vol. 5, No. 2 (June 2016). http://www.sciencediplomacy.org/article/2016/how-collaborating-in-international-science-helps-america IB

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International collaborations embed American scientists and students in vibrant, globally collaborative networks that strengthen the U.S. science, technology, and innovation (STI) enterprise, while benefiting both America and the world. Because such benefits have not been systematically explored in the United States, we present a framework for organizing and enumerating them, with national-level examples provided to illustrate scientific, economic, health, national security, educational, societal, and diplomacy and development advantages that can result from international STI collaborations. Our objectives in presenting this organizing structure are threefold. First, the framework can help those in government, academic, and private sectors who make decisions with national impact better understand how and what kinds of positive outcomes can result from international STI cooperation. Second, given the distributed and decentralized nature of the U.S. STI community, the framework can serve as a starting point for subnational decision makers to identify benefits of STI internationalization at their operational scales. Third, this organizing structure and its examples can serve as a call to action for scientists to more clearly articulate to decision makers and the public how working in areas of mutual scientific interest with international colleagues can advance U.S. national, regional, local, or institutional interests.¶ As a group of individuals who have worked across national and global science landscapes for many decades, we were motivated to develop a framework for better understanding and communicating the benefits of international science,1 technology, and innovation collaboration to the United States. The global STI system has seen dramatic change in the last several decades. For example, it is now marked by worldwide growth in investment that is significantly reducing U.S. global scientific market share, e.g., in expenditures, globally mobile students, publications, patents, and technology revenue.”2 3 The construction of advanced STI infrastructure is now more often built outside the United States by other nations or consortia. And the geography of scientific knowledge creation and use has shown new dynamics within and across many world regions.4 5 These changes have kindled a dialogue in the United States about how the nation, facing both a more worldwide distribution of STI excellence and domestic budget constraints, can best adapt to the twenty-first-century environment of international partnerships and globally distributed knowledge networks.6 7 8 9 10 Missing thus far from this dialogue has been a comprehensive and deliberate exploration of how international STI collaboration provides benefits to America at many levels.¶ We undertake such an effort by presenting an organizing structure or framework for such benefits that we hope achieves three objectives. First, given the complexity of the U.S. STI enterprise, this framework can help decision makers (including government officials at all levels, as well as academic and private sector leaders) better understand how and what kinds of positive national impacts can result from international STI cooperation. We do this by providing examples within our framework of who can benefit, in what ways, from which types of activities undertaken by different sets of U.S. and foreign partners working in various policy sectors. Second, the framework can serve as a starting point for subnational decision makers to identify benefits of STI internationalization at their operational scales. Third, this organizing structure and its examples can serve as a call to action for scientists to more clearly articulate the benefits of their international collaborations to decision makers and the public.¶ The Underappreciated Value of International Scientific Collaborations at Home¶ The United States has been slow among developed and emerging economy countries to recognize how increased international collaboration can advance domestic science excellence.11 12 13 This is likely due to America’s historic STI dominance, relative geographic isolation, and critically, to a complex STI community that is large, diverse, and decentralized. Much U.S. scientific activity is of a bottom-up, merit-based nature, driven by scientists working in domestic or international teams to address specific scientific challenges, rather than being dictated by centralized, top-down mandates.¶ The nation distributes federal support for basic scientific research from a number of agencies and across many universities and research institutions. U.S. higher education is a private or state, not a federal, responsibility, so academic STI internationalization is characterized by strong competition among states and institutions, few national policy levers, and little coordination among and within institutions.”14 Likewise, the various U.S. government science agencies operate in a relatively decentralized manner, undertaking international activities to meet their different missions with little policy direction, and with limited central and strategic coordination.”15 16 Congress and State Houses respond to local constituencies, yielding few broad national advocates for international STI collaboration. Finally, because STI results and impacts, especially those that occur in overseas collaborations, are primarily communicated across networks of scientific professionals, little feedback on international STI outcomes is available in forms that are accessible to decision makers or the general public.¶ Given these historical and structural considerations, we chose to focus on benefits derived from federal government and university involvement in international STI activities that advance national objectives such as national security, economic vitality, and diplomacy.17 We focus on Americans going abroad for STI collaboration because this has received less attention than the impact of foreign STI researchers and students working in America. We recognize that the mutual benefit realized by the collaborating foreign partner(s) is essential to this STI cooperation, but we do not address that here.¶ Crafting a Framework to Capture Benefits of International STI Collaborations¶ Our framework organizes benefits into seven sectors (i.e., scientific, economic, health, diplomacy and development, national security, educational, and societal) with distinct (or overlapping) policy drivers and potential policy outcomes (e.g., leading, accelerating, building, safeguarding, sustaining).18 Because our primary objective is to inform those whose decisions have major impacts at a national level, most of the examples in Table 1 focus on how international collaboration in national programs can help the United States. The examples illustrate an overarching benefit of international collaboration, i.e., it yields outcomes that no one nation could achieve alone. For example, international groups can leverage more resources (e.g., funding, expertise, facilities) to accomplish something faster and can combine diverse contributions (e.g., unique expertise, data, phenomena, facilities) to allow specialization and reduce duplication. Such collaborations can also increase collective participation (e.g., comprehensive global or regional monitoring) to yield more rigorous scientific synthesis and shared responsibility for future action. The examples also document how international STI collaboration can strengthen relationships (e.g., with improved networks and collaboration tools, and increased trust, generosity, and cultural understanding) with mutual scientific and diplomatic benefit to all participants. Finally, the examples sampled in Table 1 demonstrate the wide potential scope and complexity of projects, with various types and numbers of international partners, and diverse types of scientific activities undertaken to yield the set of benefits described.¶ Many of the activities cited in Table 1 are part of a rich fabric of cooperation that produces benefits across multiple sectors. For example, in the category of societal benefits, when U.S. engineers work with their Japanese counterparts on building safety, they contribute to society’s resilience to earthquakes by co-designing and sharing data from experiments in Japan on the world’s largest “shake table,” subjecting large, sensor-laden reinforced concrete buildings to different types and severity of shaking. A recent U.S.-Japan workshop on risk communication yielded additional societal benefit by providing cross-cultural insights into how to increase effective engagement with the public in natural disaster preparedness and response. Universities in the earthquake-prone nations of Japan, New Zealand, Chile, and the United States are linked in a virtual network that generates scientific benefit by sharing data on earthquake impacts on various kinds of buildings, as well as educational benefits to the participating countries by engaging their future engineers in jointly taught classes and international collaborative frameworks. The graphic of nanoHUB users around the world (Figure 1, see also Table 1), illustrates another international collaboration that yields multiple types of benefits. In addition to building a community of shared practice around nanotechnology safeguards that spreads the costs of nanotechnology safety across many countries, a main focus of nanoHUB is distributing nanoscience educational materials from around the world and providing access to computing and simulation tools in many areas of nanoscience. The United States benefits from the resultant global knowledge networks and thriving national and international educational and research collaborations in the pre-competitive areas of nanoscience.¶ We highlight direct positive impacts of STI collaboration for the wellbeing of Americans and emphasize how U.S. leadership in solving global STI challenges can benefit the world. We hope that our focus on the benefits of leveraging increased worldwide STI excellence provides a positive counterbalance to concerns that such global STI growth is primarily a threat that diminishes U.S. advantage.19 We recognize that global technology markets are fiercely competitive, that there are ongoing threats to American intellectual property, and that the nation needs to safeguard its technology for national security. But these concerns need not interfere with global engagement—many safeguards exist and are continually reinforced. There are numerous examples of international cooperation in pre-competitive research that are successfully integrated into domestic technology programs and subsequently implemented by U.S. business and government agencies. Many American industries have adopted a strategy of open collaboration to stay competitive.20 Given the breakneck speed at which STI developments emerge and expand across the globe, we endorse the view that “American security and prosperity now depend on maintaining active engagement with worldwide developments in science and technology, and with the global economy.”21 Embedding American scientists and engineers in robust, global STI networks can add value by placing local knowledge in global contexts and by bringing global knowledge back for local use.22¶ Embedding American scientists and engineers in robust, global STI networks can add value by placing local knowledge in global contexts and by bringing global knowledge back for local use.¶ Our second objective in presenting the information in Table 1 is that it serves as a starting point to help various subnational decision makers and stakeholder groups better understand the potential benefits of international STI collaboration at the levels at which they operate. Each state has a unique set of universities, industries, populations, and political and economic drivers. To paraphrase the late Supreme Court Justice Louis Brandeis, the states can be America’s “laboratories of STI globalization,” where state policies allow experimentation and local fine-tuning, delivering benefits from each state’s distinctive comparative advantages.¶ We know that the map of innovation has been “spiky,” with a few key regions (e.g., San Francisco and Boston) dominating.23 Looking ahead, America’s challenge is to sustain existing hubs and incubate new ones that can achieve site-specific local-to-global STI integration; this is especially pressing as more emerging economies devise their own recipes for innovation’s “special sauce,” that is, mega-cities that co-locate workforce, intellectual capital, investment in science, and industrial growth.24 Finally, students, researchers, and technologists are embedded within institutional, local, state, and national structures that vary in how their policies on international STI engagement yield benefit within a global context.24 25 26 Because the dynamic global STI landscape offers American institutions, regions, and states the potential to realize tremendous value in a global context, we encourage these groups to freely consider or modify our framework as they develop their international agendas.¶ As an example, one can consider in Table 1 the international science and engineering internships that yield national economic benefit by bringing into the national workforce U.S. students with globally relevant work skills, cultural experience, and professional networks. Such internships can also provide great benefit at subnational scales. For example, at a state level, public university international engagement, private sector strengths, demography, and geography can make certain regions of the world natural partners. Students returning from internships in those foreign regions are more able to work in culturally diverse teams, are more knowledgeable about business approaches, customs, and markets of countries there, and are plugged into border-spanning networks and partnerships in that region. They can help meet local American needs by using the international skills, savvy, and connections they acquired during their internships to bolster focused international ventures of a state’s private sector.¶ Our final objective is that our framework serves as a call to action that stimulates internationally engaged scientists to better document the positive impacts of their international activities at national, state, local, and institutional levels. U.S. scientists and institutions have strong traditions of free scientific inquiry with international colleagues and of training students from around the world. Many are part of global scientific networks and clamor for facilitation of bottom-up international STI collaboration. Better articulation of the positive impacts of such collaboration is needed to inform national priorities, policies (e.g., on visas, intellectual property, data sharing), and funding (e.g., to globally link students, researchers, institutions, databases, and facilities), as well as to build support for and reduce impediments to international STI engagement at subnational levels.¶ Broad support is needed at many levels for those in the American STI community who want to “go global.” Thus there is an urgent need for scientists to help decision makers and especially citizens understand and value not just the scientific benefits of international research, but also how it meets basic human and national needs.28 In the “Public Messaging” column in Table 1, we provide model language, as suggested by Alan Alda at the 2014 AAAS Annual Meeting, which we believe is straightforward, compelling, and linked to the lives of the American people.29 We emphasize outcomes that can motivate domestic action and political consensus and can be conducive to international cooperation (e.g., national pride, economic and social wellbeing, national security, generosity, the value of knowledge, civics). With the language in that column as a guide, we challenge our fellow scientists to describe, in ways that their relatives, neighbors, institutional leaders, and civic leaders can understand, how their collaborating in international science helps America.¶ A Forward-looking, Dynamic Conversation¶ We welcome discussion and further exploration of the benefits of international STI engagement by decision makers at all levels and across all sectors, as well as by scientific professional societies and scientists themselves. We see these activities as an essential part of ongoing consideration of how to develop a broad, comprehensive, globally framed strategy for U.S. STI, as well as the supportive strategies at subnational levels. We hope that our framework will contribute to the nation’s narrative about how the United States can “lead through collaboration” to build and sustain broad and deep partnerships of mutual interest that keep our scientists and students at the forefront of STI, while bolstering synergistic cooperation for the benefit of America and the world.30

### Solvency

#### Plan: The United States federal government should substantially increase its security cooperation over disease mitigation with the North Atlantic Treaty Organization in the area of biotechnology.

#### Increased US action in disease mitigation is critical to NATO effectiveness

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COVID-19 has been a systemic wake-up call, exposing vulnerabilities in health, international cooperation, and the global economy. NATO showed reliability and solidarity under the initiative of its civil and military personnel amid COVID-19. Yet, one could only imagine how easier and more efficient NATO’s response would have been if the alliance did not have to overcome tense political issues between member states and if NATO’s stronger member, the United States, had adopted a more cooperative approach78 to the virus response both internationally and domestically, similarly to what had been done for Ebola in 2014.79 This could not only have helped the NATO Public Diplomacy Division’s outreach in pushing back against disinformation, but also used the resources of the organization — constantly targeted in Trump’s complaints because of its financial burden — to share costs and responsibilities and ultimately reassure partners and markets. Instead, from a political perspective, the global pandemic revealed that American leadership can no longer be taken for granted.80 Trump not only denied the gravity of the virus, but also imposed travel bans without coordinating with European allies, abdicated leadership of the G-7 which the United States was chairing,81 withdrew from the World Health Organization,82 and refused to join international efforts to produce a vaccine.83 This behavior will leave significant scars in the trans- Atlantic partnership, of which NATO is the main pillar, and has pushed Europeans to talk more concretely about increasing their own defense capabilities.84 In spite of its respectable performance during COVID-19, one might be tempted to argue that there is not a lot to be optimistic about when it comes to NATO’s future, given widespread fatigue with multilateralism, political tensions within and between member states, and a global economic recession. With GDP plummeting worldwide, policymakers and public opinion may be reluctant to support an increase in defense spending. Because of shrinking economies, the 2% of GDP commitment for NATO members will, ironically, be easier to achieve, in the very short term. However, once GDP recovers to earlier levels there may be significant downward pressure on defense budgets throughout the alliance. Yet, in the short to medium term it is reasonable to worry about defense sector supply chains and how this will impact NATO’s fighting capabilities.85 It is therefore of paramount importance that the alliance rethink the defense spending requirement, adapting it to new technological challenges which entail not only more cost-effective options but also a broader concept of security that encompasses protection of supply chains, infrastructure, and humanitarian operations. Although disruptive, COVID-19 will not be the main factor that influences the future of NATO, which has survived sharper political divergences between its members in the past, like on the U.S.- led Iraq War in 2003. With major challenges ahead, including nuclear deterrence, Chinese and Russian geopolitical ambitions, terrorism, and increased migration flows, it is critical for NATO allies to build a common vision. As Stoltenberg recently remarked,86 the alliance needs to become “more global,” and to do so it is paramount for the U.S. and Europe to develop a common stance towards China, increase efforts to fight terrorism, and make defense more sustainable in the future. While the COVID-19 crisis will hopefully be overcome with a vaccine and NATO will benefit from this experience to increase its resilience towards future challenges, the future of the alliance itself depends on the trust between the allies. In this regard, the outcome of the U.S. election will have a major impact on the alliance itself and on its focus, and will determine either a relaunch of the trans-Atlantic cooperation on strategic infrastructure, environmental security, and deterrence against outside powers, or an historical retrenchment occurs that leaves it up to Europeans to take the lead in one way or another.

#### The plan sets standards and ensures interoperability.

Soare '21 [Simona R, Jun 11, "Innovation as Adaptation: NATO and Emerging Technologies," https://www.gmfus.org/news/innovation-adaptation-nato-and-emerging-technologies]  
\*EDT: emerging and disruptive technologies

The third driver is to foster the interoperability of military capabilities that are enabled by emerging technologies13 and to incentivize transatlantic defense cooperation on EDTs to avoid or bridge technology gaps between allies. This goes to the core of NATO’s mission to deter and defend against threats, but it is an enduring challenge. Streamlining standardization and testing, evaluation, verification, and validation procedures remains important. However, NATO should also double down on its efforts to ensure greater compliance with interoperability and baseline requirements for the security of critical infrastructure. Recent challenges in relation to national compliance with the 2019 NATO requirements for security of telecommunications infrastructure are a case in point, but there are wider and enduring challenges with hardware and communications interoperability.14 While the plans for the new Defence Innovation Accelerator promise to contribute to maintaining NATO’s technological edge, it also remains to be seen whether they will contribute sufficiently to building technology capacity among some of the smaller and more vulnerable allies. As they establish governance procedures and participation rules, allies need to mitigate the risk that the accelerator could contribute to a two-speed, two-tier alliance, dividing the technology haves from the technology have-nots.

The fourth driver is a desire to lead in setting global, normative EDTs governance. The Advisory Group on Emerging and Disruptive Technologies, for example, has emphasized that NATO “is exceptionally well placed to be a global driver of a values-based innovation agenda.”15 Democratic values are at the core of what defines security for transatlantic allies and the target of adversarial subversive measures. Consequently, embedding democratic values into the development, adoption, and use of EDTs by the allies is key to NATO’s mission. Thus, innovation efforts need to be closer linked to NATO’s democracy-centered tech diplomacy with like-minded global partners, some of whom could be invited to join the Defence Innovation Accelerator.

The fifth driver is organizational and procedural change, notably to build “a resilient innovation pipeline for the alliance”16 and a sustainable innovation ecosystem. This is a more challenging undertaking than it may first appear. Military organizations have historically innovated more coherently and efficiently than other public organizations.17 However, in the case of EDTs, this pattern is challenged. NATO and allied military organizations are not driving technological progress, are not the main agents of innovation, and depend on effective civilian-military collaboration for their own innovation efforts.

#### NATO already has an operational telemedicine framework, but it needs to be applied to disease mitigation – only that enables effective cooperation

David M. Lam 2007. M.D., US Army Telemedicine and Advanced Technology Research Center, Fort Detrick, Maryland USA, and University of Maryland School of Medicine. “Telemedicine in the Context of Force Protection.” Defense Technical Information Center. 3/1/2007. <https://apps.dtic.mil/sti/pdfs/ADA476382.pdf> IZP)  
Figure 1 Omitted

Historically, most NATO medical forces were organized to fight a large-scale Article 5 war. This organization included the requirement for large hospitals to be deployed, containing large numbers of specialists and all their specialized equipment. Thus, within a theatre of operations, most specialty consultations would have been able to be obtained within a national medical system in-theatre. At their height, these deployable military medical facilities rivaled and often surpassed in capabilities civilian hospitals of similar size. But, these large and capable hospitals are increasingly being phased out of military inventories for several reasons. Such capabilities are expensive, difficult to move, and “have a large footprint”. They require extensive site preparation and maintenance, burn up lots of fuel, and are excellent targets. Further, because of their size and relative immobility they are not normally capable of being placed close to the combat zone, but are held more to the rear. Not directly relevant to this issue, but of concern to our military medical planners is that even without farforward-deployed hospitals, Medical Personnel have historically been killed and injured at an extremely high rate during combat operations. The number of medical personnel killed or wounded while trying to rescue or treat casualties has historically been very high—as only one example, a recent review of medically-related Medal of Honor citations (the highest US decoration for valor) showed that nearly 50 % were posthumously given. It appears obvious that if we can reduce the deployment of high-value and scarce medical personnel,while maintaining the quality of care we provide, this will be of great benefit. Thus, taking into account that most wars foreseen at the present time are “small wars”, there is an international tendency to decrease the number of specialized medical personnel in the forward areas of the battlefield, and to rely on smaller less capable facilities (the so-called Role 2+-- Role 2 plus a surgical capability, with early evacuation [and advanced care en-route] rather than the larger and more capable Role 3). This trend within NATO is so marked that the most recent edition of MC 326/2 eliminated the concept of Role 2+ in favor of requiring surgical capabilities at all Role 2 units, both Role 2 E and Role 2 LM. However, during the same period, our military forces have become smaller and more technologically intense, and the types of deployments in which they are involved have greatly increased, to include not only war but peacekeeping, peacemaking, and humanitarian assistance, each of which has different medical requirements. Conscription has been done away with in most countries, leading to an increased reliance on professional and more highly skilled soldiers. It has been proven to be neither practical nor medically possible to provide the previous level of medical deployment to support ever-smaller troop levels, while maintaining the flexibility needed to respond to the varying medical needs of various missions. It has become evident that the specialty skills needed to provide care for combat casualties may be very different from the skill mix needed to provide humanitarian assistance, for example following a flood. The clinical needs of a young healthy soldier with an acute traumatic injury are very different than those of an elderly person with chronic disease who has no access to maintenance medicines following a natural disaster—thus, the specialty requirements vary from mission to mission. At the same time, there has been a demand from our politicians and our civil populaces for maintaining a very high standard of medical care for our deployed personnel. This latter demand is exemplified by NATO document MC 326/2, which demands that every soldier will receive during deployment the same level and quality of care which he or she could receive in the home country. These changes have produced within the NATO military forces a more streamlined organization, an increased role for multinational shared medical resources, and an increased effort to use new technologies to enhance military capabilities. We also see a growing expectation among our civil populations and politicians that our military operations should be casualty-free. In the period of the so-called “CNN effect”, instant transmission of images of combat casualties has significantly raised the expectation for sophisticated casualty care and medical services whenever and wherever casualties may occur. On their face, these requirements would appear to be mutually contradictory. How can we provide homecountry quality of care to our soldiers without deploying large hospitals and extensive teams of specialists to a far-off battle zone? Fortunately, many of our nations have begun development of a relatively new technology which has been proven to be able to satisfy these apparently disparate requirements--- Telemedicine. With the ongoing NATO Transformation, the emphasis is on a reduced medical service footprint, and hospitalization assets may not deploy into the Area of Operations until the theater is mature, if at all. Many of the services previously provided by deployed medical specialists will not be physically available early in a deployment, if at all. In order to ensure that junior providers at Roles 1 and 2 have access to specialist advice, and to preclude unnecessary evacuation of soldiers for “routine” consultations, telecommunications technologies must allow for clinical consultations to occur in the physical absence of specialist providers from the forward areas. The delivery of specialist medical advice utilizing telecommunications and information technologies offers the prospect of this support in austere environments. Thus, as the traditional mechanisms for obtaining specialty consultation in the field have been more and more disrupted, and will no longer be viable without frequent and often prolonged patient travel, with consequent adverse impacts on operational capabilities, there has been a great need for a new mechanism to ensure that only those patients actually requiring evacuation are sent away from their units for medical purposes. Multinational Telemedicine is one mechanism for obtaining specialty consultation while maintaining the desired smaller medical footprint in theatre. Additionally, it can provide increased access to clinical specialists who no longer need to be deployed to the conflict zone in order to allow application of their expertise, and who can thus provide their expertise in many locations simultaneously. This concept of telemedicine serves as the basis for developing doctrine, training, leader development, organizations, and materiel changes focused on the requirements for Telemedicine support to deployed and garrison troops. It further can provide the framework to describe the capabilities required for Telemedicine support to the NATO Reaction Force and other NATO force deployments. Like any other new concept, telemedicine means different things to different people. For that reason, I want to share my definition with you at the outset. The official NATO definition, found in STANAG 2517, is “The use of advanced telecommunication technologies to exchange health information and provide health care services across geographic, time, social and cultural barriers.” What this means is that Telemedicine can allow us to move expertise forward on the battlefield, rather than moving experts to the battlefield. No longer does the expert clinician have to be physically located next to the patient to give advice and comfort. For the purposes of this paper, I use the term “Telemedicine” in a restricted sense. I am not using it in the broadest sense of “e-Health”, with the implications of patient education, scheduling, telesurgery, telementoring, etc. I use the term strictly to mean “Teleconsultation”, “The provision of specialty services (e.g. dental, mental health, cardiology, dermatology, radiology, pathology) by health care specialists to other physicians”. Teleconsultation may employ a wide range of technologies (Figure 2) from simple voice communication through to real-time video tele-conferencing along with the ability to handle medical specialty-specific data streams (e.g. heart and lung sounds, electrocardiograms, video and still images) captured with the use of specialized equipment”, as defined within STANAG 2517, but the basic concept is simple— we are increasingly looking to export expertise, not experts. Two examples of this are currently deployed Telecardiology and Tele-Echography capabilities. The broader sense of the term includes many aspects of healthcare which will remain the responsibility of the individual nations, and which will probably not come under the authority of a NATO Force Commander. Since it is Teleconsultation which can potentially provide the primary benefit within a NATO multinational medical support operation, this is the Telemedicine modality to which I have restricted my comments. Although Teleconsultation has been practiced for many years, its use as a tool to enhance healthcare resulted from the wide availability of personal computers, the Internet and satellite communications. Military use of teleconsultation to support operations, so-called deployable teleconsultation, began in the Gulf War and has continued to be developed and refined to the present day. Many of the concepts and practices developed to meet military operational imperatives have now been adopted and refined to meet the needs of peacetime healthcare around the world. Technically, Teleconsultation may be enabled as shown in figure 2. Figure 2 Omitted These modalities include the transfer of data in several ways: (1) Real-time—through using dedicated two-way voice ( telephones or radio), or by use of Real-time Video teleconferencing (VTC). (2) Store-and-forward data – the ability to exchange medical knowledge asynchronously using: (a) Facsimile. (b) E-mail text only. (c) Email with small size still image attachments. (d) Email with data and with large size image attachments in compressed form, such as motion picture (MPEG), digital pathology (JPEG) or digital radiography (DICOM). (e) Dedicated Internet connectivity, such as with dedicated servers (3) Other advanced technologies (e.g. streaming video, multimedia). While real-time interactions imply that all parties participate simultaneously in a teleconsultation session, store-and-forward interactions involve sending, reviewing, and returning an opinion over a period of time. Streaming is a method of delivery of real-time or stored data such as audio, video, documents, still images, or other data type across networks. With streaming, a receiving system can start displaying data before the entire content arrives. The technological limitations of smaller systems and the lack of availability of adequate bandwidth have until recently limited the majority of deployable teleconsultation systems to providing real-time voice and storeand-forward capability. The use of real-time consultation by VTC is currently supported at Role 3 of the medical care system and above for some countries. However, the rapid development of robust high performance and miniaturized equipment such as handheld computers, small inexpensive high-resolution cameras, miniature satellite telephones and image compression techniques may enable real-time video conferencing to forward Roles of care in the future, if it proves useful (Figure 3). Figure 3 Omitted Teleconsultation, both peacetime and operationally deployable, is being used to enable an ever-increasing range of clinical practices. The most common are: (1) Tele-radiology - Primarily using store and forward techniques. (2) Tele-dermatology - Primarily using store and forward techniques. (3) Tele-pathology - Primarily using store and forward techniques. (4) Tele-psychiatry - Primarily using VTC techniques. (5) Tele-dentistry - Primarily using store and forward techniques. (6) Tele-ophthalmology - Using a combination of VTC and store-and-forward techniques. (7) Tele-ultrasonography - Using a combination of VTC and store-and-forward techniques. Health Service Support Mission. The overall mission of military health service support has remained unchanged for centuries. It comprises four key operational tasks and a supporting logistic function. These are: (1) The promotion of health; (2) The prevention of disease and injury – now described as Force Protection; (3) The evacuation of the sick and wounded; (4) The diagnosis and treatment of the sick and wounded; and (5) The provision of medical materiel and other logistic support to enable these tasks. Teleconsultation may be employed to support each of the above missions. Properly developed as a medical support tool, a national or NATO teleconsultation concept can enable a “collective” health service support environment which will augment and enhance current individual nation support. This will be particularly vital in coalition warfare and operational environments involving limited health care resources and/or short warning and duration operations in which limits on logistic support would severely constrain the medical “footprint”. It is also essential in situations where different nations will provide Role 2 and 3 support to each other, or in which various national Role 3 facilities have different levels of specialist staffing, and could therefore benefit from the exchange of expert patient-related clinical information. Through effective TMED utilization, various nations have been able to develop systems for the following medical functions: (1) Initial urgent evaluation of patients, triage decisions, and transfer arrangements; (2) Medical/surgical follow-up; (3) Supervision and consultation for primary care encounters where a physician is not available; (4) Routine consultations; (5) Transmission of diagnostic images; (6) Extended diagnostic workup or short term management of self-limited conditions; (7) Management of chronic diseases requiring a specialist not available locally; (8) Transmission of medical data; and (9) Public health, preventive medicine, and patient education. To assist nations in identifying and implementing Teleconsultation systems for use in either a national or a NATO multinational setting, NATO has established a Telemedicine Expert Team (TMED ET), which is open to membership from all Allied and Partner countries. Its mission is to facilitate national development of Teleconsultation systems, and to assist in development of interoperability programs which will enable these national systems to interoperate with those systems provided by other nations. Ideally, these will not be standalone Telemedicine or Teleconsultation systems, but will be integrated into a NATO-wide Medical Communications and Information System (MedCIS), such as the MEDICS program currently being developed by Allied Command Transformation (ACT), or its successors. The TMED ET is a subordinate body to the NATO/COMEDS Medical Communications and Information Systems (MedCIS) Panel, and if you are working in the Telemedicine arena, I strongly would recommend that you begin to become involved in the work of this group, which provides access in one place to the primary TMED expertise of the Alliance. A detailed study of NATO air, land, and maritime organizations and formations has been undertaken by the TMED ET to identify the minimum desirable capabilities for teleconsultation systems and technology at each Role of care (Figure 4), and each nation should analyze these requirements as a guide to developing its own desired deployable Teleconsultation capabilities. It must be noted that these are minimum recommendations; if a nation wishes to provide greater Teleconsultation capabilities at a given Role of care, they are certainly encouraged to do so. In accordance with the underpinning NATO principal of developing capability-based organizations, the aim has been to identify and recommend a capability, not a specific system or equipment. Individual nations should attempt to meet a specific capability requirement (for example, the capability to communicate between medical support organizations using standard internationally accepted Information Technology (IT) protocols) with the specific caveat that individual systems must meet NATO interoperability standards, once those are developed. Figure 4 Omitted Within the various national military health services systems, many telemedicine initiatives have moved from the conceptual stage to operational prototypes. These initiatives are under way at all organizational levels within military medicine and across the continuum of our responsibilities. I would like to share with you a few other examples of our experience with telemedicine—the fact that I am speaking primarily of US capabilities does not mean that the US is the only nation with such capabilities—in fact I know that is not the case, as several nations have very extensive TMED capabilities to support their field forces. I am just discussing those systems which I know the best. The US currently has connectivity from our medical facilities in Iraq, Kuwait, and Afghanistan to our medical facilities in Germany and also with several of our medical centers here in the U.S. The capabilities in use include teleconsultation (using an Army-wide Internet-based consultation system), digital X-rays, computer tomography and ultrasound transmissions, clinical e-mail, high-resolution still imagery, teledentistry and medical and patient information systems. In fact, all X-Rays taken in a deployed setting are currently being transmitted electronically and read at our Medical Center in Germany—we no longer need to deploy diagnostic radiologists to the front lines (and as a side benefit, we have eliminated the use of “wet film processing”, with all its logistic requirements and environmental hazards, from the deployed setting). We are routinely making use of teledermatology consultations, and infectious disease/internal medicine consultations played a significant role during a recent deployment to provide humanitarian aid in the Pakistan earthquake zone. In the future, all of these systems will have the capability feed data into our enterprise Electronic Health Record, called the Armed Forces Health Longitudinal Technology Application, or AHLTA. In the military arena, another very important component of this telemedicine capability is medical situational awareness and command and control. This is the age of information, and information superiority will be absolutely essential to the military in future engagements. I predict that appropriate use of Telemedicine and other IT technologies will be of great benefit in ensuring that our medical and line commanders have a vastly improved level of medical situational awareness compared to that they have had in the past. Other nations have their own areas of expertise in TMED, such as the German Telemicrobiology System, and various Teleparasitology and Telepathology programs currently in the field , not to mention both field and shipborne teleconsultation and teleradiology systems. Of note is that all nations having deployed TMED systems have found similar benefits—what I have been discussing is not simply a United States-centric opinion. A major goal of most NATO nations has been the replacement of the old paper medical records, and field medical cards, with an electronic system which would allow more accurate, complete, and readily transmittable medical records. One solution, being investigated by several nations for both civil and military use, is the Battlefield Medical Information System- Tactical, or BMIST (Figure 5). This system allows the first responder to enter immediate treatment data at the site of treatment, and to transmit it appropriately through several means, either by means of a transferable electronic medium such as the EIC or wirelessly to supporting medical organizations. Figure 5 Omitted One item of critical importance which cannot be overlooked is that of disease surveillance, and outbreak early warning systems. As we develop an increased level of multinational operations, an integrated database on infectious disease outbreaks will be critical to force protection. No longer can national outbreak data, often analysed months later, be considered acceptable. As we develop more integrated NATO-wide systems, disease surveillance reporting must be one of the earliest concepts to be integrated. It is amazing to think that we have today the capability to instantly inform the world of what the weather is like anywhere on the globe; we can transmit stock values instantly across the world; and we share transportation schedules which allow worldwide travel, but that we do not have any type of international system which can provide rapid accurate notification of disease outbreaks, validation of a working diagnosis, and direction of a multinational focused response to contain an outbreak or epidemic. The tools for this already exist, yet much more must be accomplished, and telemedicine's capabilities will play the key role. The introduction of new methods, new systems and new ideas always gives rise to apprehension, which in turn leads to resistance to change. We talk about “disruptive technologies” because they disrupt the way in which we have traditionally done our business. As telemedicine and other similar innovations within the military health services system become firmly established, we recognize this adverse response as one of our major obstacles. We simply cannot continue to do business as we have in the past—the days of the old paperbased field medical card and the associated medical records are numbered, and future field medical records will accompany the soldier on some version of “electronic dogtags”. The new ways of doing business must be proven to be clinically acceptable, as well as providing improvements in the care we can offer. We must approach new conditions with new ways of doing business, and I would point out to you that one of the only non-science fiction ways of accomplishing this in the NATO medical environment today is by the effective use of multinational, cross-border, Telemedicine systems. Continuing to do business the same way we always have is simply not an option. For operational military medicine to change the way it functions will take investment of resources and efforts that our people must be ready to make. A second problem area that we have within the NATO military health services system is the eagerness of some nations to fashion an information or telemedicine system which will satisfy their particular location or their particular special interest, without taking into account Alliance needs. We must all work to ensure that the systems we create will operate across the NATO Medical Information networks once they are fielded, that all systems can interact and that what is developed for use in one possible scenario can be transported to any other mission. To assist the nations in developing this kind of system, the TMED ET has published STANAG 2517 on Teleconsultation. It contains basic guidelines for development and use of teleconsultation systems, and contains standardization tools which will ensure that nationally-developed systems can interoperate. I strongly commend it to you. It is very simplistic, and very useful. As this is written, Edition 2 is current, but Edition 3 has recently been submitted for national ratification and processing. As a change agent for the NATO multinational military health system, telemedicine will change the way we conduct operations, regardless of where we happen to be, and regardless of which other nation, partner or ally, is on our flanks. The twin keys to improved combat casualty care are these forward battle area efforts and more medically intensive evacuation capabilities. Telemedicine is critical to them both. Our national deployed clinics and hospitals, using telemedicine, will no longer be remote from one another. Our physicians and other health care providers will work more closely together because distance and time will not be factors. The primary care physicians will still be involved with their patients while specialty care is provided via telemedicine, which will greatly improve the continuity of care for the patient as well as the understanding of the problem for both primary and specialty physicians. Evacuation back to the home country simply for routine consultations will no longer remove soldiers from the theatre for days or weeks, thus allowing more comprehensive use to be made of our deployed personnel as well as more rapid attention to their medical needs. The future of military medical care, and I would submit to you as well that it is the future of civil medical care at least in emergencies and disasters, is that of an integrated system, in which data acquired by one nation can be rapidly and accurately passed to another nation to whom the patient is being transferred. Although we may have a full panoply of capabilities, from Role 1 to Role 4, including the evacuation chain, this whole system is highly unlikely to be provided by a single nation—thus the requirement for standardized data collection and transfer. The phenomenal capabilities made possible because of these new tools can easily grab one's imagination and attention. We must remember that these advances are tools which enable us to accomplish things that previously were not possible. They are tools that expand our own personal abilities, which allow us to provide greater assistance to those who need health care. They cannot replace clinical expertise and capability, but they can help us make the best use of it, wherever located. These technologies, like telemedicine, are agents of change. They carry significant implications for how medicine will be practiced, yet medicine remains a curative art firmly based in science. As an agent of change, telemedicine carries significant implications for how military medicine will operate, yet the mission responsibilities of military medicine to provide care wherever and when ever needed remain the same. The important point here is that telemedicine is a tool to be used to improve the delivery of health care. It is here, and it works—I strongly recommend your consideration of it as an enhancement to your national military healthcare system, and as a viable aspect of your force protection program.

#### Disease prevention on a country-by-country basis makes the problem worse – a paradigm of international cooperation is the only effective method

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When COVID-19 hit Europe, most countries in the trans-Atlantic space turned inwards, protecting their own medical resources through bans on the export of medical equipment35 and uncoordinated border closures36 or travel restrictions, such as the one to and from the Schengen area established by Trump.37 These events contributed to spread a sense of distrust toward international solidarity even among NATO member states. Despite Macron’s diagnosis of NATO as brain- dead, the alliance was able to resort to the muscle memory of its military and logistical apparatus and provide a positive response in a moment of deep crisis. NATO officials set aside politics to focus on operations, and drew upon the organization’s exceptional crisis management capabilities, which rely on close coordination between civil and military personnel with both civil and military tools.38 On March 25, Stoltenberg activated the Crisis Management Mechanism to study the progression of the pandemic and plan a comprehensive response ranging from coordination transportation of medical equipment to dispatching NATO military doctors to countries in need to assist in the construction of field hospitals.39 Following these preliminary efforts, in their first virtual meeting on April 2, NATO foreign ministers authorized NATO’s strategic planning military headquarters — Supreme Headquarters Allied Powers Europe (SHAPE) in Mons, Belgium — to create a dedicated COVID-19 Task Force, headed by Lieutenant General Olivier Rittimann,40 to operationalize these plans. . The alliance had no prior experience with a global pandemic and had never faced a crisis that hit every member state with the same threat at the same time. Yet its crisis management and disaster relief record — from the International Security Assistance Force (ISAF) mission to Afghanistan41 to disaster relief support to support the United States after Hurricane Katrina42 to the response to the 2010 tsunami in Indonesia43 — was extremely helpful in quickly adapting NATO’s logistical apparatus to non- military purposes. In this regard, the COVID-19 Task Force heavily relied on the Euro-Atlantic Disaster Response Coordination Center.44 After seeing their personnel previously reduced to just three staff members, the EADRCC was supplemented by units from across NATO and other international organizations to reach a staff of 30.45 As of July 2020,46 the EADRCC has functioned as clearinghouse to coordinate assistance requests and offers from seven allied and nine partner nations, as well as from the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA). Examples include Germany sending ventilators to Spain; Spain sending facemasks to Iran; the United Kingdom transporting a field hospital for the World Food Program (WFP) from Britain to Accra, Ghana; Italy receiving help from Albania, the United States,47 and Turkey (among others); and Norway donating a field hospital to North Macedonia. Beyond efficiently pairing supply and demand for medical aid, NATO’s added value in the response to this crisis also relies on the ability to offer efficient logistical solutions at a shared transportation cost. To coordinate logistics, SHAPE relied on NATO’s Support and Procurement Agency (NSPA), which since 1958 has managed procurement for airfield logistics and transport of weapon systems and medical services across the world.48 During the COVID-19 crisis, the NSPA organized rapid cost-effective deliveries of protective medical equipment, like in the case of Luxembourg that received field hospital tents in less than 24 hours,49 through NATO’s airlift capabilities. In this respect and in connection with NSPA, NATO’s initiatives such as the Strategic Airlift International Solution (SALIS) and the Strategic Airlift Capability (SAC), established in 2003 and 2009 respectively,50 have been vital to the prompt delivery of medical aid, given their roots in a durable and reliable link between the alliance and the private sector. SALIS consists of a consortium of nine NATO allies (Belgium, the Czech Republic, France, Germany, Hungary, Norway, Poland, Slovakia, and Slovenia). It has assured access to up to five special mission- ready aircrafts from the German company Antonov Logistics — two of which, the AN-124-100, can carry up to 120 tons of cargo. Building on experience with Antonov aircrafts to transport aid to Pakistan following the 2005 earthquake and in the airlifting of the African Union peacekeepers in and out of Darfur, countries like Poland, Czech Republic, and Slovakia used SALIS to import urgent medical equipment like facemasks, surgical gloves and protective suits during the COVID-19 pandemic.51 Similar to SALIS, the Strategic Airlift Capability (SAC) initiative allows partners to share flying hours and costs. SAC involves 10 NATO members (Bulgaria, Estonia, Hungary, Lithuania, the Netherlands, Norway, Poland, Romania, Slovenia, and the United States) and two close NATO partners (Finland and Sweden). SAC consists in joint ownership of three C-17 Globemaster heavy cargo aircrafts operated by the Heavy Airlift Wing (HAW) based in Hungary and staffed with personnel from all participating nations. Established in 2009, SAC has supported several operations, including the Unified Protector in Libya and humanitarian relief in Haiti. During the COVID-19 response, the SAC initiative allowed Romania52 and Bulgaria53 to quickly receive several tons of medical supplies. Cooperation with multilateral organizations such as the European Union, the World Health Organization (WHO), and the United Nations also facilitated the achievement of NATO deliverables. NATO’s Rapid Air Mobility initiative, for instance, in cooperation with EUROCONTROL (intergovernmental agency for coordination of air traffic), allowed simplified procedures for military relief flights. Conversely, the EU also resorted to NATO logistics apparatus to deliver aid between and even beyond EU countries. Romania, for example, sent a 17-strong medical team to Italy through the European Civil Protection Mechanism in coordination with NATO’s EADRCC.54 In addition to it, NATO and EU cooperated through sharing information in regular briefing on joint procurement between the EADRCC and the EU’s Emergency Response Coordination Centre (ERCC) and between the NATO COVID-19 Task Force and the one created by the EU’s European External Action Service (EEAS).55 Another area of cooperation was medical resilience, where NATO and EU could count on the experience of two initiatives inaugurated in 2018, the Multinational Medical Coordination Center (MMCC) and European Medical Command (EMC), with the goal of increasing readiness in medical capabilities through cooperation between military medical services and civilian health system of member states.56

#### US Support in Healthcare is Key – it’s the only way to be prepared for future pandemics

* lack of international monitoring institutions
* us lead innovation is key to combat antibiotic resistant bacterias
* lack of funding outside of the united states

Authors: Thomas J. Bollyky, Senior Fellow for Global Health, Economics, and Development, and Eric Goosby, UN Special Envoy on Tuberculosis and Former U.S. Global AIDS Coordinator November 3, 2016 Health and U.S. Foreign Policy in the Age of Miracles http://www.cfr.org/health/health-us-foreign-policy-age-miracles/p38459

Global deaths from malaria and tuberculosis (TB) declined 48 percent and 47 percent, respectively, over this period. Maternal mortality dropped 43 percent. Deaths for children under five have halved, which means nineteen thousand fewer of these children die each day. More than ten million people with HIV/AIDS in sub-Saharan Africa are on lifesaving antiretroviral treatment, up from just one hundred thousand in 2003.¶ U.S. leadership and investment helped spur this progress. The U.S. President's Emergency Plan for AIDS Relief (PEPFAR) program, created in 2003, remains the largest financial commitment of any country to global health or the treatment of a specific disease. The United States is among the biggest funders of the global vaccine alliance GAVI and the Global Fund to Fight AIDS, Tuberculosis, and Malaria, which immunize and treat millions of people each year.\* The United States also provides the most aid to fight neglected tropical diseases and poor maternal and child health. These investments have been consistently bipartisan, and their returns are, quite literally, measured in reduced human suffering and longer lives around the globe.¶ Can this age of miracles endure? Yes, but only with continued U.S. leadership and investment amid some challenging headwinds. The next president should build on the recent efforts to harness the positive synergies between global health and U.S. foreign policy.¶ Woman suffering from Tuberculosis holds her baby, who suffers from TB and malnutrition, in a hospital... A woman suffering from tuberculosis in a South Sudan hospital. (Photo: Andreea Campeanu/Reuters)¶ Global Health Amid the Headwinds¶ Global health needs are changing. First, population growth, warming temperatures, urbanization, and easier trade and travel are remaking the world in ways conducive to the spread of infectious disease. The recent Ebola and Zika virus outbreaks have exacted a terrible toll, but a more lethal infectious disease could do far worse. The coordination and funding of international pandemic preparedness and response continues to be ad hoc, which greatly undermines their effectiveness. Time and consistent support is needed to develop competent national health systems and disease surveillance, effective diagnostics and medical countermeasures, and outbreak response and communication plans.¶ Second, rates of heart disease, cancer, diabetes, and other noncommunicable diseases (NCDs) in low- and middle-income countries are accelerating in working-age populations, rapidly outpacing declines in communicable diseases. In 2013, NCDs killed nearly eight million people before their sixtieth birthdays in these developing countries. Health systems in lower-income countries are ill-prepared for the scale and speed of this shift to chronic diseases. Most of these health systems are still built for acute care rather than chronic or primary care. Health spending in developing nations, though increasing, remains low. This is particularly true in low-income countries, where foreign aid accounts for 40 percent of health expenditures and where governments spend, on average, three cents per capita on health for every dollar spent by high-income countries. Medicines are still purchased out of pocket in many countries and are often unaffordable for the poor.¶ Third, a combination of overuse of existing antibiotics and underinvestment in new ones has left the world on a precipice of a postantibiotic era. In 2015, 580,000 people worldwide developed multidrug-resistant TB. Routine medical procedures, such as hip replacements and kidney dialysis, become dangerous without effective antibiotics. Even childbirth becomes more risky. The U.S. Centers for Disease Control and Prevention reports that more than two million people in the United States become infected with antibiotic-resistant bacteria every year, and more than twenty-three thousand die as a result. The global consequences of antimicrobial resistance are less clear, but estimates are seven hundred thousand deaths annually, including two hundred thousand from multidrug-resistant TB.¶ The aid environment is not favorable for addressing these new challenges. Donor support for global health has flatlined in recent years and may be poised to decline. Governments and foundations have stepped up admirably in recent fundraising for the Global Fund, but much more will be needed to meet the global reduction targets for HIV, TB, and malaria. The United States, United Kingdom, and Bill and Melinda Gates Foundation have been primarily responsible for sustaining the current level of global health aid (Figure 1), but the UK’s continued support is uncertain following the country’s turn inward and vote to exit the European Union. The apathetic global response to the Zika virus outbreak bodes poorly for raising funds to combat future global health emergencies.

# 2AC

## Disease

### Pandemics Impact

#### Pandemics cause extinction

Bar-Yam, 16 – physicist and complex systems scientist, Founding President of the New England Complex Systems Institute, Ph.D., S.B., physics, Massachusetts Institute of Technology (Yaneer Bar-Yam, “Transition to extinction: Pandemics in a connected world,” NECSI, 7-3-2016, <http://necsi.edu/research/social/pandemics/transition>)//RCU

[ FIGURE 1 OMITTED ] The video (Figure 1) shows a simple model of hosts and pathogens we have used to study evolutionary dynamics. In the animation, the green are hosts and red are pathogens. As pathogens infect hosts, they spread across the system. If you look closely, you will see that the red changes tint from time to time — that is the natural mutation of pathogens to become more or less aggressive. Watch as one of the more aggressive—brighter red — strains rapidly expands. After a time it goes extinct leaving a black region. Why does it go extinct? The answer is that it spreads so rapidly that it kills the hosts around it. Without new hosts to infect it then dies out itself. That the rapidly spreading pathogens die out has important implications for evolutionary research which we have talked about elsewhere [1–7]. In the research I want to discuss here, what we were interested in is the effect of adding long range transportation [8]. This includes natural means of dispersal as well as unintentional dispersal by humans, like adding airplane routes, which is being done by real world airlines (Figure 2). [ FIGURE 2 OMITTED ] When we introduce long range transportation into the model, the success of more aggressive strains changes. They can use the long range transportation to find new hosts and escape local extinction. Figure 3 shows that the more transportation routes introduced into the model, the more higher aggressive pathogens are able to survive and spread. [ FIGURE 3 OMITTED ] As we add more long range transportation, there is a critical point at which pathogens become so aggressive that the entire host population dies. The pathogens die at the same time, but that is not exactly a consolation to the hosts. We call this the phase transition to extinction (Figure 4). With increasing levels of global transportation, human civilization may be approaching such a critical threshold. Figure 4: The probability of survival makes a sharp transition (red line) from one to zero as we add more long range transportaion (horizontal axis). The right line (black) holds for different model parameters, so we need to study at what point the transition will take place for our world. In the paper we wrote in 2006 about the dangers of global transportation for pathogen evolution and pandemics [8], we mentioned the risk from Ebola. Ebola is a horrendous disease that was present only in isolated villages in Africa. It was far away from the rest of the world only because of that isolation. Since Africa was developing, it was only a matter of time before it reached population centers and airports. While the model is about evolution, it is really about which pathogens will be found in a system that is highly connected, and Ebola can spread in a highly connected world. The traditional approach to public health uses historical evidence analyzed statistically to assess the potential impacts of a disease. As a result, many were surprised by the spread of Ebola through West Africa in 2014. As the connectivity of the world increases, past experience is not a good guide to future events. A key point about the phase transition to extinction is its suddenness. Even a system that seems stable, can be destabilized by a few more long-range connections, and connectivity is continuing to increase. So how close are we to the tipping point? We don’t know but it would be good to find out before it happens. While Ebola ravaged three countries in West Africa, it only resulted in a handful of cases outside that region. One possible reason is that many of the airlines that fly to west Africa stopped or reduced flights during the epidemic [9]. In the absence of a clear connection, public health authorities who downplayed the dangers of the epidemic spreading to the West might seem to be vindicated. As with the choice of airlines to stop flying to west Africa, our analysis didn’t take into consideration how people respond to epidemics. It does tell us what the outcome will be unless we respond fast enough and well enough to stop the spread of future diseases, which may not be the same as the ones we saw in the past. As the world becomes more connected, the dangers increase. Are people in western countries safe because of higher quality health systems? Countries like the U.S. have highly skewed networks of social interactions with some very highly connected individuals that can be “superspreaders.” The chances of such an individual becoming infected may be low but events like a mass outbreak pose a much greater risk if they do happen. If a sick food service worker in an airport infects 100 passengers, or a contagion event happens in mass transportation, an outbreak could very well prove unstoppable. Watch this mock video of a pathogen spreading globally through land and air transportation. Long range transportation will continue to pose a threat of pandemic if its impacts cannot be contained.

### Bioterror Impact

#### Terror groups are trying to get them.

Langer '20 - Scoville Fellow working with Michael Nelson in the Technology and International Affairs Program [Ronit and Shruti Sharma, Nov 20, "The Blessing and Curse of Biotechnology: A Primer on Biosafety and Biosecurity," https://carnegieendowment.org/2020/11/20/blessing-and-curse-of-biotechnology-primer-on-biosafety-and-biosecurity-pub-83252]

SECURITY THREATS

Recent advances in synthetic biology, a technology that can be used to artificially create organisms in labs, carry the foreboding potential to develop biological weapons. Moreover, the emergence of the DIY community and the open-source nature of this movement have sparked concerns that terrorists could easily acquire the information needed to weaponize biotechnology, although none of these DIY groups have exhibited any nefarious intentions. Nefarious actors who previously acquired pathogens from a lab or from nature with the intention of developing a bioweapon can now either order DNA fragments online and assemble them to create dangerous pathogens or synthesize lethal pathogens from scratch using genomic information available online. Moreover, such actors can leverage vulnerabilities in the cyber defenses of labs and private companies to gain access to sensitive information that is not publicly available online.

To better understand the security threats emerging from recent developments in biotechnology, it is worthwhile to return to the aforementioned hypothetical Ebola scenario. Imagine for a moment that the researchers involved, in collaboration with an editor at an esteemed journal, decided that they would publish a redacted version of the methods and the results section of their research due to security concerns. A month after the paper was published, the lab noticed unusual activity on their servers. The lab immediately reported the incident to the university’s information technology department. The department contacted local law enforcement officials, and together they traced the hack to a suspected terrorist organization. The group was trying to gain access to the methodology that led to the accidental creation of a more virulent Ebola strain so as to launch a deliberate biological attack. Law enforcement put DNA synthesis companies on high alert for any orders that closely aligned with research on the Ebola virus or other high-risk pathogens. Thankfully, a company was able to flag an order and law enforcement was able to cooperate with local officials to shut down the unauthorized lab before it began creating and releasing harmful products.

In reality, individuals have at times tried to acquire deadly pathogens and other sensitive biological information. For example, two Canadians were arrested in the city of Buffalo, New York in 1984 after they were suspected of illegally acquiring and smuggling strains of botulism and tetanus to Canada. The Japanese cult Aum Shinrikyo made unsuccessful attempts in 1995 to acquire strains of Ebola from Central Africa to develop the group’s biological weapons program. More recently, two Chinese hackers were indicted in the United States for seeking to obtain intellectual property related to coronavirus treatments and vaccines. Similar incidents were reported in Spain; allegedly Chinese hackers were trying to steal data from Spanish labs conducting vaccine research.

In addition to strategically embedding members into research organizations to acquire these deadly pathogens, some terrorist organizations also have sought to rely on lab insiders to either develop biological weapons or grant access to organisms or sensitive information. For example, a Malaysian scientist tried to develop anthrax weapons for Osama bin Laden, the founder of al-Qaeda.

While most countries have national guidelines for handling safety and security threats, the examples described above highlight the global implications of such threats. It is therefore important to evaluate global best practices, treaties, and conventions that deal with such risks and devise strategies to update these safeguards to govern dual-use applications of emerging biotechnologies.

### Food Wars Mod

#### Science diplomacy ensures equitable healthcare

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Introduction Science diplomacy is the use of scientific collaborations among nations to address common problems facing 21st century humanity and in building constructive international partnerships (Fedoroff, 2009). This applies also in the field of health regulations and regulatory science. Good Health and Well Being is Goal 3 of the Sustainable Development Goals. Its aim is to achieve universal health coverage and provide access to safe and affordable medicines and vaccines to all (United Nations, 2015a). Supporting research and development for vaccines is an essential part of this process as well (United Nations, 2015b). Regulatory systems play a key role in assuring quality, safety and efficacy of medical products. An effective regulatory system is an essential component of the health system, and it contributes to desired public health outcomes and innovation. National Regulatory Authorities (NRAs) are government entities responsible for ensuring safety, efficacy and quality of medicines; and they play a vital role in the health- care system by providing regulatory oversight of all medical products. Since many decades, a growing number of networks and initiatives have been developed to strengthen medicines regulatory systems. The region of the Americas has developed an initiative to strengthen health regulatory systems through an evaluation- and- certification process that allows appointment of Regional Reference Regulatory Authorities of medicines and biological products (NRArs). NRArs work jointly through cooperation mechanism on capacity- building in other countries of the region; allowing them to strengthen their regulatory systems and act as a group with consensual positions in different international forums (Ojeda, 2016). Strengthening Regulatory Systems in the Americas National Regulatory Authorities play a vital role in the health- care system by providing regulatory oversight of all medical products such as medicines, vaccines, blood products, traditional or herbal medicines and medical devices. They perform their mandate based on a legal framework along with a set of recommended regulatory functions that span the medical product life- cycle, including clinical trial oversight, marketing authorization and registration, licensing and inspection of premises, market surveillance and enforcement activities when required. The Americas is a region of deep asymmetries where inequalities to access have persisted in poor and vulnerable populations, and there still exists fragmentation and segmentation in the system, which should guarantee access to health technologies. In the case of national regulatory authorities, large difference in structure and autonomy of the regulatory bodies, financing systems and their regulatory capacity are abridged to ensure effective compliance with their functions (Ojeda, 2016). In the last two decades, a group of global and regional initiatives have been developed for strengthening NRAs’ capacities, based on the population’s right to access to quality medicines commensurate with science and technology advances. One of the initiatives is the evaluation and certification of the Regional Reference Regulatory Authorities’ process in the Americas. In 2006, a group of five regulatory authorities from Latin America (Argentina, Brazil, Chile, Cuba and Mexico) had met in Oaxaca, Mexico, with a proposal to build a common agenda to consolidate mutual trust in regulatory matters for the economic well-being and public health of inhabitants of the region.1 That led to the proposal of an NRA evaluation process as the regional mechanism of certification of drugs regulatory authorities, focusing on evaluation of their performance in fulfillment of their functions, and also for serving as the capacity- building mechanism in the regulation of medicinal products’ field. The evaluation process concludes with the rating of the authority assessed, according to its results in one of the four levels. A Regional Reference Authority reaches level IV—this describes an authority that is competent and efficient in fulfilling functions recommended by PAHO/WHO to ensure efficacy, safety and quality of medicines. The Pan American Health Organization (PAHO) acts as the facilitator of the process leading to evaluation and giving certification to the Regional Reference Regulatory Authority for medicinal products and biologists to those very NRAs which reach level IV. To- date, 8 National Regulatory Authorities have been recognized by PAHO/WHO as National Regulatory Authorities of Regional Reference— Argentina’s National Administration of Drugs, Food and Medical Technology (ANMAT);Brazil’s National Health Surveillance Agency (ANVISA);the Center for State Control of Drug and Medical Devices of Cuba (CECMED);the National Institute of Food and Drug Monitory of Colombia (INVIMA);the Federal Commission for Protection against Sanitary Risks of the United Mexican States (COFEPRlS);Canada’s Health Canada, US Food and Drug Administration and Chile’s Institute of Public Health (P AHOc, 2018) A significant milestone was the discussion of this initiative at the 50th P AHO Directing Council meeting, in September 2010, and the approval of Resolution CD50. R9: “Strengthening National Regulatory Authorities for Medicines and Biologicals”. In this resolution, P AHO Member States were urged to strengthen and evaluate their regulatory capabilities with respect to the functions characteristic of the regulatory and oversight agency for medicines and biologicals through examination of the performance of their essential functions; to use the results of the qualification activity and the designation of the regulatory authorities of regional reference to strengthen their performance in terms of steering role of the health authority; and to support national regulatory authorities so that they can benefit from the processes and information from the national regulatory authorities of reference (PAHO, 2010) The regional reference authorities work as a network; which together with PAHO are committed to support efforts to strengthen other regulatory agencies, based on their own experience by promoting exchange and cooperation among countries and by actively participating in regulatory harmonization efforts within the framework of the Pan American Network for Drug Regulatory Harmonization (P ANDRH). Considering this, they develop a wide range of cooperation activities for capacity -building in other NRAs. From 2010 till- date, more than 30 courses have been carried out in different countries of the region along with bilateral consultancies and internships in the ARNr2. They also lead different regional projects on pharmaceutical regulation approved by PANDRH (PAHO, 2016). These reference authorities are also working in building trust among themselves while sharing information on their best practices and in exchanging technical information to achieve mutual recognition of their regulatory decisions to speed-up drugs’ approval processes allowing their better access. Regulatory collaboration through inter-agency work and data-sharing help to strengthen the regulatory capacity of all partners by promoting sustainable exchange of technical knowledge. Some bilateral agreements have been established to highlight inspection of final report exchange, considering large number of pharmaceutical companies, and the cost of in situ inspections, to establish mutual recognition of Good Manufacturing Practices Compliance. Regional Reference Authorities in Multilateral Forums In 2011, a group of ARNr was created—this group carries out two annual meetings; in the first semester it reviews the results of the work of the previous year and defines strategies and working plan for the new year3 and in the second semester, a meeting with PAHO is held to evaluate progress of their joint work to strengthen regulatory systems in the region. The following section highlights the regional level initiatives: The Regional Working Group on Medical Device Regulation: Established during the “1st Regional Meeting of the Regulatory Authorities for the Strengthening of Regulatory Capacity on Medical Devices in the Americas Region” held in La Habana, Cuba. It currently comprises16 NRAs; countries joined the Working Group voluntarily with the commitment to advance towards strengthening the Regulatory Capacity on Medical Devices through Regional exchange of information, joint projects, and training strategies towards the harmonization of regulatory requirements. This group is led by CECMED, the Cuban NRA (PAHO, 2018b): Specialist from regional reference authorities are a collection of experts in NRA acting as PAHO advisory experts of the system for evaluation of national reference regulatory authorities; 26 ARNs have so far been evaluated. Center for the State Control of Drugs and Medical Devices (CECMED) is working with PAHO and the Ministry of Health to strengthen the Nicaraguan National Regulatory Authority of Drugs as part of the technology transfer project for production of biologicals and immuno- biologicals between the governments of Russia and Nicaragua (PAHO,2018a) The regional reference NRA group is coordinated by one of its members for a period of two years. In the meetings different international forums and meetings that take place during the year, most current topics and initiatives, criteria, concerns and position are discussed. After the discussion process they try to adopt joint position responding to regional concerns. These actions are of particular importance during the international consultation process on the strengthening of the regulatory systems developed by WHO since October 2014 aimed at reaching a Global Benchmarking Tool (GBT) for evaluation of national regulatory system of medical products. The World Health Organization began assessing regulatory systems in 1997 using a set of indicators, designed to evaluate regulatory programmes for vaccines. Since that time, a number of tools and revisions were introduced. In 2014, work started on the development of a unified tool for evaluation of medicines and vaccines regulatory programmes following a mapping of existing tools in use within and external to WHO (WHO, 2018). For this, tools already applied by the organization, the tool used by the Pan American Health Organization for the evaluation and designation of Regional Reference Authorities, the standards established by the ISO standards, among others, were taken into account. The final objective was to have only one tool that replaces all tools previously used by WHO, representing the first truly ‘global’ tool for benchmarking regulatory systems. Recently, WHO has published a new document (Revision VI) that has taken into consideration inputs received from two international consultations with Member States in 2015, a public consultation in early 2018 and a series of meetings involving experts from regulatory authorities from different parts of the world. The work of the Americas region, (represented by P AHO), was significant, particularly as the region that already had a tool and an evaluation process with 8 years of experience. This last document contains a large part of recommendations and criteria, made by the NRAs and has incorporated indicators and measures criteria of the evaluation tool used in the process developed in the Americas. The document would be used to evaluate and publicly designate WHO-listed authorities (WLAs), which have objectively been documented to perform at high maturity levels in 2019. Conclusion The process of evaluation and certification of Regional Reference National Regulatory Authorities in the Americas completes 9 years of establishment in 2019. During these years, the initiative has succeeded in building capacities in the drug regulatory agency in the region strengthening their medicines regulatory systems,. An example is the process of strengthening the Nicaraguan National Drug Regulatory Authority as part of the technology transfer project for the production of biological and inmuno-biologicals, implemented by the governments of Russia and Nicaragua and the process of development of regional ecosystems, to evaluate the regulatory capacity on medical devices. The joint work of the regional reference authorities can be an example of the real implementation of science diplomacy based on the international collaboration of the authorities involved; showing their engagement in value- based international partnerships. This alliance adds values to national medicines programmes and other Ministries of Health missions. The development of joint capacity-building programmes enables taking advantage of the strengths of each member of the group of authorities for the benefit of their regional counterparts while sharing responsibilities and expenditures with maximized results to assure safety, efficacy and quality of medicines. Effective regulatory systems are an essential component of health systems and contribute to desired public health outcomes.

#### Rural healthcare is key to US food production.

**Alemian, 16**—Vice President, Capital Crest Financial Group (David, “Rural Healthcare Is a Matter of National Security,” <https://www.mdmag.com/physicians-money-digest/contributor/david-alemian-/2016/11/rural-healthcare-is-a-matter-of-national-security>, dml)

Rural health organizations are **already struggling** with enormous turnover rates and costs that run up into the millions of dollars each year. The **additional financial burden** of penalties from Medicare and Medicaid will put many rural health organizations at risk of **going out of business**. If **too many rural health organizations go out of business**, it then becomes a matter of **national security** and here’s why:

In most rural communities, the healthcare organization is the **largest employer**. When the largest employer goes out of business, the community **collapses** and people **move away.** What was once a thriving community then becomes a ghost town. Rural America produces the food that **feeds the rest of the country**.

What will happen when **our amber waves of grain turn to desert wastelands** because there is **no one to work our great farmlands**? As the source of food dries up, and store shelves empty, the **price of food will go through the roof**. As food prices go up, **hyperinflation will become a reality**, and our printed money will become **worthless**. Almost **overnight**, Americans will **begin to go hungry** because they won’t be able to afford to put food on the table.

#### Which prevents nuclear escalation in multiple hotspots.

**Castellaw, 17**—Lieutenant General, former President of the non-profit Crockett Policy Institute (John, “Opinion: Food Security Strategy Is Essential to Our National Security,” <https://www.agri-pulse.com/articles/9203-opinion-food-security-strategy-is-essential-to-our-national-security>, dml)

The United States faces many threats to our National Security. These threats include **continuing wars** with extremist elements such as **ISIS** and **potential wars** with rogue state **North Korea** or regional nuclear power **Iran**. The heated economic and diplomatic **competition with Russia** and a **surging China** could **spiral out of control**. Concurrently, we face threats to our future security posed by **growing civil strife**, **famine**, and **refugee** and **migration challenges** which create **incubators for extremist** and **anti-American government factions**. Our response cannot be one dimensional but instead must be a nuanced and comprehensive National Security Strategy combining all elements of National Power including a **Food Security Strategy**.

An American Food Security Strategy is an **imperative factor** in **reducing the multiple threats** impacting our National wellbeing. **Recent history** has shown that **reliable food supplies** and **stable prices produce more stable** and **secure countries**. Conversely, **food insecurity**, particularly in poorer countries, can lead to **instability**, **unrest**, and **violence**.

Food insecurity **drives mass migration around the world** from the Middle East, to Africa, to Southeast Asia, **destabilizing neighboring populations**, **generating conflicts**, and **threatening our own security** by disrupting our economic, military, and diplomatic relationships. Food system shocks from extreme food-price volatility can be **correlated with protests** and **riots**. Food price related protests **toppled governments** in Haiti and Madagascar in 2007 and 2008. In 2010 and in 2011, food prices and grievances related to food policy were one of the **major drivers** of the Arab Spring uprisings. **Repeatedly**, history has taught us that a **strong agricultural sector** is an **unquestionable requirement** for inclusive and sustainable growth, broad-based development progress, and **long-term stability**.

The impact can be **remarkable** and **far reaching**. Rising income, in addition to **reducing** the opportunities for an upsurge in **extremism**, leads to changes in diet, **producing demand** for more diverse and nutritious foods **provided**, in many cases, **from American farmers** and **ranchers**. Emerging markets currently purchase **20 percent of U.S. agriculture exports** and that figure is **expected to grow** as populations boom.

Moving early to ensure stability in strategically significant regions requires long term planning and a disciplined, thoughtful strategy. To combat current threats and work to prevent future ones, our national leadership must employ the entire spectrum of our power including diplomatic, economic, and cultural elements. The **best means to prevent future chaos** and the **resulting instability** is positive engagement **addressing the causes of instability before it occurs**.

This is **not rocket science**. We know where the instability is **most likely to occur**. The world population will grow by 2.5 billion people by 2050. Unfortunately, this massive population boom is projected to occur **primarily in the most fragile** and **food insecure countries**. This alarming math is not just about total numbers. Projections show that the greatest increase is in the age groups most vulnerable to extremism. There are currently 200 million people in Africa between the ages of 15 and 24, with that number expected to double in the next 30 years. Already, 60% of the unemployed in Africa are young people.

Too often these situations **deteriorate into shooting wars** requiring the deployment of our military forces. We should be continually mindful that the price we pay for committing military forces is measured in our most precious national resource, the blood of those who serve. For those who live in **rural America**, this has a disproportionate impact. Fully 40% of those who serve in our military come from the farms, ranches, and non-urban communities that make up only 16% of our population.

Actions taken now to increase **agricultural sector jobs** can provide **economic opportunity** and **stability** for those unemployed youths while helping to feed people. A **recent report** by the Chicago Council on Global Affairs identifies **agriculture development** as the **core essential** for **providing greater food security**, **economic growth**, and **population well-being**.

Our **active support for food security**, including agriculture development, has **helped stabilize key regions** over the past 60 years. A robust food security strategy, as a part of our overall security strategy, can **mitigate the growth of terrorism**, **build important relationships**, and **support continued American** economic and **agricultural prosperity** while materially contributing to our Nation’s and the world’s security.

### Zoonotic Diseases Mod

#### Data sharing is key to quickly identify and respond to zoonotic diseases

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(Leila, “Moving pathogen genomics out of the lab and into the clinic: what will it take?”, 12/30/15, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4697326/)

Pathogen genomics is a team game The most successful demonstrations of the capabilities of pathogen genomics were the deciphering of the origins of the Middle East respiratory syndrome coronavirus and the management of the Europe-wide 2011 STEC outbreak. These have also been excellent examples of the effectiveness of collaborations, which were supported by openness and data sharing, that span multiple geographies, fields of expertise and professional groups. As we move towards implementing these advances across entire health systems, this collaborative spirit needs to be harnessed and scaled up to deliver more formalised networks for sharing knowledge and best practice. These networks will expedite national service deployment, accelerate future service development and provide expert forums in which the arduous but essential task of establishing the standards and benchmarks of service quality can be undertaken. High-level strategic coordination and knowledge-sharing across health delivery organisations are equally essential. For example, synergy in the development of pathogen genomics programmes across animal and human health sectors will be needed to deliver a ‘one-health’ approach to tackling many of the most pressing zoonotic disease threats, such as avian influenza and the spread of antimicrobial resistance from livestock to humans, as well as the more commonplace but persistent issue of foodborne illnesses. Data — it’s time to go big No large-scale genomics enterprise can hope to succeed without effective data integration and sharing. In the case of pathogen genomics for clinical or public health, data integration will require the construction of dedicated infrastructure (real or virtual) to collate, store, analyse and share genomic, epidemiological and clinical data across complex national and international health systems. This integration will be particularly crucial to enable the delivery of genomic epidemiology services, in which the requirement for data sharing across locations is fundamental and time (as in the 2015 Ebola outbreak) is very much of the essence. Data integration and access will become equally central in diagnostic microbiology, where having an accurate and readily accessible summary of genotype, phenotype and clinical information for different pathogens is essential to deliver care to patients. Notably, the Global Microbial Identifier (http://www.globalmicrobialidentifier.org/Workgroups#work-group-1) and the Global Alliance for Genomic Health (https://genomicsandhealth.org/node/12703) projects are already demonstrating that huge technical, regulatory and political efforts will be required to overcome barriers imposed by the varying capabilities, legal systems and cultural frameworks of different nations if transnational genomic and clinical data integration is to be achieved. As an example, such barriers led the Indonesian government to temporarily withdraw from the Global Influenza Surveillance Network in 2007, owing to concerns that, if data were shared, proprietary interests would be exerted over the H5N1 strains [9]. The same issues can also impose barriers to sharing and data integration within individual health systems. Staying ahead of the game The application of genomics to infectious disease management is still in its infancy, and we currently lack the background knowledge, as well as the technological capability, to deliver rapid, clinically actionable information based on genomic analysis that can improve outcomes for patients. This situation is fluid, as sequencing technology (in the form of devices that are increasingly more portable, cost less and have a longer read capability) and analysis (in the form of cloud computing, more efficient metagenomic analysis and implementation of automated analytic pipelines) continue to develop apace. However, capitalising on the current rapid pace of innovation will demand novel approaches to public–private cooperation and co-development of the type seen with the Oxford Nanopore Minion Access Programme, which puts new genomic technology in the hands of its users (including those in the health system) at the earliest possible opportunity [10]. These efforts will also benefit from building on the commendably open and collaborative approaches for the development of knowledge and analytical methods that are already being taken by many pathogen genomics researchers. These collaborations will ensure that the knowledge and expertise of these researchers are shared rapidly with the clinical and public-health communities in which their influence is most needed.

#### Zoonotic diseases cause extinction---genome sequencing and data sharing is key to solve

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(Ross and Alex, “Infectious Disease, Endangerment, and Extinction”, 1/4/13, https://www.hindawi.com/journals/ijeb/2013/571939/)

Why should the possible role of infectious disease in endangerment and extinction be regarded as a critical issue in modern conservation? Whether or not disease was ever a major cause of extinction in the fossil record [19], in our times it plays an acknowledged but perhaps underestimated role. Pathogen-driven population declines have been identified in a wide array of invertebrate and vertebrate taxa (cf. [20]), suggesting that the phenomenon is probably universal. Yet without the kinds of monitoring methods now available, some and perhaps most of these declines would have gone undetected, or attributed to other causes. Further, the processes forcing such declines are as diverse as the pathogens themselves and are far from being clearly understood. The apparent increase in zoonotic diseases during the last few decades [21] may be objectively real or merely due to better monitoring, but it seems highly likely that loss or reduction of pristine habitats and the overall impact of invasive species should promote the introduction of opportunistic pathogens into wildlife with increasing frequency. Thus, understanding the dynamics of disease-mediated species declines may be critical to conservation missions concerned with a wide variety of species and habitats. Recent advances in molecular biology and microbiology have permitted the detection and identification of hosts of novel microorganisms, many of which are pathogenic, and the technology needed to assess threat levels is becoming increasingly available. Although the fossil record clearly establishes that the fate of all species is to eventually die out, it is obvious from the same record that the rate of disappearance of individual species varies significantly [22]. As already noted, inferences about how (as opposed to when) an individual species disappeared must be developed inductively and retrospectively. An important guideline is that apparent causes of extinction that are diachronic (repeatedly affect species across time) are inherently more plausible than ones that are claimed to have occurred only once, or apply to only one taxon. Although this means that explanations about individual extinctions are not strictly testable, they can nevertheless be evaluated in terms of likelihood, which is the approach currently taken by the International Union for Conservation of Nature (IUCN) and several other conservation organizations interested in compiling extinction statistics [23, 24]. It is an accepted tenet in conservation biology that any severe, continuing threat to a species might eventually contribute to its extinction [25]. From this perspective, it is also accepted that diseases presenting with very high levels of mortality—as in the case of a highly transmissible infection that is newly emergent in a population—can cause outright endangerment. But are there conditions under which a disease, probably in combination with other threats, might so imperil a species to cause its complete disappearance? MacPhee and Marx [19] considered this issue from the standpoint of model pathogenic features that a disease-provoking organism might exhibit in forcing the extinction of a given species. These features include: (1) a reservoir species presenting a stable carrier state for the pathogen, (2) a high potential for causing infections in susceptible species, affecting critical age groups, (3) a capacity for hyperlethality, defined here as mortality rates in the range of 50–75%. Only under the most extreme conditions is it conceivable that a species would suffer extinction in a single epizootic event. Much more likely would be repeated outbreaks over a period of years gradually reducing the fitness level of the species, with final disappearance potentially caused by stochastic events (such as causally unassociated climate change). One way in which this condition might be achieved would be through a stable carrier (i.e., a species other than the target, living in similar circumstances in the same environment, and in which the infection is inapparent or at least sublethal). A well-studied example is the transfer of simian acquired immunodeficiency virus from one species of macaque to another [26]. Although this instance occurred under captive conditions, repeated outbreaks of distemper in lions and African wild dogs have long been thought to be due to transfer from domestic dogs (although the mechanism is debated; see [27]). Obviously, for a disease to have a very severe impact, it would be necessary for the pathogen to occur in highly lethal, aggressive strains that strongly impact the target species before attenuated strains arise and become common. High potential for causing infections in a susceptible species is usually associated with the ability to successfully enter the organism through a major portal, such as the respiratory tract, where it can be lodged and transmitted easily (e.g., via aerosol). To achieve hyperlethality and produce serious mortality, all age groups within a species would probably have to be susceptible, not just the very young or very old (or the immunocompromised), with death the usual outcome. In large-bodied mammals, a fundamental consideration is that any process that deleteriously affects young individuals will have a pronounced effect on survivorship because of the lengthy intervals in birth spacing [19]. Lethality in the range of 50–75% is obviously extremely high and thus extremely unusual, although historically seen in Ebola infections in humans and in experimental transmission studies from pigs to macaques [28]. High percentages may have also been achieved in rinderpest outbreaks among East African bovids in the early 20th century [29], although quantitative data on this are largely lacking. An important issue here, however, is whether pathogens causing this level of lethality could maintain themselves in nature long enough to seriously imperil a species. Speculatively, a possible outcome with hyperlethal infections producing a rapid, fatal outcome is that affected populations would be reduced to small numbers of widely dispersed and/or relatively or completely immune individuals. Under these circumstances, the epizootic would necessarily abate as it ran out of new hosts, leading to the conclusion that exceptionally lethal diseases cannot be indefinitely maintained in a population or species under normal circumstances. However, if reservoirs exist from which the pathogen could repeatedly emerge, in principle epizootics might resurge year after year until population sizes were reduced below viable levels (~50–500 individuals). At this point stochastic effects might intervene and lead to complete loss of the species. Among possible examples of this “perfect storm” of circumstances and consequences is the loss of Christmas Island rats, detailed elsewhere in this paper. Among birds, the severe impact of avian malaria on Hawaiian honeycreepers is also pertinent and discussed later in this paper. Although a number of honeycreeper species survive at high elevations, above the limit at which introduced Culex mosquitos can survive, there are multiple adventitious threats, such as deforestation and competition from invasive species, which add to their endangerment picture [30]. Demonstrating that disease can produce endangerment and even extinction in species of invertebrates is not inherently more difficult than demonstrating the same thing for vertebrates. However, because there tend to be far fewer specialists for individual invertebrate groups, save for those having some degree of economic significance, the chances are high that disease impacts will frequently be missed. One case that was not missed was the loss of the last members of Partula turgida, a snail from French Polynesia that succumbed to an infection of the microsporidian Steinhausia sp. [31]. Steinhausia is a known parasite of various taxa of bivalve molluscans, infecting oocytes and thereby reducing fecundity (e.g., “mussel egg disease”; [32]). The decline of P. turgida received an unusual level of attention (for an invertebrate) because of this species’ importance for studying evolutionary variation and niche occupation [33]. This snail and several of its close relatives were already considered extinct in the wild due to predation by the introduced wolfsnail Euglandina when the last few known individuals were collected and kept as a captive colony. As is frequently the case with unmanaged natural populations, there were no relevant baseline data for this species, and it cannot be excluded that Steinhausia was already present in the colony. Admittedly, so small a coterie of individuals hardly constituted a viable species and could have been driven to extinction by other mechanisms as well. It should also be noted that Steinhausia infections are not known to present a severe threat to any natural populations of bivalves, or at least any that have maintained normal populations. Other possible instances of extinction by disease in invertebrates are few and inconclusive [1], although the loss of the eelgrass limpet (Lottia alveus) may be mentioned in this context as it demonstrates that “pathogen pollution” can have severe indirect effects on species other than the one affected by disease [34]. In this case, eelgrass wasting disease killed off seagrasses on both sides of the Atlantic on such a massive scale that all known populations of this limpet terminally crashed [35]. 4. Extinction and Infectious Disease in Amphibians In their survey Smith et al. [4] noted that amphibians account for 30% of critically endangered animals and that they also comprise approximately 75% of critically endangered species threatened by disease. Although ranavirus infections, trematode infestations, and several other pathogen threats have been proposed as driving particular cases of decline, the agent thought to contribute most widely to amphibian endangerment is Batrachochytrium dendrobatidis, first identified in the 1990s as the cause of a fatal chytridiomycosis [36, 37]. A concern that has emerged in the last few years is the effect of the global trade in amphibians on the health of natural populations. There are several instances of ranavirus and chytrid infections having been detected in pet store populations [38]; if infected individuals were to escape, transmission to wildlife is an obvious possibility. Release of captive-bred animals in reintroduction experiments represent another potential danger if captives were exposed to virulent pathogens. Amphibians are under global assault from a large variety of impactors additional to infectious diseases, including habitat loss, pollution, pesticides, and harmful UV radiation. Perhaps as many as 120 amphibian species have already been driven to extinction in recent decades; however, because of the complexity of the factors affecting their endangerment, the number actually lost to the effects of infectious disease remains uncertain [4, 39]. 5. Extinction and Infectious Disease in Birds Smith et al. [4] identified 18 examples of bird extinctions and extirpations that have been attributed at least partly to infectious diseases. Of these, 16 cases concern endemics that lived in the Hawaiian Islands; most were from one tribe of finches, the Hawaiian honeycreepers (Drepanidini, Fringillidae). Warner [40] proposed that these losses were due to panzootics caused by the inadvertent introduction of Culex quinquefasciatus, a vector of avian malaria (Plasmodium relictum). Another lethal agent, presumably introduced as well, was avian pox (Poxvirus avium). Although there are no empirical observations relating to the hypothesized panzootics (which presumably occurred in the early 19th century, when the mosquito arrived), one obvious effect of massive population depletions was that surviving species of honeycreepers—formerly common in the lowlands—became restricted to higher elevations where the mosquitoes do not occur. Additional research in more recent years indicates that such diseases limit the distribution and abundance of susceptible species, and that it is these factors (grouped as habitat loss) that primarily govern local or complete extinction [41, 42]. 6. Extinction and Infectious Disease in Mammals Although there are several current examples of mammalian species already under threat for various reasons being severely impacted by infectious diseases—including canine distemper in black-footed ferrets and lions [43, 44], Ebola and Marburg hemorrhagic diseases in anthropoids [45], and transmissible facial tumour disease in Tasmanian devils [46]—none of these has (yet) resulted in extinction. Possible examples in the mammalian fossil record (cf. [19]), although compelling in some instances, lack adequate corroboration for reasons already discussed. Indeed, to date there is only one study [10] that may be said to meet appropriate retrospective criteria for identifying disease as the primary cause of extinction at the species level in any mammal. This study involved an investigation of the disappearance of two endemic murid species on Christmas Island (Indian Ocean) at the beginning of the 20th century. That the Christmas Island extinctions could be usefully studied at all is due in large measure to the work of the biologist Andrews [47] and, later, the parasitologist Durham [48], both of whom spent considerable time on the island and recorded many valuable observations on the rats before and during their disappearance. Christmas Island was evidently uninhabited by humans until the last quarter of the 19th century. With the discovery of phosphate deposits on the island, its exploitation became inevitable, and Christmas Island was formally annexed by the United Kingdom in 1888. An immediate result was increased ship traffic, with the result that in 1899 black rats (Rattus rattus) were inadvertently introduced. Within 5 years, the two endemic murids, the Christmas Island rat (Rattus macleari) and the bulldog rat (Rattus nativitatis), were seriously affected; populations declined precipitously, and individuals were described as behaving abnormally (e.g., nocturnally active rodents appearing during the daytime) and displaying evidence of infection with parasitic trypanosomiasis [48]. By 1908 it was believed that the native rats had become extinct, but that some of the endemic diversity should have survived in the form of R. rattus × R. macleari and R. rattus × R. macleari hybrids (as deduced from pelt characteristics). Samples of hybrids, together with earlier collections of the Christmas Island rat and the less abundant bulldog rat, have been stored in museum collections in the UK since then. Wyatt et al. [10] extracted DNA from all available remaining Christmas Island and bulldog rats along with putative hybrid animals and black rats collected at the same time. Mitochondrial, nuclear, and trypanosome DNAs were amplified from the samples. Mitochondrial and nuclear DNA analysis clearly indicated Rattus rattus and Rattus macleari were biologically distinct, but that the alleged hybrids were in fact exclusively black rat morphotypes. Thus, the Christmas Island rat is completely extinct and its genetic endowment has not persisted in any form. Genetic evidence of the murid-specific trypanosome Trypanosoma lewisi was found in the true black rat and the Christmas Island rat samples. In samples of the bulldog rat, all collected earlier than 1899, no evidence of trypanosome infection could be found. Thus, detection of trypanosomes correlates with the arrival of invasive black rats and the subsequent extinction of the native rat species on Christmas Island (only inferential in the case of the bulldog rat). Like many other islands, Christmas Island is notable for having suffered mammal extinctions that cannot be explained by hunting pressure or sudden changes in climate [49]. The only other native ground-dwelling mammal on the island, the Christmas Island shrew (Crocidura trichura), survived many decades after the disappearance of the endemic rodents, but it has not been seen since 1985 despite considerable surveying effort [50]. More recently, the Christmas Island pipistrelle (Pipistrellus murrayi) appears to have become extinct in 2010, following an unexplained precipitous decline starting in the 1980s [50, 51]. The last remaining native mammal is the Christmas Island flying fox (Pteopus melanotus natalis), also declining rapidly. Whether these extinctions and declines subsequent to the loss of the endemic rats are disease-related might be resolved if appropriate samples were collected historically, although this possibility has not yet been investigated. In summary, and regardless of final cause, the rodent extinctions on Christmas Island display two interesting features. First, the extinctions were extremely rapid: the interval from first notice of decline to declared extinction was 10 years, with the actual event probably occurring within an even shorter period [52]. Second, the species affected would not normally be regarded as being particularly susceptible to extinction; murid rodents tend to be extremely adaptable, with high reproductive rates, and thus would normally be well buffered against population collapses sufficient to cause complete loss. The susceptibility factor at work in these cases was almost certainly long isolation on, and restriction to, a single small island. Among mammals the “island extinction effect” is particularly well investigated; more than 80% of the ~80–90 species of mammals that became extinct in the past 500 years were island dwelling [53]. Such losses are usually attributed to habitat destruction and the deleterious effects of invasive species, but under some circumstances introduced infectious diseases might be plausible as drivers. There are a number of other, largely anecdotal, instances of mammalian species succumbing to unknown infectious diseases (see [19]). One example of considerable interest is the Tasmanian tiger or thylacine (Thylacinus cynocephalus). Although extensively hunted because of its supposed taste for sheep, until the turn of the 20th century thylacines were not uncommon. Thereafter they became exceedingly rare, with no confirmed kills logged after about 1910. Distemperlike outbreaks observed in captive thylacines, as well as widespread outbreaks in other Australian marsupials at the same time, have been taken as anecdotal evidence that disease played a role in the final disappearance of thylacines [1]. Validation of a role for disease in this extinction would be particularly difficult, as distemper viruses are single-stranded RNA paramyxoviruses that are unlikely to be preserved in museum skins or bone. 7. Recent Cases of Infectious Disease Causing Serious Endangerment in Mammals Several excellent review articles have analyzed the impacts of infectious disease on extant natural populations [1, 3, 4]. To these may be added several more examples of verified associations of disease and severe population decline in mammal species living in diverse environments. Whether any of these taxa will actually disappear is unknown at present, but the very fact that new examples are being discovered at a much higher rate than in past decades presumably indicates that infectious diseases have been undervalued as a significant cause of species endangerment. 7.1. Koalas Koalas are under siege by two major pathogens. Kola retrovirus (KoRV), frequently observed in captive koalas, is oncogenic and causes substantial mortality [54]. The virus is not distributed evenly across Australia, as its frequency within populations decreases from north to south. Given the history of overhunting of koalas in the last 120 years, especially in southern Australia, it was originally concluded that KoRV must have entered Australia within the last 200 years, travelling from north to south [55]. However, a recent study [14] utilizing historical samples demonstrated that KoRV was already widespread by the late 1800s in northern Australia. Furthermore, its evolution is very slow, which is consistent with the retrovirus having entered koala populations long before this and likely having caused disease throughout this time. The second pathogen decimating koala populations at present is a specific strain of infectious Chlamydia pecorum. Infection can result in subsequent sterility or blindness [56]. There is some evidence that KoRV infection correlates with chlamydial infection [57]. This is plausible, as KoRV belongs to the gammaretrovirus family, many members of which are immunosuppressive. Infection with KoRV would thus provide opportunities for secondary infectious agents such as Chlamydia in less-resistant hosts. Koala populations exhibit low diversity in their mitochondrial DNA [58]; this lack of genetic diversity, if it affects overall resistance, may be emblematic of their inability to fend off infectious agents. According to the World Wildlife Foundation [59], serious overlapping infections of this kind could lead to the local extirpation, if not the outright extinction, of koalas within the next 50 years. 7.2. Myotis Bats A cryophilous fungus (Geomyces destructans), introduced to the northeastern USA from Europe within the last decade, has been conclusively shown to cause massive mortality (“white nose syndrome”) in the little brown bat (Myotis lucifugus) [60]. Fungal infections do not normally induce severe disease in mammals, except in cases of immunosuppression (often itself caused by another pathogen). Interestingly, Myotis myotis, a closely related species endemic to Europe, is also infected with this fungus, but other than the characteristic “white nose” produced by fungal growth, animals suffer no negative symptoms and there is no increased mortality associated with infection [61–63]. Geomyces destructans, which only grows at cold temperatures, interrupts bat hibernation; this causes wintering animals to awaken more frequently than normal, seriously impairing their energy and water balances and ultimately leading to death. Although why these two species differ so dramatically in their response to infection is obscure, the consequences are clear; millions of little brown bats, including entire populations of some hibernacula, have died as a result of their incapacity to resist infection [61]. Indeed, current mortality rates suggest that the little brown bat may eventually suffer complete regional extinction [64]. 7.3. Tasmanian Devils Devil facial tumor disease (DFTD), a severe threat to the Tasmanian devil (Sarcophilus harrisii), is currently receiving a great deal of attention because of its highly unusual nature [65]. Unlike most infectious diseases, the agent in this case is not viral, bacterial, parasitic, or prion-derived (infectious protein). Rather, the agent is a tumor that is spread from individual to individual by mechanical transmission of tumor cells during agonistic encounters, which often involve aggressive behavior. The only similarly infectious cancer identified to date is canine transmissible venereal tumor (CTVT), which affects dogs. The DFTD source tumor evidently derived from multiple individual clones developed in a single female; male and female devils are equally susceptible, and the disease has now spread throughout Tasmania. Museum samples predating 1996 display no evidence of the disease, making it likely that DFTD is newly emergent. At the same time, there are clearly complex evolutionary dynamics at play; for example, different clonal lineages derived from the original source tumor vary in frequency, geographical distribution, and diversity [65]. How such tumors manage to escape the devil’s immune system is unknown, but the ongoing threat is very real. Unless tumor-free populations can be established and protected, further population collapse, if not complete extinction, will be the probable outcome [66, 67]. Although host-pathogen interactions have been a subject of interest in conservation biology for some time, the possibility that disease might actually drive extinctions in certain contexts has rarely been considered. This is partly due to a general lack of knowledge concerning wildlife pathogens and their microbiology, but it also stems from a lack of well-researched and unequivocal examples of disease-induced loss of naturally occurring populations or species. We anticipate that, with the advent of endeavors such as the Human Microbiome Project [68] and the further development of next-generation sequencing, we will have an increasingly better understanding of microbiological processes in wildlife. Because of their relevance to human health, bat and rodent viromes are being explored with special intensity using high-throughput approaches, with the result that many novel—and potentially significantly pathogenic—viral strains have been identified in recent years [8, 69–72]. As such surveys increase, and sequencing costs decrease, we can expect to see a wealth of new data concerning microbiological diversity in wildlife, as well as new understandings of the natural history of host-pathogen relationships. New insights will also come from archives that we have never heretofore been able to tap. It is already the case that entire genomes from historical samples (aboriginal human genome) or now-extinct species (woolly mammoths, neandertals) have proven amenable to reconstruction using modern methodologies; it may be confidently predicted that our ability to undertake such investigations will only improve in future [73]. With regard to ancient pathogens, investigators have already made exciting discoveries, such as the recent identification of previously undocumented strains of Yersinia pestis retrieved from 13th century plague pits [16]. At present, the most promising methods are based on either microarray or solution-based hybrid capture methods, in which a sequence of interest is either synthesized directly or produced by PCR, biotinylated, and then used to “capture” target sequences in samples from which sequencing libraries have been generated [74]. With DNA microarrays, multiple targets can be collected in a single experiment; when coupled with next-generation sequencing, extraordinary amounts of sequence information can be recovered at minimal cost. Although such methods have been primarily applied to modern DNA, there have been some notable successes with ancient DNA applications [75, 76]. Again, it is surely reasonable to assume that, as methodologies improve and are applied to fresh questions, we will be able to recover sequence data on ancient DNA-based pathogens at levels that would have been unimaginable only a decade or so ago. To be sure, RNA-based pathogens may remain resistant to study due to the poor preservation of RNA genomes after mortem, but even here there is reason to be optimistic. For example, improvements in protein sequencing may provide information on the identity of RNA-based viruses (either as such, or in the form of presence/absence information), even though the level of analytical detail will likely be persistently poorer than we can now achieve with DNA-genome-based pathogens [77]. Whether epizootics in wildlife occupying pristine environments are in fact increasing is a question that can only be settled by much larger pools of data than we have at present. Nevertheless, we believe that understanding the role of disease in provoking endangerment and extinction is critically important to the education of conservation professionals, if only because the contribution of disease to declines and outright extinction has likely been underestimated. What we do not understand, or ignore, may be what hurts us most.

## Solvency

### Solvency Mechanism

#### Aff solvency mechanism

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A military alliance such as NATO is not a first responder in a health crisis, as most tasks must be implemented at the domestic level. However, given the impact and the spillover effects of COVID-19 on the very day-to-day operations of the alliance — military personnel are not immune from viruses — as well as on supply chains, and economies and societies around the world, it was paramount for NATO to take initiative both to protect its member states against malign actors and to offer crucial support in the spirit of solidarity. In spite of these successful initiatives, the Operations Division of NATO headquarters in Brussels has admitted64 that the alliance was ill-prepared to handle such a crisis. As Rittimann noted, the alliance lacked its own means and political bandwidth to do more.65 For this reason, NATO and its member states should not miss the opportunity that the COVID-19 crisis offers to set up more structured plans to ensure readiness in crisis management. In particular, they should expand the concept of security to include the most pressing non-military global security threats: climate change, health risks, and social resilience against disinformation. So far, NATO has set up a Lessons Learned Steering Group (LLSG)66 on COVID-19, which collects inputs by agencies, divisions, and delegations to help the alliance design a strategy for both future waves of this coronavirus and for future pandemics. Stemming from the inputs of the LLSG and from the reflections of officials interviewed for this paper, the following recommendations to the alliance focus on resilience and readiness in crisis management. ● Resilience: NATO must remain vigilant against malign exploitation of crises. Under whatever circumstances may arise, the Atlantic alliance should not shift its focus away from its main objectives of pushing back against adversaries through deterrence and response-readiness.67 ○ NATO should have a protocol to follow in case of crises like pandemics to ensure continuity of operations. So far, the alliance has shown impressive adaptability and was able to keep its missions running and continue with training and exercises, even if at a reduced level. However, military activities have been reduced by 33% with 80% fewer personnel participating,68 and the climate of uncertainty surrounding the impact of COVID-19 on NATO missions, training, and exercises could have left gaps for malign actors to exploit, especially in more fragile settings like in Iraq. To prevent future pandemics or similar events from eroding NATO’s readiness capabilities, it is paramount to develop structured plans and protocols that would allow timely adaptation, personnel protection, and resilience against external threats. To further protect core combat capabilities, it would be necessary for NATO personnel employed in quick-response units to receive early access to vaccines; the alliance should also be prepared with contact-tracing capabilities to identify outbreaks quickly.69 ○ NATO should increase its counter- disinformation efforts and protect its member states against malign actors exploiting crises to promote their geopolitical and economic interests. Although disinformation has been included among the list of threats to NATO since the 2014 summit in Wales, the alliance has not established a special agency or team to focus on countering disinformation. During COVID-19, when NATO member states were targeted by Chinese “mask diplomacy” and Russia’s claims about the inability of Western countries to deal with COVID-19, the organization resorted to its Public Diplomacy Division — in cooperation with the European Union’s East Stratcom Task Force70 — to increase its public profile and debunk Chinese and Russian fake news. However, this is not yet enough to counter the volume and reach of such propaganda, which requires real-time investigation and fact-checking and outreach to the audience that has been targeted by disinformation, with the possibility of providing training for soldiers and commanders to react to information warfare.71 For this reason, the alliance should consider setting up a dedicated team and establish a framework of coordination with the East Stratcom Task Force to broaden the scope of counter- disinformation efforts and take more targeted actions to strengthen societal resilience across member states. Readiness: NATO must further enhance its crisis management toolkit. The core lesson COVID-19 taught NATO concerned crisis management capabilities and culture. The alliance adjusted fairly quickly and made an incredibly efficient use of its logistical apparatus; yet, more can be done to enhance NATO readiness to face challenges of this nature. ○ Strengthen the Euro-Atlantic Disaster Relief Coordination Center. As mentioned, over the past few years, the EADRCC staff had been reduced to three people; as COVID-19 hit Europe, NATO was forced to rapidly reallocate military personnel from other departments to support the work of NATO’s clearinghouse for aid requests and delivery. At a time when the impact of global challenges can no longer be ignored, NATO should invest in and expand the EADRCC’s capacity and scope to increase preparedness in preparation for subsequent COVID-19 waves and other future catastrophic events. Along with the EADRCC, the alliance should enhance the flexibility in the NSPA procurement process in order to speed up access to cost-effective airlifting as well as to the procurement of medical equipment. Beyond overseeing the transportation supplies and medical assistance, the EADRCC could also play a role in coordinating NATO’s support to national armed forces in member states, in the event that such forces experience significant losses. ○ Increase knowledge, prediction capabilities, and awareness. Building on existing analytical platforms and programs72 and intelligence sharing between allied nations, NATO should increase its understanding and awareness of how global challenges and threats such as pandemics can affect NATO operations and personnel and increase preparation of tailored contingency plans for suitable responses. Some of these actions may include several aspects of the alliance’s activities, from decisionmaking to technological potential and research through its own laboratory (the Center for Maritime Research and Experimentation located in La Spezia, Italy) and its Science for Peace and Security (SPS) Program.73 Given NATO’s renewed sensitivity to biological risks, intelligence sharing could be crucial to elaborate plans for countering new threats such as bioterrorism.74 ○ Coordination with the European Union. NATO’s logistical apparatus was crucial in delivering aid when the EU’s Civil Protection Mechanism was under stress, and after initial hesitation, in coordination with the EU mechanism. Moving forward, in the words of Malcom Chalmers, deputy director-general of Britain’s Royal United Services Institute (RUSI), the EU-NATO relationship will be crucial “if the West is to survive as a coherent entity.”75 Given that many NATO countries are also EU member states, all that applies to logistics, transportations, and purchases falls under the regulatory umbrella of the European Union. For this reason, a more established framework of cooperation between NATO and the EU will be crucial to ensure a smoother application of crisis protocols and ease the transportation of essential items within alliance territory, similarly to what was envisaged to ensure military mobility for the DEFENDER-Europe 20 drilling. In particular, the EU and NATO should also collaborate to establish permanent stockpiles76 and reduce the alliance’s dependence from global supply chain for crucial medical material, but also to develop cost-effective strategies for the production and distribution of a COVID-19 vaccine. Such coordination should also remain wary of duplicating efforts — as in the case of the NATO pandemic relief trust fund,77 which risks creating overlapping with the Civil Protection Mechanism for the accumulation of medical supplies.

### SPS

#### SPS can specifically focus on CBRN threats like disease – that enables effective mitigation efforts

NATO ESCG 2019. The Emerging Security Challenges Division. “THE NATO SCIENCE FOR PEACE AND SECURITY SPS PROGRAMME.” NATO OTAN. 2019. IZP)

In line with NATO’s political agenda to improve the ability of the Alliance and its partners to protect their populations and forces from CBRN threats, the SPS Programme supports activities under the key priority of Defence against CBRN agents. This ambition to continuously improve NATO’s capabilities and technologies to counter CBRN threats was reiterated at the 2018 Brussels Summit by the Alliance’s Heads of State and Government. The objectives of SPS activities under this key priority are to deliver high-quality scientific research, develop technologies and capacity building, and train young researchers and experts, strengthening the overall resilience and capabilities of participating countries. In this way, SPS supports situational awareness on safety and security developments, and enhances CRBN response capabilities, technical competences and skills in NATO and partner nations. Under this key priority, a total of 18 SPS activities were completed in 2019, involving co-directors from 21 countries. 11 MYPs developed technologies to rapidly and efficiently detect and identify CBRN agents, increase the efficiency of decontamination, detect biological agents, and manage radioactive dust disturbances and leaks. 512 specialists were trained in a single ATC on medical counter-measures and emerging technologies against CBRN agents. Moreover, three ASIs and three ARWs brought together 72 scientists and 227 participants respectively to share their skills and knowledge, and discuss topics such as diagnosis and exposure assessment, detection, and nanotechnology. DIMLAB-Deployable Chemical and Biological Analytical Laboratory [new] November 21-22, 2019 marked the official launch of the MYP, “Deployable Biological and Chemical Analytical Laboratory (DIMLAB)” in Madrid, Spain. This 30-month project, will be run by an international consortium including Spanish non- profit association, Adelfas, as project coordinator; the 1st Regiment of NBC Defense “Valencia” of the Spanish Army; the Mohammed V University Science Faculty; the General Directorate of Civil Protection, Morocco; the Institute of Applied Sciences and Technology (INSAT); and both the Tunisian General Directorate of Environment and Quality of Life and National Office of Civil Protection. Two dual-use (civil and military) deployable laboratories, one chemical and one biological, will be built for Tunisia and Morocco respectively. In attendance at the project launch were representatives from the SPS Programme, Adelfas members, scientific delegations from Morocco and Tunisia, and Ministry of Defence representatives from the three participating countries. NATO has been working with its partners towards strengthening its capacity to defend against CBRN agents. Scientific research with direct applications in defence and security, such as the DIMLAB project, is necessary to ensure that the Alliance meets its strategic partnership objective, which calls for mutually beneficial cooperation on issues of common interest including CBRN defence. This project is a key component of the SPS contribution to the DCB package for Tunisia, which also listed CBRN defence as a priority area of cooperation with NATO in its most recent IPCP. Similarly, the latest draft of the IPCP between NATO and Morocco highlighted “exchange of information and expertise, and capacity building in defence against CBRN agents” as a main practical area of cooperation through the SPS Programme. CBRN Exposure Assessment and Medical Countermeasures [completed] This ARW was initiated and supported by different organizations pertaining to the French Ministry of Armed Forces, the Commissariat à l’Energie Atomique et aux énergies alternatives (CEA) and the National Federation of Firefighters. It was embedded in the 3rd International Conference CBRNE on Research and Innovation held in Nantes, which welcomed internationally recognized scientists from different NATO and partner nations. 109 participants and speakers attended three interactive days of activities, discussing in depth all pillars of the new paradigm of medical countermeasures, including pre-deployment aspects to supportive care and new antidotes/ vaccine research activities or lessons learned from recent events. Presentations and posters addressed various threats (chemical, biological, viral diseases), as well as skin decontamination, and detection (alert and identification). This event directly addressed the strategic objective to “further develop NATO’s capacity to defend against the threat of chemical, biological, radiological and nuclear weapons of mass destruction”. Furthermore, it contributed to strengthening ties with an important partner in a critical area of defence and security research.

### US Key

#### US leadership is key to NATO effectiveness

NYT 2018 - Editorial Board   
"Why NATO Matters," Jul 8, https://www.nytimes.com/2018/07/08/opinion/editorials/why-nato-matters.html

Across seven decades NATO has invoked its Article 5 mutual defense commitment only once: to rally to the defense of the United States after the attacks of 9/11. Even today, the armed forces of 39 countries are serving, and sometimes dying, with American troops in Afghanistan.

More than 70 (NATO and non-NATO) countries are part of the U.S.-led fight against the Islamic State; two dozen countries have joined a global counterterrorism initiative.

In short, NATO remains central to major American national security initiatives in a world shaken by the rise of an increasingly assertive China, the expansion of competing power centers from India to Saudi Arabia, the surge of migration from the Middle East and Africa and the dislocations caused by globalization.

Yet NATO is being weakened from within — by members’ failure to spend enough on defense; by the rise of nationalism and authoritarianism, especially in Turkey, Hungary and Poland; and perhaps most of all, by President Trump, who seems to prefer President Vladimir Putin of Russia to America’s European allies.

NATO has always depended on leadership from the United States, the world’s biggest economy and most lethal military power. Mr. Trump not only doesn’t want to lead the West, he has denigrated the alliance, bullied its leaders and accused NATO and the European Union of exploiting American largess.

#### The US is key to NATO interoperability and unlocking the potential of smaller countries.

Soare '21 [Simona R, Jun 11, "Innovation as Adaptation: NATO and Emerging Technologies," https://www.gmfus.org/news/innovation-adaptation-nato-and-emerging-technologies]  
\*EDT: emerging and disruptive technologies

Pursuing Collaborative Innovation

Not all allies have the defense funding, technological capacity, skills, and military infrastructure to facilitate rapid defense innovation, including the adoption and scaling of emerging technologies. And not all that have such resources and knowledge are willing to share them in collaborative innovation processes. Leading allies—the United States, France, the United Kingdom, and the Netherlands—already have national-focused approaches to the adoption of EDTs. By contrast, for most Central and Eastern countries EDTs in defense are mainly a long-term prospect. Previous challenges in integrating cyber capabilities into NATO operations, persistent capability gaps among the allies, and slow standardization procedures are a good indication of the magnitude of the challenge, which is acknowledged at the highest levels of NATO decision-making.

As Secretary-General Stoltenberg has stated, a technological gap between the allies would undermine interoperability and weaken alliance cohesion. In the context of the NATO AI and big data strategies and the Defense Innovation Accelerator, allies should reflect on how to improve and facilitate technological transfers among themselves. This could enable smaller allies to specialize in niche EDTs capabilities, as has been the case with cyber, for example, and could prevent the emergence of new technological and capability gaps between the allies. The Biden administration’s focus on shared democratic values and the digital agenda, and its willingness to strengthen NATO and technology partnerships, constitute a window of opportunity for the alliance. It should be fully capitalized on to accelerate transatlantic collaborative defense innovation.

## Coop Bad DA

### Top Level

#### NATO is key---it’s a full-spectrum force multiplier and guarantees multilateral logistics

Weinrod 16 - Former Secretary of Defense Representative Europe and Defense Advisor to the U.S. Mission NATO (W Bruce, “We Still Need NATO,” The American Interest, https://www.the-american-interest.com/2016/01/15/we-still-need-nato/)

Not only does NATO remain relevant, but more importantly it continues to support and advance U.S. security interests—though again, often in ways that do not make headlines and that casual observers rarely appreciate in full. Most fundamentally, NATO provides a standing multilateral military capability that can deter or be deployed should a significant security threat arise. Because NATO has a military capability in place, the core elements for mobilization, deployment, and sustainment of substantial multilateral military forces already exist. The ongoing training, exercises, and regular communication among the national militaries of NATO members allows them to jump-start preparations and actions when needed without very lengthy preparatory work. This can allow the U.S. government to proceed in shaping and leading military coalitions more quickly, at less cost and with greater effectiveness, than if NATO did not exist and its functional equivalent had to be invented from scratch at a moment’s notice. While the U.S. government retains the capacity and the right to act unilaterally if and when necessary, it makes sense for it to act with others whenever possible, whether through NATO or ad hoc coalitions of the willing. A multilateral framework can provide both political cover and military resources, and the United States very much can benefit from both. The United States also benefits significantly from NATO’s logistics capabilities. Pontificating about grand strategies sounds impressive, but for military effectiveness and success, logistics capabilities are what really count. For example, while NATO did not formally participate in the 1991 Gulf War, NATO resources, supplies, bases, and other infrastructure provided crucial support prior to and during the U.S.-led coalition military action to force Saddam Hussein out of Kuwait. The coalition in effect borrowed NATO capacities already in existence, and benefitted greatly from equipment compatibility and common training and resources. Other coalitions of the willing assembled under U.S auspices and utilizing NATO resources can follow the same approach. In addition, the U.S. government has access to the numerous military facilities and resources that member nations make available to NATO. A good example is Incirlik Air Base in Turkey, now being used against ISIS in what is not a formal NATO operation. As importantly, working through NATO usually makes it relatively routine for host governments to agree to U.S. requests to use facilities within their territory for military-related purposes. Without NATO, in order to fulfill its security responsibilities, the U.S. government would need to develop and maintain a complex network of bilateral and multilateral security agreements and arrangements that would seek to maintain the kind of connectivity and flexibility that NATO already provides. Further, the U.S. government would need not only agreements to access such military facilities but also would likely need to obtain specific approval from the host nation for each use and perhaps even in some cases legislative approval. In general, it is much simpler, faster, and easier politically and otherwise for nations to grant the United States the use of their facilities within a NATO framework than it would be to have to grant permission to the United States on their own. Over recent decades NATO has, as noted above, developed a global security network that reflects formalized relationships with non-NATO nations. For the United States, this brings the advantage that it can work through NATO to develop or enhance security relationships with states that belong to the PFP, the MD, the ICI, and NATO bilateral security relationships. Working through NATO provides an extra dimension to U.S. efforts to enhance the military capacities of friends and allies in various regions who, with training and assistance, can provide supplementary support to NATO or U.S.-led operations. NATO also supports U.S. interests by providing a multilateral framework for a U.S. presence in nations where the U.S. government wishes to help train and also enhance its military contacts, but where unilateral U.S. military involvement might be politically contentious.

#### American leadership in NATO solves their impacts

Burns 2018 - former under secretary of state and ambassador to NATO, teaches diplomacy and international relations at Harvard   
Nicholas, "What America Gets out of NATO," Jul 11, https://www.nytimes.com/2018/07/11/opinion/what-america-gets-out-of-nato.html

Third, future American leaders will find Europe is our most capable and willing partner in tackling the biggest threats to global security: climate change; drugand cybercrime cartels; terrorism; pandemics and mass migration from Africa and the Middle East. And America’s NATO allies will continue to be indispensable in safeguarding democracy and freedom, under assault by Russia and China.

Mr. Trump’s campaign to undermine the European Union and diminish America’s leadership in NATO serves none of these interests. He seems driven by resentment about European trade surpluses and low defense budgets, issues that blind him to all the other benefits Americans derive from our alliance with Europe and Canada.

Mr. Trump may believe his blistering attacks on Europe’s trade policies and defense budgets are a good negotiating tactic before the summit. But in fact they have already done enormous damage. While he cannot outright kill NATO — the American public and Congress support it too strongly — he has eroded significant levels of trust and good will. As it became clear during my recent visits across Europe, a dangerous breach has opened in the trans-Atlantic alliance — by far the worst in seven decades.

Mr. Trump wants Americans to believe that their allies are simply taking advantage of them. On Sept. 11, 2001, I witnessed a far different reality as American ambassador to NATO. Canada and the European allies volunteered within hours of the attacks to invoke Article 5 of the NATO treaty, which compels all members to respond to an attack on any single member, for the first time in history. They came to our defense when we most needed them. They sent troops to fight with us in Afghanistan. They are still there with us 17 years later.

Are we now going to throw off that mutual protection, and go it alone in a dangerous 21st-century world? That would be a historic mistake. But that is where we may find ourselves if Mr. Trump’s anti-Europe vendetta continues.

### War Mod

#### The alternative is war

Berlinski 7-15-2018 – PhD in IR @ Oxford (Claire, “Europe’s Dependence on the U.S. Was All Part of the Plan: Postwar U.S. statesmen designed our world order as it is for a reason. They had lived through what happened without it.,” *Politico*, <https://www.politico.com/magazine/story/2018/07/15/trump-nato-europe-history-dependence-219011>)

Trump’s NATO-bashing surprised no one. He has repeatedly suggested the United States’ postwar security architecture is a “bad deal,” one negotiated by weak and foolish “incompetents.” Foreign policy, in his view, is a zero-sum game; any benefit to another nation must of necessity be a loss for the United States. “NATO countries,” he declared on Twitter, “must pay MORE, the United States must pay LESS. Very Unfair!” Unfair? A world that revolves around American military, economic and cultural power, and uses the U.S. dollar as its reserve currency? What Trump fails to understand is that the disparity in spending, with the U.S. paying more than its allies, is not a bug of the system. It is a feature. This is how the great postwar statesmen designed it, and this immensely foresighted strategy has ensured the absence of great power conflict—and nuclear war—for three-quarters of a century. The open, liberal world order we know today was built in the wake of World War II and expanded after the collapse of the Soviet Union. By design, it is led by the United States; by design, it ensures permanent U.S. military hegemony over Eurasia while uniting Europe under the U.S.’ protection. The goal of this American grand strategy is to prevent any single power from dominating the region and turning on the United States and its allies. American hegemony serves, too, to quell previously intractable regional rivalries, preventing further world wars. Dean Acheson, George Marshall and the other great statesmen of their generation pursued this strategy because they had learned, at unimaginable cost, that the eternal American fantasy of forever being free of Europe—isolationism, or America Firstism, in other words—was just that: a fantasy. Four hundred thousand American men lost their lives in the European theaters of the First and Second World Wars. (American fatalities in all of the other 20th-century conflicts—including Vietnam, Korea and the Persian Gulf—do not total one-quarter of that number.) Our postwar statesmen were neither weak nor incompetent. They were the architects of the greatest foreign policy triumph in U.S. history. So successful was this policy that Americans now—most of whom weren’t alive to witness the enormity of these wars—see peace, unity, prosperity and stability as Europe’s natural state. This is an illusion. For centuries, Europe was the fulcrum of global violence. With the age of global exploration, it became the globe’s primary exporter of violence, the tempo and horror of the carnage rising every century with improvements in technology for violence. The Scramble for Africa, the division and colonization of that continent by Europe, is a case in point. The 1884-85 Berlin West Africa Conference, which assembled the representatives of 13 European powers to settle their colonial claims to Africa by diplomacy in place of arms, did lead to peace in Europe for several years. Africans, however, would not recall these years for their exceptional comity. For example, the conference indulged King Léopold II’s claim that the Congo Free State was his private property. Ten million Congolese souls perished under his ministrations. In recognizing this history of blood, however, we must recognize something equally true: In the wake of World War II, liberal democracy saw its fullest realization in the West. This flourishing of peace and human rights cannot be explained by a sudden outbreak of European pacifism. (Consider the 1956 Suez expedition, crushed by an infuriated President Dwight Eisenhower; or the 1954-62 Franco-Algerian War.) It happened because during World War II, Europe destroyed itself, leaving the United States overwhelmingly powerful by comparison, its only rival the Soviet Union. Through the application of economic, diplomatic and military force majeure, the United States suppressed Europe’s internal security competition. This is why postwar Europe ceased to be the world’s leading exporter of violence and became, instead, the world’s leading exporter of luxury sedans. Only America, and massive power as the U.S. exercised it, could have pacified and unified Europe under its aegis. No other continental country possessed half the world’s GDP. No other country had enough distance from Europe to be trusted, to a large extent, by all parties and indifferent to its regional jealousies. No other country had a strategic, moral and economic vision for Europe that its inhabitants could be persuaded gladly to share. Indeed, Europeans cooperated with the U.S. program because it created conditions under which both the United States and Europe flourished. The United States assisted Europe’s postwar economic recovery with $13 billion of aid in the form of the Marshall Plan. (In today’s dollars, roughly $113 billion.) It midwifed the groupings and treaties that would become the European Union. It brought Europe under the U.S. security umbrella with the NATO treaty. Article V of the treaty, its most important element, declares that an attack on one member of NATO is an attack on all members. These policies were intended not only to counter the Soviet Union, but to condition Europe’s prosperity upon its integration into a single market, with free movement of goods, capital and labor. The founders of these institutions fully intended them to be the foundations of a United States of Europe, much like the United States of America. Profound economic interdependence, they believed, would make further European wars impossible. At the same time, the United States built an open, global order upon an architecture of specific institutions: the United Nations, the International Monetary Fund and the International Court of Justice. This order is in many respects an empire—a Pax Americana—but it is more humane than any empire that preceded it, with institutions that are intended to benefit all parties. Postwar U.S. statesmen believed that prosperous, liberal democracies that traded freely with each other would neither go to war with each other nor the United States. They ascribed, in other words, to the so-called Democratic Peace theory—a theory with overwhelming empirical support. The U.S. military was always an integral part of the plan to unite and rebuild Europe from the rubble. Since World War II, U.S. troops have been deployed in Eurasia to ensure the continent cannot be dominated by a single power capable of monopolizing its resources and turning them against the U.S. The United States has built overwhelmingly massive military assets there to deter local arms races before they begin, and it has simultaneously assured those under U.S. protection that there is no need to begin local arms races, for their safety is guaranteed. American grand strategy rests upon the credibility of its promise to protect American allies; this credibility rests, in turn, upon U.S. willingness to display its commitment. (The Berlin Airlift, when U.S. troops airlifted supplies to Berlin during a Soviet blockade, was precisely such a display.) In return for the United States’ commitment, U.S. allies have accepted America’s dominant role in the international system. In the postwar era, just as now, the enemies of liberal democracy sought to undermine the order the U.S. was building. Precisely because the Marshall Plan would strengthen and unite the West under the United States’ protection, the Soviet Union’s propaganda organs cranked into overdrive to denounce it. A cartoon, for example, published in Isvestia in 1949, depicted the Marshall Plan’s administrator, Paul Hoffman, as a fat capitalist bent on destroying the sovereignty of European nations. The French paper L'Humanité, which reliably parroted Moscow’s line, wrote, “After disorganizing the national economies of the countries which are under the American yoke, American leaders now intend conclusively to subjugate the economy of these countries to their own interests.” The Soviet Union’s criticism of the Marshall Plan and other American involvement in Europe was eerily similar to the language Russia’s now uses in its campaign to undermine NATO and the EU. The vocabulary and tropes of Russian propaganda are widely echoed, wittingly or unwittingly, by far-right, far-left and other antiliberal politicians, parties and movements throughout the West. With the men who built the postwar world order now in their graves, and the memory of carnage and horror buried with them, a very sizable constituency of Americans has forgotten that their country built this system for a reason—that the United States does not maintain its alliances as an act of foolish largesse. The loudest exponent of the idea that the U.S. is getting rolled, that the European Union was “created to destroy us,” and that multilateral institutions such as the World Trade Organization assault the “sovereignty” of the nations concerned is, unfortunately, the president of the United States. It’s hard to understate how foolish and reckless these notions are. History can be shoved down the memory hole, for a time, but reality is never so cooperative. Global free trade sustains modern economic life. An interruption to this trade—carried out chiefly on global shipping lanes safeguarded by the U.S. military—would bring modern life to an end. The Second World War proved not only that isolationism and American-Firstism were fantasies, but exceptionally childish and dangerous ones, at that. In the age of hyperglobalized trade, international air travel, the internet, nuclear weapons and intercontinental ballistic missiles, these fantasies are even more childish and dangerous. The U.S. may be on another continent, but it is not on another planet. It is true that the U.S. spends more on its military, in absolute dollars and as a percentage of GDP, than any European country. That was always part of the deal. The U.S. is a global superpower. It can fight a war anywhere in the world, invade any country at will, and (at least in theory) fight multiple simultaneous major wars—even in space. Of course this costs more. It is in America’s advantage to be the only power on the planet that can do this. Conversely, it is not remotely in America’s advantage for other countries to spend as much money on their militaries as we do. Europe is America’s biggest export market, as designed. We want Europeans to spend their money enjoying U.S. goods and services, not razing Flanders to the ground yet again. Yet Trump’s refusal to deter our shared enemies and protect our allies risks provoking a regional European arms race—exactly what the U.S. has sought to avoid for 74 years. It is an invitation to adventurism from Putin. Trump’s refusal to adopt the encouraging language of past presidents toward European integration, language that until now has been transformed into policy by professional and experienced State Department employees, puts further strain on an already-weakened Europe. Above all, Trump’s overt support for sordid, Kremlin-backed actors who seek to undermine Europe’s unity is unfathomable: How could it be in Europe’s interest, or in ours, for the American president to lend the United States’ prestige and support to Europe’s Nazis, neo-Nazis, doctrinal Marxists, populists, authoritarians, and ethnic supremacists, particularly since all of them are ideologically hostile to the United States? The damage Trump has deliberately inflicted on Europe’s stability comes at a uniquely dangerous time. Democracy’s so-called third wave—the global blossoming of open political systems after the Cold War—has long since receded. A threat to liberal democracy, in the form of a distinct, rival ideology—illiberal democracy—is ascendant. We see it today in Russia and Turkey—a corrupt, oligarchic, kleptocratic and hollow form of democracy that spreads and consolidates itself through the new technologies of the 21st century. The global order the U.S. built was based on the principle that only a world of liberal democracies can be peaceful and prosperous. That principle is correct. Should the unraveling of the order the U.S. built proceed at this pace, the world will soon be neither peaceful nor prosperous. Nor will the effects be confined to regions distant from the United States. America will feel them gradually, and then, probably, overnight—in the form of a devastating, sudden shock. Charles de Gaulle believed the Anglophone world could not, in the long term, be trusted with French security. It led him to withdraw France from NATO’s military integrated command and launch an independent nuclear development program. The independent nuclear program was real, but the withdrawal from NATO wasn’t—a secret agreement kept France in NATO anyway. But, today, with other NATO members obliged to consider the costs and benefits of an independent accommodation with Russia and the risks and rewards of acquiring an independent nuclear deterrent, de Gaulle is saying from the grave, I told you so. The American-led world order, undergirded by the ideal of liberal democracy, has been highly imperfect. But it has been the closest thing to Utopia our fallen and benighted species has ever seen. Its benefits are not just economic, although those benefits are immense. Its benefits must be measured in wars not fought, lives not squandered. Yet many Americans have turned their backs on history and reality alike. Let us hope pride does not prevent them from realizing this mistake before it’s far too late.

#### Consensus goes aff---NATO eradicates war

Beauchamp 16 – senior reporter at Vox, where he covers global politics and ideology, citing multiple political science professors (Zach, “Donald Trump needs to clarify his position on NATO before something scary happens,” *Vox*, https://www.vox.com/2016/7/21/12247074/donald-trump-nato-war)

Trump’s comments about NATO are like an arrow pointed straight at the heart of the alliance -- and, if implemented, would directly threaten the foundations of global peace itself. Any president could simply choose not to abide by Article 5. But abrogating NATO agreements was always deemed unthinkable by both parties, which has played an important part in maintaining credible deterrence vis-à-vis Russia. Trump has put the idea of the US not defending NATO on the table, in a very real way. This threatens the very integrity of NATO itself. If NATO allies start to think that the United States can’t be trusted to defend them, that NATO is just on paper, then they’ll start to wonder why they bother to adhere to this alliance in the first place. If Trump wins the election, this could cause them to exit the security agreement altogether. According to the best available research, this would make war on the European continent far more likely. One study, from professors Jesse C. Johnson and Brett Ashley Leeds, surveyed about 200 years of data on conflicts and concluded that "defensive alliances lower the probability of international conflict and are thus a good policy option for states seeking to maintain peace in the world." Another study looked specifically at the period from 1950 to 2000 and found that "formal alliances with nuclear states appear to carry significant deterrence benefits." The US's formal agreements, then, deter aggression against its non-nuclear partners (like Germany and the Baltics). In their new book on American grand strategy, Dartmouth scholars Steven Brooks and William Wohlforth also surveyed research from regional experts and found a similar consensus. In Europe, they write, "most assessments nonetheless sum up to the conclusion that NATO is a net security plus." Trump, then, could end up weakening one of America’s most important security agreements — and may already have done so.

### Middle East Invasion Mod

#### US abdication of NATO responsibilities greenlights Russian invasion of the Middle East

Shapiro 2019 - Distinguished Visiting Fellow at the Institute for National Security Studies in Tel Aviv Daniel, "The Most Dangerous Thing Trump Could Do Yet, and Its Nightmare Fallout for Israel," Jan 17, <https://www.haaretz.com/us-news/.premium-trump-leaving-nato-a-nightmare-for-israel-netanyahu-1.6846949>

Remove the United States from NATO - and forward-deployed U.S. forces from Europe, which would certainly follow - and the United States’ ability to respond to a Middle East crisis would be diminished.

Could U.S. support for Israel be shifted and coordinated instead through U.S. Central Command, based in the Persian Gulf? It has been proposed before as an efficiency measure. But Israeli generals have always resisted the proposal. Their worry is that they would find it challenging to enjoy the same level of intimacy they currently have with Europe-based U.S. commanders, with commanders who maintain a similar closeness with Arab militaries.

True, Israel is closer strategically today with the Arab Gulf states than at any time in its history, because of a focus on the common threat of Iran and the lower priority of the Palestinian issue. But those relationships are a long way from being normalized - and could still backslide.

Israeli security planners are, therefore, still most likely to want to maintain separation between their relationships with the U.S. military and with their Arab neighbors. Having observed the intense friendships formed between Israeli military commanders and their U.S. counterparts based in Europe, I can say that these ties will not be easily replaced.

The broader Middle East would also experience the effects of NATO’s demise in the form of further empowerment of Russia. That is happening already, but losing NATO would turbocharge those trends.

Already, Russia’s brutally decisive intervention in Syria, combined with successive U.S. administrations’ preference to reduce active U.S. military engagements in the region, have led many regional states to explore expanded security ties with Russia.

Israeli Prime Minister Benjamin Netanyahu meets more frequently with Putin than he does with Trump, and the IDF and Russian Air Force deconflict their operations in Syria. The leaders of Egypt, Saudi Arabia, and the United Arab Emirates, all close partners of the United States, have visited Moscow and explored acquiring advanced Russian weapons systems in addition to their American-supplied arsenals.

Should Russia decide to exert leverage, such as by constraining Israeli freedom of action against Iranian military targets in Syria, the United States would be ill-equipped to push back.

A U.S. withdrawal from NATO would unmistakably be understood as a major pullback from the United States’s leadership in global affairs. The effect of expanding Russian influence would be felt far beyond Europe and the Middle East.

#### That makes WWIII inevitable

Hanson 2016 - classicist and historian at the Hoover Institution, Stanford University   
Victor Davis, "The return of appeasement, collaboration and isolationism," Feb 18, tribunecontentagency.com/article/the-return-of-appeasement-collaboration-and-isolationism/

By the start of the Great Depression in 1929, America was mostly unarmed and determined never to get involved in European feuding again. Most Americans complained that the huge death toll of World War I had led to neither perpetual peace nor even a peaceful Germany. America’s isolationism and disarmament also helped prompt another global war. Had the U.S. kept its military strong after World War I, and had it entered into a formal alliance with its former World War I partners, Germany never would have risked a second war against the combined strength of a fully armed Britain, France and United States. Instead, Hitler assumed the U.S. either could not or would not offer much military help to his intended European targets. Why, then, did a relatively weak Nazi Germany between 1939 and 1941 believe that it could take on much of the world, and inspire Axis partners such as Italy and Japan to follow its suicidal lead? The answer is obvious. British and French appeasement, Soviet collaboration and American isolation had together convinced Hitler and his Axis allies that the victors of World War I were more eager to grant concessions at any cost than were the defeated. The world of 2016 is eerily beginning to resemble the powder keg of 1939 Europe. Iran, China and North Korea, along with radical Islamic terrorist groups, all have particular contempt for Western democracies. Almost daily, various aggressive nations or organizations seek provocation by shooting off intercontinental missiles, boarding American boats, sending millions of young male Middle Easterners into the West, and issuing unending threats. China is creating new artificial islands to control commercial routes to and from Asia. The European Union is largely unarmed. Yet it still trusts that it can use its vaunted "smart diplomacy" to reason with its enemies. Meanwhile, Vladimir Putin’s Russia cuts deals with Iran, Syria and most of the enemies of the West. Like Stalin before, Putin cynically assumes that his triangulations will turn aggressive powers exclusively against the West. Recently, he warned the West of a "new world war" starting in the Middle East. America is slowly withdrawing from involvement abroad, using the same isolationist arguments heard in the 1920s. Past interventions in the Middle East have worn on the nation. Ingrate nations did not appreciate American sacrifices. In tough economic times, some contend that defense spending should be diverted to more social programs. Appeasement, collaboration and isolationism always prove a lethal mix — past and present.

## Unilat CP

### Multilat Key – Diplomacy

#### Military-to-military contacts are necessary to build trust and avoid miscalculation

Ebitz 19, graduate of the Federal Bureau of Investigation National Academy, and holds master’s degrees in Military Studies, from the U.S. Marine Corps Command and Staff College, and Strategic Studies, from the U.S. Marine Corps War College (Amy, “The use of military diplomacy in great power competition,” Brookings Institute, <https://www.brookings.edu/blog/order-from-chaos/2019/02/12/the-use-of-military-diplomacy-in-great-power-competition/)//BB>

Within the main elements of national power (diplomacy, informational, military, and economic, or DIME), the military is often considered the last resort. However, the U.S. military has been a key player in, for instance, the spread of democracy, building partner countries’ strength through military-to-military relationships (including in the form of bi- and trilateral exercises to support standing Operation Plans, NATO, the United Nations, and Theater Security Cooperation), personnel exchange, and humanitarian assistance operations. Through these efforts, among others, the U.S. military helps to carry out the diplomatic mission of the United States (military diplomacy paved the way for NATO, the European Union, and the World Trade Organization, for instance). When military units participate in bilateral or multilateral exercises with other countries, for example, the purpose is several-fold: The interaction increases interoperability between the militaries, provides for cultural exchange and understanding, and offers an opportunity to expand each nation’s capabilities while exercising potential contingencies. The importance of military diplomacy in foreign engagement is to build dialogue that may facilitate further communication and, during a crisis, avoid confusion between cultures.

#### Military diplomacy builds trust and relations

Ebitz 19, graduate of the Federal Bureau of Investigation National Academy, and holds master’s degrees in Military Studies, from the U.S. Marine Corps Command and Staff College, and Strategic Studies, from the U.S. Marine Corps War College (Amy, “The use of military diplomacy in great power competition,” Brookings Institute, <https://www.brookings.edu/blog/order-from-chaos/2019/02/12/the-use-of-military-diplomacy-in-great-power-competition/>)//BB

Moreover, in places where the U.S. military has maintained a long-term presence (e.g. Japan, South Korea, Germany), we see that military interoperability enhances regions economically—directly through commercial contracting and the resulting employment, servicemember contributions through commerce, and in some cases, contributions of military gear and equipment through foreign military sales or otherwise. The resulting “military diplomacy,” also referred to as “defense diplomacy,” “soft power,” “military public diplomacy,” and “strategic communication,” allows the military to have a direct impact on foreign policy through other means. Although not diplomacy in the traditional sense of a State Department mission, military relationships between countries build a foundation on which further connections between nations are developed.

#### Military diplomacy promotes soft power

Ebitz 19, graduate of the Federal Bureau of Investigation National Academy, and holds master’s degrees in Military Studies, from the U.S. Marine Corps Command and Staff College, and Strategic Studies, from the U.S. Marine Corps War College (Amy, “The use of military diplomacy in great power competition,” Brookings Institute, <https://www.brookings.edu/blog/order-from-chaos/2019/02/12/the-use-of-military-diplomacy-in-great-power-competition/)//BB>

Since military people know better than anyone the true cost of waging war, the U.S. military has a vested interest in working to build capabilities and partnerships to maintain worldwide peace and stability. Although the lines between what are doctrinally military or diplomatic missions may blur, it is to the advantage of both the State Department and the military to capitalize on any opportunity to advance the policy and security of the United States. The military, known as a hard-power tool, can also be used as a soft-power one. Military members serving overseas in any capacity are already often the forefront of American diplomacy, moving their mission set beyond traditional warfighting to an extended role in support of the National Security Strategy of the United States, with great success. The fact that China is increasingly involved in regions like Africa and Latin America—giving Beijing influence there—is further reason for the United States to take a more active approach and mitigate vulnerabilities. China has learned from our greatest strategic achievement, the Marshall Plan, and has formulated a long-term strategy to, among other things, undermine U.S. influence. We need a coordinated, long-term plan of military diplomacy and economic support in response.

### Restraint Fails

#### Restraint will fail – the US needs to wield its power for good.

Brands '22 - The Henry Kissinger Distinguished Professor at Johns Hopkins University’s School of Advanced International Studies [Hal, Jun1, "The World Doesn’t Need a More Restrained America,"https://www.aei.org/op-eds/the-world-doesnt-need-a-more-restrained-america/]

It has been a bumpy year for the restraint coalition — that loose network of analysts, advocates and politicians calling for a sharply reduced US role in the world. Having reached peak influence with the withdrawal from Afghanistan, this group initially found itself marginalized by Russia’s war in Ukraine. Now, the restraint crowd is offering a renewed critique of US policy, one that will probably prove to be persistent, though not persuasive.

Restraint is a broad church. It features anti-interventionist academics, who often style themselves as non-ideological “realists,” alongside well-funded think tanks such as the Quincy Institute. It includes libertarians such as Senator Rand Paul who deplore the financial costs of US foreign policy and progressives who contend that American globalism is a cover for imperialism and neoliberalism. There are pacifists who believe that all wars are criminal, as well as nationalists such as Senator Josh Hawley who argue that being appropriately hawkish on China requires being more dovish on nearly everything else.

Some restrainers seek wholesale global retrenchment; others mainly decry ongoing US involvement in Europe and the Middle East. What unites them is a conviction that the overuse of US power has been catastrophic for America and the world.

This coalition seemed ascendant a year ago, when President Joe Biden denounced the “forever wars” while pulling out of Afghanistan. That decision, two analysts argued, marked Biden as a hard-nosed realist — and perhaps an ally in the struggle to reshape American diplomacy.

Yet the moment didn’t last. The collapse of the Afghan state even before the US finished withdrawing showed that, while waging wars is expensive, losing them can impose a serious cost. Then came Russia’s assault on Ukraine. As Vladimir Putin’s forces sought to restore the Soviet empire and murdered Ukrainian citizens, they revealed just how awful a world shaped by great powers other than Washington might be.

Indeed, Biden isn’t getting much praise from self-proclaimed realists today. While refusing to intervene militarily, Biden has otherwise backed Ukraine with money, weapons and other support. NATO — whose peaceful expansion allegedly forced Putin to order a campaign of aggression and murder — now appears likely to add two new members, Finland and Sweden. Biden has even invoked the rhetorical legacy of his cold war predecessors, declaring that Ukraine is a vital front in the struggle to save the free world.

In response, the restraint coalition has itself opened a new front, finding multiple reasons to attack Biden’s Ukraine policy.

First is cost. Sustaining a medium-sized country under a ferocious military assault is fantastically expensive. The latest US support package for Ukraine totals some $40 billion — money, Hawley complained, that could be better spent on giving US military personnel a generous raise. Some Republicans in Congress seem to agree — 57 representatives and 11 senators voted, unsuccessfully, against the aid package.

Second is risk. No one knows how the war in Ukraine will end. If the US helps Ukraine defend itself too successfully, the thinking goes, then perhaps a humiliated Russia will escalate wildly rather than accept defeat.

Finally, there is politics. With Biden having gone all-in on Ukraine, there’s little space for the restraint contingent on the left. But Hawley and other Republicans seeking to inherit Donald Trump’s political base clearly believe that there is a constituency for claims that supporting a vulnerable democracy equates to putting “America last.”

It is uncharitable to label such arguments “pro-Putin.” Forty billion dollars is real money, given that the Pentagon is struggling to find a 10th of that for urgent near-term improvements to America’s military posture in the Pacific. There is, undoubtedly, danger in a scenario where Putin worries that he is losing the war — and in consequence loses his head.

But the perpetual problem with restraint is the corresponding unwillingness to consider what happens after America pulls back. Suppose Washington does slash support to Ukraine and leave European security to the Europeans. What does that bring?

Judging by the past century — or even the past six months — the answer is not a stable Europe and a more solvent America. Rather, the result is likely to be a partially successful Russian war of conquest that creates pervasive insecurity in Europe; a continent that, lacking American leadership, is less united and confident in opposing Putin; and greater global instability that ultimately makes it harder to contain China, as well.

Similarly in the Middle East, reasonable people can debate the proper level of U.S. involvement, or what constitutes a reasonable risk to accept on a variety of issues, from containing Iran to opposing Putin’s ambitions in Ukraine. But recent events have reminded us that a world less influenced by the US will be one in which autocratic predation becomes more common. The Ukraine war has reminded the world about the stubborn persistence of evil. In doing so, it has also illuminated the virtues of American power.

### Multilat Key – Biotech

#### A coordinated framework is necessary to check the dual-use aspects of biotech.

Cummings '21 [Christopher L., Kaitlin M. Volk, Anna A. Ulanova, Do Thuy Uyen Ha Lam & Pei Rou Ng, “Emerging Biosecurity Threats and Responses: A Review of Published and Gray Literature” in *Emerging Threats of Synthetic Biology and Biotechnology*, pp 13–36]

Biosecurity threats include biological weapons and accidental releases as demonstrated in the Sverdlovsk anthrax event, but they have also become more diversified and complicated as researchers develop and utilize advanced biotechnology techniques for the betterment of society across other sectors. Gene drives for mosquito population control, engineered algae for biofuel creation, and recreation of extinct pathogens for novel vaccine development have unique and potentially unknown associated risks. The envisioned coordinated biosecurity framework would allow for beneficial innovation to proliferate while simultaneously reducing anticipated and unanticipated risk of harm to humans, animals, agricultural, and the environment (Trump et al. 2020b; Wells et al. 2020).

## Cap K

### Sustainability

#### Spreading capitalism creates global prosperity and environmental sustainability. Abandoning it is disastrous.

Rhonheimer, 20—teaching professor at the Pontifical University of the Holy Cross (Martin, “Capitalism is Good for the Poor – and for the Environment,” <https://austrian-institute.org/en/subjects-en/catholic-social-doctrine-2/capitalism-is-good-for-the-poor-and-for-the-environment/>, dml)

It is not social policy but capitalism that has created today’s prosperity.

What is important is that what made today’s mass prosperity possible – a phenomenon unprecedented in history – was not social policy or social legislation, organised trade union pressure, or corrective interventions in the capitalist economy, but rather market capitalism itself, due to its enormous potential for innovation and the ever-increasing productivity of human labour that resulted from it.

Increasing prosperity and quality of life are always the result of increasing labour productivity. Only increased productivity enabled higher social standards, better working conditions, the overcoming of child labour, a higher level of education, and the emergence of human capital. This process of increasing triumph over poverty and the constantly rising living standards of the general masses is taking place on a global scale – but only where the market economy and capitalist entrepreneurship are able to spread.

From industrial overexploitation of nature to ecological awareness

The first phase of industrialisation and capitalism was characterised by an enormous consumption of resources and frequent overexploitation of nature, which soon gave the impression that this process could not be sustainable. Since the end of the 19th century, disaster and doom scenarios have repeatedly been put forward, but in retrospect they have proved to be wrong: The combination of technological innovation, market competition, and entrepreneurial profit-seeking (with the compulsion to constantly minimise costs) have meant that these scenarios never occurred. The ever-increasing population has been increasingly better supplied thanks to innovative technologies, ever-increasing output with lower consumption of resources less harmful to the environment – e.g. less arable land in agriculture, or oil and electricity instead of coal for rapidly increasing mobility. More recent disaster scenarios, such as those spread by reputable scientists since the late 1960s and in the 1970s, have also proved to be inaccurate.

The reason things developed differently was the always underestimated innovative dynamism of the capitalist market economy, a growing ecological awareness and, as a result, legislative intervention that took advantage of the logic of market capitalism: As a result of the ecological movement that had come out of the United States since 1970, wise legislation began to use the price mechanism to apply market incentives to internalize negative externalities. Environmental pollution was given a price-tag.

This led to an enormous decrease in air pollution and other ecological consequences of growth, which is only possible in free, market-based societies, because the production process here is characterized by competition and constant pressure to reduce costs, i.e. to the most profitable use of resources. On the other hand, all forms of socialism, i.e. a state-controlled economy, have proved to be ecological disasters and have left behind destruction of gigantic proportions, without providing the population with anything that is near comparable in prosperity, often even by destroying existing prosperity, such as happened in Venezuela.

Capitalist profit motive combined with digitalization as a solution: Increasing decoupling of growth and resource consumption

Moreover, technological innovations combined with capitalist profit-seeking and market competition have led to a new and surprising phenomenon over the past decades, which is still hardly noticed in the public debate: the decoupling of growth and resource consumption (“dematerialization”). In a wide variety of industrial sectors, the developed countries, above all the U.S., are now achieving ever greater productive output with increasingly fewer resources. This has a lot to do with technology, especially the digitalization of the economy and of our entire lives.

As the well-known MIT professor Andrew McAfee shows in his book More from Less, published in October 2019, this process also follows the logic of capitalist profit maximization. To get it going, we do not need politics, even though wise, properly incentivizing legislation can be helpful and sometimes necessary. Above all, however, it is the combination of technological innovation, capitalist profit-seeking, and market-based entrepreneurial competition that will also solve the problem of man-made global warming.

In addition, property rights and their protection are decisive for the careful use of natural resources. And where this is not possible, legal support for collective self-governing structures, in accordance with the principle of subsidiarity, are important—as is analysed by Nobel Economic Prize winner Elinor Ostrom. By contrast, the growing ideologically motivated anti-capitalist eco-activism, and the policies influenced by it, are leading in the wrong direction, distracting precisely from what would be best for the climate and the environment—and distracting us from what could help protect us against the inevitable consequences of global warming.

#### Innovation and growth are good – any less capitalist or less growth-oriented model wrecks it, which impoverishes society and ensures violent conflict

Tudoreanu ’20 [Mihnea; 9/23/20; doctoral candidate in economics at the University of Massachusetts Amherst; David M. Kotz; professor emeritus of economics at the University of Massachusetts Amherst; "Stable Jobs or iPhones? The Dilemma of Innovation in Socialism," Review of Radical Political Economics, Vol. 52, Vol. 4, p. 642-649]

**Note: DPS = Democratically Planned Socialism**

One of the advantages for innovation in DPS is that it can effectively take into account social and environmental costs, including the jobs lost or disrupted by the introduction of a new technology.8 But this can also be problematic, in that it is likely to make innovation slower in socialism than in capitalism. Democratic majorities are not immune to some of the same factors that caused Soviet managers to be technologically conservative.

On the one hand, DPS should not suffer from taut planning, unrealistic plan targets imposed from the top down, or an incentive structure that discourages risk-taking by trying out new technologies. But on the other hand, innovation is always disruptive in any kind of economic system. As old technologies are superseded, product lines become obsolete and production processes are changed, and as a result certain kinds of jobs are no longer needed. Even with an employment guarantee, the loss of one’s job may have to involve retraining, changing careers, or moving across the country. So, it is reasonable to expect that workers will resist new technologies.9 Yet at the same time, in their capacity as consumers, they will demand new and better products.

This is the “Stable jobs or iPhones?” dilemma. We can prioritize cutting-edge consumer products, or we can prioritize stable employment, but perhaps not both.10 In DPS, the people will be able to decide between one and the other, on a case-by-case basis, so that some innovations will be pursued, others will be scrapped because of their disruptive effects, and some will be introduced at a deliberately slow pace. Meanwhile, capitalism always comes down in favor of the iPhones despite the conflict with stable jobs. Since socialism will not always do this, it is likely that socialism will have more job security but fewer cutting-edge consumer products than capitalism.

If there is an international rivalry between socialism and capitalism, the citizens of the two kinds of societies will be able to compare their lifestyles with those in the other economic system. Workers living under capitalism may be attracted by the stable jobs, shorter working hours, democratic workplaces, and social benefits provided by socialism. However, those living under socialism will likely also be attracted by the rapid introduction of new consumer goods under capitalism. Moreover, as long as the speed of innovation in socialism is lower than that in capitalism, the “consumer gap” with capitalism would grow over time.

This may not be considered a problem for socialism if most of the population value stable jobs more than iPhones, but there would likely be a minority who do not. If the consumer gap is large enough, and/or that dissenting minority has an overriding preference for new consumer goods, then we have a category of people with a material interest in supporting capitalism, which values a new technology over job stability, even though they are part of the working class.

A common response to the flaws of Soviet socialism has been to propose other models of socialism that would not have those flaws. But the trade-off between job security and innovation is not one that can be easily eliminated within socialism. It is not due to the overly centralized or undemocratic nature of Soviet socialism.

Furthermore, there is a military aspect to the innovation problem. Innovations that aid the military are also likely to have a disruptive effect on employment, as in the case of consumer-oriented innovations. This is a problem because it might put DPS at a military disadvantage with respect to capitalism, which would hurt the socialist side in international relations even if no military conflict takes place. If one side knows it would lose any war that did take place, then that side will act timidly and avoid even nonviolent confrontation, so as to avoid provoking the other side into war. For both sides to stand a good chance of success in a peaceful rivalry, they must be more or less evenly matched militarily, so that neither feels that it can do whatever it wants with impunity or that it must tread lightly to avoid confrontation.

The Cold War was a multifaceted struggle between two different systems. Any future socialist economic order will most likely face capitalism in a somewhat similar struggle. Can such a struggle be won by socialism without matching capitalism’s rate of technological development? That is the question.

### Cap S War

#### The spread of capitalism causes world peace!

Mousseau, 19—Professor in the School of Politics, Security, and International Affairs at the University of Central Florida (Michael, “The End of War: How a Robust Marketplace and Liberal Hegemony Are Leading to Perpetual World Peace,” International Security, Volume 44, Issue 1, Summer 2019, p.160-196, dml)

Is war becoming obsolete? There is wide agreement among scholars that war has been in sharp decline since the defeat of the Axis powers in 1945, even as there is little agreement as to its cause.1 Realists reject the idea that this trend will continue, citing states' concerns with the “security dilemma”: that is, in anarchy states must assume that any state that can attack will; therefore, power equals threat, and changes in relative power result in conflict and war.2 Discussing the rise of China, Graham Allison calls this condition “Thucydides's Trap,” a reference to the ancient Greek's claim that Sparta's fear of Athens' growing power led to the Peloponnesian War.3

This article argues that there is no Thucydides Trap in international politics. Rather, the world is moving rapidly toward permanent peace, possibly in our lifetime. Drawing on economic norms theory,4 I show that what sometimes appears to be a Thucydides Trap may instead be a function of factors strictly internal to states and that these factors vary among them. In brief, leaders of states with advanced market-oriented economies have foremost interests in the principle of self-determination for all states, large and small, as the foundation for a robust global marketplace. War among these states, even making preparations for war, is not possible, because they are in a natural alliance to preserve and protect the global order. In contrast, leaders of states with weak internal markets have little interest in the global marketplace; they pursue wealth not through commerce, but through wars of expansion and demands for tribute. For these states, power equals threat, and therefore they tend to balance against the power of all states. Fearing stronger states, however, minor powers with weak internal markets tend to constrain their expansionist inclinations and, for security reasons, bandwagon with the relatively benign market-oriented powers.

I argue that this liberal global hierarchy is unwittingly but systematically buttressing states' embrace of market norms and values that, if left uninterrupted, is likely to culminate in permanent world peace, perhaps even something close to harmony. My argument challenges the realist assertion that great powers are engaged in a timeless competition over global leadership, because hegemony cannot exist among great powers with weak markets; these inherently expansionist states live in constant fear and therefore normally balance against the strongest state and its allies.5 Hegemony can exist only among market-oriented powers, because only they care about global order. Yet, there can be no competition for leadership among market powers, because they always agree with the goal of their strongest member (currently the United States) to preserve and protect the global order based on the principle of self-determination. If another commercial power, such as a rising China, were to overtake the United States, the world would take little notice, because the new leading power would largely agree with the global rules promoted and enforced by its predecessor. Vladimir Putin's Russia, on the other hand, seeks to create chaos around the world. Most other powers, having market-oriented economies, continue to abide by the hegemony of the United States despite its relative economic decline since the end of World War II.6

To support my theory that domestic factors determine states' alignment decisions, I analyze the voting preferences of members of the United Nations General Assembly from 1946 to 2010. I find that states with weak internal markets tend to disagree with the foreign policy preferences of the largest market power (i.e., the United States), but more so if they are major powers or have stronger rather than weaker military and economic capabilities. The power of states with robust internal markets, in contrast, appears to have no effect on their foreign policy preferences, as market-oriented states align with the market leader regardless of their power status or capabilities. I corroborate that this pattern may be a consequence of states' interest in the global market order by finding that states with higher levels of exports per capita are more likely than other states to have preferences aligned with those of the United States; those with lower levels of exports are more likely to have interests that do not align with the United States, but again more so if they are stronger rather than weaker.

Liberal scholars of international politics have long offered explanations for why the incidence of war may decline, generally beginning with the assumption that although the security dilemma exists, it can be overcome with the help of factors external to states.7 Neoliberal institutionalists treat states as like units and international organization as an external condition.8 Trade interdependence is dyadic and thus an external condition.9 Democracy is an internal factor, but theories of democratic peace have an external dimension: peace is the result of the expectations of states' behavior informed by the images that leaders create of each other's regime types.10 In contrast, I show that the security dilemma may not exist at all and how peace can emerge in anarchy with states pursuing their interests determined entirely by internal factors.11

### Cap S Biotech

#### Capital is crucial for biotechnology – solves a laundry list of impacts

Chris Edwards ’21, Director of Tax Policy Studies and Editor, Down​siz​ing​Gov​ern​ment​.org, “The Triumph of Biotechnology and Private Capital”, CATO, 9/24/21, https://www.cato.org/commentary/triumph-biotechnology-private-capital

People often claim that capitalism focuses only on short-term profits. But the venture capitalists and angel investors who fund firms such as Moderna and BioNTech are hugely patient, and they lose money on most of their investments. Typically, their model rests on the calculation that a small percentage of their investments will generate a sufficiently high return on going public or being sold to both “pay” for those that — as will often be the case in a very tricky sector — lose money (or make very little) and make the sort of good money that they and their clients are expecting when putting together an investment portfolio.

In biotechnology and other leading-edge industries, after-tax investor gains are often reinvested in the next round of risky startups, thus creating a virtuous cycle. If the government had taxed away the Struengmanns’ capital gains from selling Hexal, they might not have had the cash or incentive to invest in BioNTech. One of the reason that nearly all high-income countries keep capital-gains taxes low is to help ensure that investors and entrepreneurs are incentivized to take the risk of committing time and resources to ventures that can offer no promise of a good return, the sort of ventures, in other words, so typical of ventures relying on scientific and technical innovation. Those who take high risks should be rewarded, if that risk works out, with high rewards.

Unfortunately, that logic eludes President Biden and congressional Democrats. They not only would like to raise capital-gains-tax rates, but some of them would also like to broaden the capital-gains-tax base, including by taxing gains before they are realized. If applied to startup investing, that could do terrible damage to the ability of early stage companies to secure the patient capital that they need. Punishing capital gains makes no sense if we want investors and entrepreneurs to pursue valuable but risky growth opportunities.

Some cynics are griping about the big profits that Moderna and BioNTech are now making, but investors in those firms absorbed losses for a decade. Besides, there is no better place for profits to flow right now than to biotech firms and their research. BioNTech announced that it will build on its mRNA advances to develop shots against malaria and tuberculosis, which together kill more than a million people a year. And numerous biotech firms are now aiming to create more effective influenza vaccines based on mRNA technologies.

One of the key moments in the development of the biotech sector as we know it today was the launch of Genentech in 1976, backed by venture-capital firm Kleiner Perkins. The success of that pioneering firm “gave credence to the view that scientific research, infused with start-up firm spunk, could be a critical component of economic growth,” noted a history of the industry by Walter Powell and Kurt Sandholtz.

To undermine an approach that has worked so well, and delivered so much, by raising capital gains makes no economic sense. Worse still, as we consider the lives saved or improved by companies in biotechnology and other innovative sectors, companies that relied on private risk capital, it may well come at considerable human cost, too.

#### Stable regs key to pharma innovation.

**Michel and Battalgia 20** – Chief Judge Michel appointed to the United States Court of Appeals for the Federal Circuit in March of 1988 by President Ronald Reagan, an accomplished first-chair trial lawyer, appellate lawyer, and former US Justice Department lawyer who has successfully tried to verdict a broad array of civil and criminal cases, (Paul and John, “Pandemics and the Need for U.S. Patent Laws That ‘Promote … Progress’ and Invention: The Federal Circuit, En Banc, Can Fix This,” *IP Watchdog*, 4-12-20, <https://www.ipwatchdog.com/2020/04/12/pandemics-need-us-patent-laws-promote-progress-invention-federal-circuit-en-banc-can-fix/id=120575/>, Accessed 7-4-20, LASA-AH)

Needless to say, no one involved in U.S. patent law or policy wants the pandemic or its multi-faceted consequences. Nor would a contrary ruling in Athena, supra, have meant that an innovator would have had at the ready the desired diagnostic testing for coronavirus. Nor a ready-made or known treatment, cure or vaccine. That said, the famous Burkean wisdom of course applies here. To paraphrase, “evil” or horrendous things can prevail if good people stand by and do nothing—and allowing bad precedents to go uncorrected has consequences. Unfortunately, we are seeing those consequences play out with U.S. patent law in real time. For nearly 15 years, the Supreme Court’s IP opinions that have had the effect of de-valuing U.S. patent rights, making it increasingly difficult (for example) for U.S. intellectual-property owners to obtain injunctive relief against those who infringe, trespass on, or otherwise steal their patented ideas and property rights. See, e.g., eBay Inc. v. MercExchange, LLC, 547 U.S. 388, 391 (2006). (By contrast, the patent laws of China have made such injunctive relief available as a matter of course, with some reporting that prevailing patentees there obtain injunctions for nearly 90% of all requests.) And through the years, whether by Supreme Court precedent or other law-making, it has become increasingly easy to invalidate U.S. patents, see, e.g., KSR Int’l Co. v. Teleflex, Inc., 550 US 398, 415 (2007), and to render the subject matter of a patent ineligible for protection under §101. (We do not tackle here the separate pitfalls created by the 2011 America Invents Act.) This includes ineligibility not just for diagnostic testing, but for software, business methods, and quite possibly anything else in a patent claim that can be subjectively deemed “directed to” an “abstract idea, law of nature, or natural phenomena”; and doesn’t reflect an “inventive concept,” per the Supreme Court’s Mayo-Alice “framework” for Section101. To be sure, this is not an article focused on Supreme Court Section101 precedent and the harms to innovation that it has wrought, though that has certainly played a major or even primary role in the harm to U.S. innovation. (And indeed, the proper analysis of that Section 101 precedent is a subject that warrants separate, in-depth treatment.) The larger point here is that, given the expanding uncertainty with the case law on U.S. patents—and whether, for example, they’ll protect the subject matter of a million- (or even billion-) dollar investment—U.S. investment in R&D has dropped. And perhaps most notably, it has dropped among innovative bio-pharmaceutical companies. See, e.g., Unpredictability in Patent Law and Its Effect on Pharmaceutical Innovation, by Christopher M. Holman, 76 Mo. L. Rev. 645, 663-64 (summer 2015) (“In recent years, major innovative pharmaceutical companies have experienced two pronounced and significant trends: a decreasing output of innovative new drugs and cutbacks in research and development (R&D) investment”). And innovation—the lifeblood of the American economy—has dropped with it. See, e.g., id. (explaining that the “high level of unpredictability in today’s patent law is a significant impediment to the development of new medicines” and cause of the “R&D crisis”); Bloomberg Innovation Index (2018); The U.S. Drops out of the Top 10 in Innovation Ranking, Bloomberg News (Jan. 22, 2018), by Michelle Jamrisko & Wei Lu, available at (visited March 28, 2020).

#### Pharma industry solves disease spread.

Sachs 14 — Jeffrey D. Sachs, professor of sustainable development, health policy, and management at Columbia University, director of the Earth Institute at Columbia University, special adviser to the UN Secretary-General on Millennium Development Goals, 8-18-2014 (“Important lessons from Ebola outbreak”, *Business World Online*, http://www.bworldonline.com/content.php?section=Opinion&title=important-lessons-from-ebola-outbreak&id=92924)

Ebola is the latest of many recent epidemics, also including AIDS, SARS, H1N1 flu, H7N9 flu, and others. AIDS is the deadliest of these killers, claiming nearly 36 million lives since 1981. Of course, even larger and more sudden epidemics are possible, such as the 1918 influenza during World War I, which claimed 50-100 million lives (far more than the war itself). And, though the 2003 SARS outbreak was contained, causing fewer than 1,000 deaths, the disease was on the verge of deeply disrupting several East Asian economies including China’s. There are four crucial facts to understand about Ebola and the other epidemics. First, most emerging infectious diseases are zoonoses, meaning that they start in animal populations, sometimes with a genetic mutation that enables the jump to humans. Ebola may have been transmitted from bats; HIV/AIDS emerged from chimpanzees; SARS most likely came from civets traded in animal markets in southern China; and influenza strains such as H1N1 and H7N9 arose from genetic re-combinations of viruses among wild and farm animals. New zoonotic diseases are inevitable as humanity pushes into new ecosystems (such as formerly remote forest regions); the food industry creates more conditions for genetic recombination; and climate change scrambles natural habitats and species interactions. Second, once a new infectious disease appears, its spread through airlines, ships, megacities, and trade in animal products is likely to be extremely rapid. These epidemic diseases are new markers of globalization, revealing through their chain of death how vulnerable the world has become from the pervasive movement of people and goods. Third, the poor are the first to suffer and the worst affected. The rural poor live closest to the infected animals that first transmit the disease. They often hunt and eat bushmeat, leaving them vulnerable to infection. Poor, often illiterate, individuals are generally unaware of how infectious diseases -- especially unfamiliar diseases -- are transmitted, making them much more likely to become infected and to infect others. Moreover, given poor nutrition and lack of access to basic health services, their weakened immune systems are easily overcome by infections that better nourished and treated individuals can survive. And “de-medicalized” conditions -- with few if any professional health workers to ensure an appropriate public-health response to an epidemic (such as isolation of infected individuals, tracing of contacts, surveillance, and so forth) -- make initial outbreaks more severe. Finally, the required medical responses, including diagnostic tools and effective medications and vaccines, inevitably lag behind the emerging diseases. In any event, such tools must be continually replenished. This requires cutting-edge biotechnology, immunology, and ultimately bioengineering to create large-scale industrial responses (such as millions of doses of vaccines or medicines in the case of large epidemics).

### Perm

#### The perms solve best – restructuring capitalism is possible

Mazzucato ’21 [Mariana; Jan 28; Professor in the Economics of Innovation and Public Value at University College London where she is the founding director of the UCL Institute for Innovation and Public Purpose; “Mission Economy: A Moonshot Guide to Changing Capitalism,” p. 204-10]

This book has applied what I believe is the immensely powerful idea of a mission to solving the ‘wicked’ problems we face today. In it, I have argued that tackling grand challenges will only happen if we reimagine government as a prerequisite for restructuring capitalism in a way that is inclusive, sustainable and driven by innovation.

First and foremost, this means reinventing government for the twenty-first century – equipping it with the tools, organization and culture it needs to drive a mission-oriented approach. It also means bringing purpose to the core of corporate governance and taking a very broad stakeholder position across the economy. It means changing the relationship between public and private sectors, and between them and civil society, so they all work symbiotically for a common goal. The reason for the emphasis on rethinking government is simple: only government has the capacity to bring about transformation on the scale needed. The relationship between economic actors and civil society shows our problems at their most profound, and this is what we must unravel.

We can start by recognizing that capitalist markets are an outcome of how each actor in the system is organized and governed, and how the different actors relate to one another. This holds for the private and public sectors and for other sectors such as non-profits. No particular kind of market behaviour is inevitable. For example, the market pressure often cited as forcing a business to neglect the long term in favour of the short term, as too many companies do today, is the product of a particular organization of the market. Nor is there anything inevitable in government bureaucracies being too slow to react to challenges such as digital platforms and climate change. Rather, both are outcomes of agency, actions and governance structures that are chosen inside organizations, as well as the legal and institutional relationships between them. It is all down to design within and between organizations.

Capitalism is, indeed, in crisis. But the good news is that we can do better. We know from the past that public and private actors can come together to do extraordinary things. I have reflected on how, fifty years ago, going to the moon and back required public and private actors to invest, to innovate and to collaborate night and day for a common purpose. Imagine if that collaborative purpose today was to build a more inclusive and sustainable capitalism: green production and consumption, less inequality, greater personal fulfilment, resilient health care and healthy ageing, sustainable mobility and digital access for all. But small, incremental changes will not get us to those outcomes. We must have the courage and conviction to lift our gaze higher – to lead transformative change that is as imaginative as it is ambitious, aiming for something far more ambitious than sending a man to the moon.

To do this successfully, governments need to invest in their internal capabilities – building the competence and confidence to think boldly, partner with business and civil society, catalyse new forms of collaboration across sectors, and deploy instruments that reward actors willing to engage with the difficulties. The task is neither to pick winners nor to give unconditional handouts, subsidies and guarantees, but to pick the willing. And missions are about making markets, not only fixing them. They’re about imagining new areas of exploration. They’re about taking risks, not only ‘de-risking’. And if this means making mistakes along the way, so be it. Learning through trial and error is critical for any value-creation exercise. Ambitious missions also have the courage to tilt the playing field.

If government is indeed a value creator that is driven by public purpose, its policies should reflect and reinforce that. Too many green policies today are just minor adjustments to a trajectory that still favours the old waste-prone behaviours and the financial casino that worsens inequality. A healthy economy that works for the whole of society must tilt the playing field consistently to reward behaviours that help us achieve agreed and desirable goals. That means achieving coherence in a multiplicity of fields, from taxes to regulation, from business law to the social safety net.

As emphasized throughout the book, it is key to not pretend that social missions are the same as technological ones. With challenges that are more ‘wicked’ it is essential that moonshot thinking is linked with support to underlying government systems. For example, a moonshot around disease testing or health priorities must interact closely with the public-health system, not replace or circumvent it. Similarly, a moonshot around clean growth must interact with transport systems and planning authorities and understand behavioural change. Thus it is critical to perceive missions not as siloed projects but as being intersectoral, bottom-up, and building on existing systems (such as innovation systems, among others).

Governments cannot pursue missions alone. They must work alongside purpose-driven businesses to achieve them. As I’ve argued in this book, this requires addressing one of the biggest dilemmas of modern capitalism: restructuring business so that private profits are reinvested back into the economy rather than being used for short-term financialized purposes. Missions can accelerate this shift by shaping expectations about where business opportunities lie and also getting a better return for public investment. In this sense they can begin to walk the talk of stakeholder value. This means creating a more symbiotic form of partnership and collaboration in different sectors, whether in health, energy or digital platforms. A market-shaping perspective requires governing these interactions so that intellectual property rights, data privacy, pricing of essential medicines and taxation all reflect what needs to happen to reach the common objective. In health that must mean health innovation driven by the mission of better health care for all; in energy it must mean divestment from fossil fuels and the creation of public goods like green infrastructure and green production systems that protect the earthly oasis that Armstrong referred to; and in the digital domain it must mean the use of digitalization to improve the access of all people to the power of the technologies of the twenty-first century – while ensuring both data privacy and that our welfare states are strengthened, not weakened, by digital platforms.

Doing capitalism differently requires reimagining the full potential of a public sector driven by public purpose – democratically defining clear goals that society needs to meet by investing and innovating together. It requires a fundamentally new relationship between all economic actors willing and able to tackle complexity to achieve outcomes that matter.

### Transition Wars

#### Alt fails---transition wars and domestic pressure means the alt abandons fidelity to the environment.

Smith '19 [Noah; 4/5/19; Bloomberg Opinion columnist, former assistant professor of finance at Stony Brook University; "Dumping Capitalism Won’t Save the Planet," https://www.bloomberg.com/opinion/articles/2019-04-05/capitalism-is-more-likely-to-limit-climate-change-than-socialism]

It has become fashionable on social media and in certain publications to argue that capitalism is killing the planet. Even renowned investor Jeremy Grantham, hardly a radical, made that assertion last year. The basic idea is that the profit motive drives the private sector to spew carbon into the air with reckless abandon. Though many economists and some climate activists believe that the problem is best addressed by modifying market incentives with a carbon tax, many activists believe that the problem can’t be addressed without rebuilding the economy along centrally planned lines.

The climate threat is certainly dire, and carbon taxes are unlikely to be enough to solve the problem. But eco-socialism is probably not going to be an effective method of addressing that threat. Dismantling an entire economic system is never easy, and probably would touch off armed conflict and major asdasd upheaval. In the scramble to win those battles, even the socialists would almost certainly abandon their limitation on fossil-fuel use — either to support military efforts, or to keep the population from turning against them. The precedent here is the Soviet Union, whose multidecade effort to reshape its economy by force amid confrontation with the West led to profound environmental degradation. The world's climate does not have several decades to spare.

Even without international conflict, there’s little guarantee that moving away from capitalism would mitigate our impact on the environment. Since socialist leader Evo Morales took power in Bolivia, living standards have improved substantially for the average Bolivian, which is great. But this has come at the cost of higher emissions. Meanwhile, the capitalist U.S managed to decrease its per capita emissions a bit during this same period (though since the U.S. is a rich country, its absolute level of emissions is much higher).

In other words, in terms of economic growth and carbon emissions, Bolivia looks similar to more capitalist developing countries. That suggests that faced with a choice of enriching their people or helping to save the climate, even socialist leaders will often choose the former. And that same political calculus will probably hold in China and the U.S., the world’s top carbon emitters — leaders who demand draconian cuts in living standards in pursuit of environmental goals will have trouble staying in power.

The best hope for the climate therefore lies in reducing the tradeoff between material prosperity and carbon emissions. That requires technology — solar, wind and nuclear power, energy storage, electric cars and other vehicles, carbon-free cement production and so on. The best climate policy plans all involve technological improvement as a key feature.

# NEG

## Disease

### AT Disease

#### Disease can’t cause extinction

Dr. Toby Ord 20, Senior Research Fellow in Philosophy at Oxford University, DPhil in Philosophy from the University of Oxford, The Precipice: Existential Risk and the Future of Humanity, Hachette Books, Kindle Edition, p. 124-126

Are we safe now from events like this? Or are we more vulnerable? Could a pandemic threaten humanity’s future?10

The Black Death was not the only biological disaster to scar human history. It was not even the only great bubonic plague. In 541 CE the Plague of Justinian struck the Byzantine Empire. Over three years it took the lives of roughly 3 percent of the world’s people.11

When Europeans reached the Americas in 1492, the two populations exposed each other to completely novel diseases. Over thousands of years each population had built up resistance to their own set of diseases, but were extremely susceptible to the others. The American peoples got by far the worse end of exchange, through diseases such as measles, influenza and especially smallpox.

During the next hundred years a combination of invasion and disease took an immense toll—one whose scale may never be known, due to great uncertainty about the size of the pre-existing population. We can’t rule out the loss of more than 90 percent of the population of the Americas during that century, though the number could also be much lower.12 And it is very difficult to tease out how much of this should be attributed to war and occupation, rather than disease. As a rough upper bound, the Columbian exchange may have killed as many as 10 percent of the world’s people.13

Centuries later, the world had become so interconnected that a truly global pandemic was possible. Near the end of the First World War, a devastating strain of influenza (known as the 1918 flu or Spanish Flu) spread to six continents, and even remote Pacific islands. At least a third of the world’s population were infected and 3 to 6 percent were killed.14 This death toll outstripped that of the First World War, and possibly both World Wars combined.

Yet even events like these fall short of being a threat to humanity’s longterm potential.15

[FOONOTE]

In addition to this historical evidence, there are some deeper biological observations and theories suggesting that pathogens are unlikely to lead to the extinction of their hosts. These include the empirical anti-correlation between infectiousness and lethality, the extreme rarity of diseases that kill more than 75% of those infected, the observed tendency of pandemics to become less virulent as they progress and the theory of optimal virulence. However, there is no watertight case against pathogens leading to the extinction of their hosts.

[END FOOTNOTE]

In the great bubonic plagues we saw civilization in the affected areas falter, but recover. The regional 25 to 50 percent death rate was not enough to precipitate a continent-wide collapse of civilization. It changed the relative fortunes of empires, and may have altered the course of history substantially, but if anything, it gives us reason to believe that human civilization is likely to make it through future events with similar death rates, even if they were global in scale.

The 1918 flu pandemic was remarkable in having very little apparent effect on the world’s development despite its global reach. It looks like it was lost in the wake of the First World War, which despite a smaller death toll, seems to have had a much larger effect on the course of history.16

It is less clear what lesson to draw from the Columbian exchange due to our lack of good records and its mix of causes. Pandemics were clearly a part of what led to a regional collapse of civilization, but we don’t know whether this would have occurred had it not been for the accompanying violence and imperial rule. The strongest case against existential risk from natural pandemics is the fossil record argument from Chapter 3. Extinction risk from natural causes above 0.1 percent per century is incompatible with the evidence of how long humanity and similar species have lasted. But this argument only works where the risk to humanity now is similar or lower than the longterm levels. For most risks this is clearly true, but not for pandemics. We have done many things to exacerbate the risk: some that could make pandemics more likely to occur, and some that could increase their damage. Thus even “natural” pandemics should be seen as a partly anthropogenic risk.

#### Disease doesn’t cause extinction.

Halstead 19 – John Halstead, doctorate in political philosophy. [Cause Area Report: Existential Risk, Founders Pledge, https://founderspledge.com/research/Cause%20Area%20Report%20-%20Existential%20Risk.pdf]//BPS

However, there are some reasons to think that naturally occurring pathogens are unlikely to cause human extinction. Firstly, Homo sapiens have been around for 200,000 years and the Homo genus for around six million years without being exterminated by an infectious disease, which is evidence that the base rate of extinction-risk natural pathogens is low.82 Indeed, past disease outbreaks have not come close to rendering humans extinct. Although bodies were piled high in the streets across Europe during the Black Death,83 human extinction was never a serious possibility, and some economists even argue that it was a boon for the European economy.84 Secondly, infectious disease has only contributed to the extinction of a small minority of animal species.85 The only confirmed case of a mammalian species extinction being caused by an infectious disease is a type of rat native only to Christmas Island. Having said that, the context may be importantly different for modern day humans, so it is unclear whether the risk is increasing or decreasing. On the one hand, due to globalisation, the world is more interconnected making it easier for pathogens to spread. On the other hand, interconnectedness could also increase immunity by increasing exposure to lower virulence strains between subpopulations.87 Moreover, advancements in medicine and sanitation limit the potential damage an outbreak might do.

#### Selective pressures and UN reports mean risk is low.

Farquhar et al. 17 – Sebastian Farquhar, DPhil student at Oxford specializing in Cyber Security and AI. John Halstead, doctorate in political philosophy. Owen Cotton-Barratt, DPhil in pure mathematics. Stefan Schubert, Oxford's department of experimental psychology. Haydn Belfield, degree in Philosophy, Politics and Economics from Oriel College. Andrew Snyder-Beattie, Director of Research at the Future of Humanity Institute, University of Oxford, MS in biomathematics. [Existential Risk: Diplomacy and Governance, Global Priorities Project 2017]//BPS

For most of human history, natural pandemics have posed the greatest risk of mass global fatalities.37 However, there are some reasons to believe that natural pandemics are very unlikely to cause human extinction. Analysis of the International Union for Conservation of Nature (IUCN) red list database has shown that of the 833 recorded plant and animal species extinctions known to have occurred since 1500, less than 4% (31 species) were ascribed to infectious disease.38 None of the mammals and amphibians on this list were globally dispersed, and other factors aside from infectious disease also contributed to their extinction. It therefore seems that our own species, which is very numerous, globally dispersed, and capable of a rational response to problems, is very unlikely to be killed off by a natural pandemic. One underlying explanation for this is that highly lethal pathogens can kill their hosts before they have a chance to spread, so there is a selective pressure for pathogens not to be highly lethal. Therefore, pathogens are likely to co-evolve with their hosts rather than kill all possible hosts.39

#### No extinction – their impacts are all media fear-mongering – ebola proves

Dean 14 [Alex, "Fear Not, Ebola Won't Wipe Us Out", Spiked, 8/6/14, www.spiked-online.com/newsite/article/fear-not-ebola-wont-wipe-us-out/15549#.VaAbVvlViko] // SKY

Whenever a disease breaks out, we are bombarded with doomsday predictions. Coverage of ebola has conformed to this pattern. Major newspapers have bombarded us with page after page of pharmaceutical puffery; some journalists speak as though we are headed for an apocalypse. Commentary has been speculative, pessimistic and quick to apportion blame. The Guardian’s West Africa correspondent says that ‘new hotspots have flared up, fuelled by cross-border trade’, while US Republican politician Phil Gingrey has been making unsubstantiated rants about ‘illegal immigrants carrying deadly diseases’. The head of the World Health Organisation stoked panic with his statement that the virus ‘is moving faster than efforts to control it’. We must compare this reportage, all these ‘the end is nigh’ performances, with the reality. A quick look at hard science shows there is a dramatic mismatch and that commentators have wildly exaggerated the threat ebola poses. We are not headed for extinction. John Oxford, a virologist at the University of London, has explained that the hysteria surrounding ebola is disproportionate to the threat. He points out that ebola ‘doesn’t spread very easily’, and that the virus’s reproductive number - how many people are infected by each carrier - is very low. Where measles has a reproductive number of 12, ebola’s number is 1. Moreover, virologists have been quick to point out that ebola is very easily destroyed, for a virus. A quick wash of the hands and it’s gone. Ebola can devastate families and communities, yes, but when you consider that it has a low death toll compared with other viruses in Africa, we must conclude that reports have been hyperbolic and scaremongering. Yet this disproportionate panic over ebola was to be expected. We saw similar responses when swine flu broke out and the UK’s chief medical officer predicted 65,000 deaths and the media swallowed it up, and again when the House of Lords told us that 65,000 Britons would die from bird flu. Perhaps political and medical bodies have a duty to err on the side of caution – to over-prepare and over-predict – but the media and some of the public also gobbled up these doomsday predictions with relish. What’s the explanation for this? Why do some observers seem to be ravenously awaiting the next big pandemic? Why do we want these viruses to be worse than they are? I think some people long for doomsday predictions because they want their anti-progress attitudes to be validated. Ours is an era in which we are told to fear other people for their unpredictability and to see our fellow humans as a threat. Relationships are sometimes described as ‘toxic’ - such is our misanthropy that we now even describe our ultimate forms of intimacy in the language of disease. Today’s anti-human scaremongers are desperate for their attitudes to be affirmed, and so they exaggerate viruses which are spread through human contact and movement. People convince themselves that ebola is the result of immigration and human contact and modern forms of travel because then their regressive attitudes feel truer, more real. They don’t see the hectic globalised world as exciting; they see it as unnerving and are thrilled when a virus gives them reason to complain about it. These ridiculous attitudes have found no real affirmation, though. Humankind will deal with ebola, and a disease spread through contact should never serve as a reason to despise that contact: intimacy makes life worth living and immigration and trade are the seeds of social and economic progress. We must not allow the fearmongers to undermine our rational convictions. Pay no attention to the miserablists. Fear not, humankind – we are doing okay.

### AT Bioterror

#### Bioterrror fails

**Pinker 18** – Steven Arthur Pinker is a Canadian-American cognitive psychologist, Professor at Harvard University. [Enlightenment Now: The Case for Reason, Science, Humanism, and Progress, Viking, Penguin Group]//BPS

Biological agents are particularly ill-suited to terrorists, whose goal, recall, is not damage but theater (chapter 13).58 The biologist Paul Ewald notes that natural selection among pathogens works against the terrorist’s goal of sudden and spectacular devastation. 59 Germs that depend on rapid person-to-person contagion, like the common-cold virus, are selected to keep their hosts alive and ambulatory so they can shake hands with and sneeze on as many people as possible. Germs get greedy and kill their hosts only if they have some other way of getting from body to body, like mosquitoes (for malaria), a contaminable water supply (for cholera), or trenches packed with injured soldiers (for the 1918 Spanish flu). Sexually transmitted pathogens, like HIV and syphilis, are somewhere in between, needing a long and symptomless incubation period during which hosts can infect their partners, after which the germs do their damage. Virulence and contagion thus trade off, and the evolution of germs will frustrate the terrorist’s aspiration to launch a headline-worthy epidemic that is both swift and lethal. Theoretically, a bioterrorist could try to bend the curve with a pathogen that is virulent, contagious, and durable enough to survive outside bodies. But breeding such a fine-tuned germ would require Nazi-like experiments on living humans that even terrorists (to say nothing of teenagers) are unlikely to carry off. It may be more than just luck that the world so far has seen just one successful bioterror attack (the 1984 tainting of salad with salmonella in an Oregon town by the Rajneeshee religious cult, which killed no one) and one spree killing (the 2001 anthrax mailings, which killed five).60 To be sure, advances in synthetic biology, such as the gene-editing technique CRISPR-Cas9, make it easier to tinker with organisms, including pathogens. But it’s difficult to re-engineer a complex evolved trait by inserting a gene or two, since the effects of any gene are intertwined with the rest of the organism’s genome. Ewald notes, “I don’t think that we are close to understanding how to insert combinations of genetic variants in any given pathogen that act in concert to generate high transmissibility and stably high virulence for humans.”61 The biotech expert Robert Carlson adds that “one of the problems with building any flu virus is that you need to keep your production system (cells or eggs) alive long enough to make a useful quantity of something that is trying to kill that production system. . . . Booting up the resulting virus is still very, very difficult. . . . I would not dismiss this threat completely, but frankly I am much more worried about what Mother Nature is throwing at us all the time.”62 And crucially, advances in biology work the other way as well: they also make it easier for the good guys [public protectors] (and there are many more of them) to identify pathogens, invent antibiotics that overcome antibiotic resistance, and rapidly develop vaccines.63 An example is the Ebola vaccine, developed in the waning days of the 2014–15 emergency, after public health efforts had capped the toll at twelve thousand deaths rather than the millions that the media had foreseen. Ebola thus joined a list of other falsely predicted pandemics such as Lassa fever, hantavirus, SARS, mad cow disease, bird flu, and swine flu.64 Some of them never had the potential to go pandemic in the first place because they are contracted from animals or food rather than in an exponential tree of person-to-person infections. Others were nipped by medical and public health interventions. Of course no one knows for sure whether an evil genius will someday overcome the world’s defenses and loose a plague upon the world for fun, vengeance, or a sacred cause. But journalistic habits and the Availability and Negativity biases inflate the odds, which is why I have taken Sir Martin up on his bet. By the time you read this you may know who has won.65

#### No impact to bioterror

**Jefferson, et al, 14** [ Catherine, 21 August 2014 | doi: 10.3389/fpubh.2014.00115, Synthetic biology and biosecurity: challenging the “myths”, Catherine, Jefferson, imageFilippa Lentzos and imageClaire Marris\* Department of Social Science, Health and Medicine, King’s College London, London, UK, Catherine joined SSHM in January 2013. Before joining the department, she worked as a senior policy advisor for international security at the Royal Society, where she led a project on Neuroscience, Conflict and Security. Prior to this she was a research fellow with the Harvard Sussex Program on Chemical and Biological Weapons at the University of Sussex, where she also obtained her DPhil. Catherine’s research interests are focused on the intersection of science and security policy, with a particular emphasis on chemical and biological security, dual use governance of emerging technologies and the growth of the amateur biology community. She is currently involved in research on the social dimensions of synthetic biology within theCentre for Synthetic Biology and Innovation, <http://journal.frontiersin.org/Journal/10.3389/fpubh.2014.00115/full>]

Challenges to Myth 5 There are two dimensions to Myth 5. The first is about the intention of would-be terrorists, and the assumption is that terrorists would seek to produce mass casualty weapons and pursue capabilities on the scale of twentieth century state-level bioweapons programs. While most leading biological disarmament and non-proliferation experts believe that the risk of a small-scale bioterrorism attack is very real and very present, they consider **the risk of sophisticated large-scale bioterrorism attacks to be very small** (65). This is **backed up by historical evidence**. The three confirmed attempts to use biological agents against humans in terrorist attacks in the past were small-scale, low casualty events aimed at causing panic, and disruption rather than excessive death tolls: (i) the Rajneesh cult’s use of Salmonella on salad bars in local restaurants to sicken potential voters and make them stay away from the polls during Oregon elections in 1984; (ii) the 1990–95 attempted use of botulinum toxin and anthrax by the Japanese Aum Shinrikyo cult; (iii) and the “anthrax letters” sent to media outlets and members of US Congress in 2001 resulting in at least 22 cases of anthrax, five of which were fatal (66, 67). The second dimension to Myth 5 is the implicit assumption that producing a pathogenic organism equates producing a weapon of mass destruction. **It does not**. Considerable knowledge and resources are necessary for the processes of scaling up, storage, and developing a suitable dissemination method. These processes present **significant technical and logistical barriers**. Drawing from her in-depth study of the Iraqi, Soviet, and US bioweapons programs (3, 4), Ben Ouagrham-Gormley explains: Scaling up fragile microorganisms that are sensitive to environmental conditions and susceptible to change — and viruses are more sensitive than bacteria — has been one of the stiffest challenges for past bioweapons programs to overcome, even with appropriate expertise at hand. Scaling-up requires a gradual approach, moving from laboratory sample, to a larger laboratory quantity, to pilot-scale production, and then to even larger-scale production. During each stage, the production parameters need to be tested and often modified to maintain the lethal qualities of the agent; the entire scaling-up process can take several years (68). The dissemination of biological agents also poses difficult technical challenges. Whereas persistent chemical agents such as sulfur mustard and VX nerve gas are readily absorbed through the intact skin, no bacteria and viruses can enter the body via that route unless the skin has already been broken. Biological agents must either be ingested or inhaled to cause infection. To expose large numbers of people through the gastrointestinal tract, possible means of delivery are contamination of food and drinking water, yet neither of these scenarios would be easy to accomplish. Large urban reservoirs are usually unguarded, but unless terrorists added massive quantities of biological agent, the dilution effect would be so great that no healthy person drinking the water would receive an infectious dose (66). Moreover, modern sanitary techniques such as chlorination and filtration are designed to kill pathogens from natural sources and would probably be equally effective against a deliberately released agent. Bacterial contamination of the food supply is also unlikely to inflict mass casualties. Cooking, boiling, pasteurization, and other routine safety precautions are generally sufficient to kill pathogenic bacteria. The most likely way to inflict mass casualties with a biological agent is by disseminating it as a respirable aerosol: an invisible cloud of infectious droplets or particles so tiny that they remain suspended in the air for long periods and can be inhaled by large numbers of people. A high-concentration aerosol of B. anthracis or some other pathogen, released into the air in a densely populated urban area, could potentially infect thousands of victims simultaneously. After an incubation period of a few days, depending on the type of agent and the inhaled dose, the exposed population would experience an outbreak of an incapacitating or fatal illness. Although aerosol delivery is potentially the most lethal way of delivering a biological attack, **it involves major technical hurdles that most terrorists would be unlikely to overcome**.To infect through the lungs, infectious particles must be microscopic in size – between 1 and 5 μm in diameter. Terrorists would therefore have to develop or acquire a sophisticated delivery system capable of generating an aerosol cloud with the necessary particle size range and a high enough agent concentration to cover a broad area. Overall, an important trade-off exists between ease of production and effectiveness of dissemination. The easiest way to produce microbial agents is in a liquid form, yet when such a “slurry” is sprayed into the air, it forms heavy droplets that fall to the ground so that only a small percentage of the agent is aerosolized. In contrast, if the bacteria are first dried to a solid cake and then milled into a fine powder, they become far easier to aerosolize, yet the drying and milling process is technically difficult. The Aum Shinrikyo cult struggled with dissemination (67, 69, 70). In one of its anthrax dissemination attempts, it sprayed unknown, but probably very large, quantities of a liquid aerosol (most likely crude culture, unprocessed in any way) of B. anthracis from the roof of the Aum’s headquarters building in Tokyo. For the dissemination, the Aum set up two sprayers on the roof of the eight-story building, each within a large round cooling tower. Pipes were extended from the cooling towers to tanks below, which were filled with a liquid suspension of B. anthracis. The device worked poorly, producing large droplets rather than the very fine aerosol needed for effective transmission of anthrax. It also appears the spore concentration was very low (at least five orders of magnitude below that necessary for a highly infectious wet aerosol). In another dissemination attempt, targeting the area around the Kanagawa prefectural office and the Imperial Palace, the Aum equipped vehicles with spraying devices, but according to prosecutors’ statements, the nozzle of the sprayer clogged and the operation failed. Despite its 200 m2 laboratory containing, amongst other equipment, a glove box, incubator, centrifuge, drier, DNA/RNA synthesizer, electron microscope, two fermenters each having about a 2,000 litre capacity, and an extensive scientific library, and despite its repeated attempts at dissemination, the Aum was unsuccessful in causing any disease, and in retrospect it is clear that the cult did not even make the first substantive step toward an effective bioweapon. If, despite the odds, aerosolization was achieved, the effective delivery of biological agents in the open air is highly dependent on atmospheric and wind conditions, creating additional uncertainties. Only under highly stable atmospheric conditions would the aerosol cloud remain close to the ground where it can be inhaled, rather than being rapidly dispersed. Moreover, most microorganisms are **sensitive to u**ltra**v**iolet radiation and cannot survive more than 30 min in bright sunlight, limiting their use to night-time attacks. One major exception is anthrax, which can be induced to form spores with tough outer coats that enable them to survive for several hours in sunlight. Terrorists could, of course, stage a biological attack inside an enclosed space such as a building, a subway station, a shopping mall, or a sports arena. Such an attack, if it involved a respiratory aerosol, might infect thousands of people, but even here the technical hurdles would by no means be trivial. Finally, even if a biological weapon had been disseminated successfully, the outcome of an attack would be affected by factors like the health of the people who are exposed to the agent, and the speed and manner with which public health authorities and medical professionals detected and were able to respond to the resulting outbreak. A prompt response with effective medical countermeasures, such as antibodies and vaccination, **can significantly blunt the impact of an attack**. Simple, proven ways to curtail epidemics, such as wearing face masks, hand washing, and avoiding hospitals where transmission rates might soar, can also prove effective in stemming the spread of a disease. Indeed, this aspect of a bioterrorism attack is often underplayed in scenarios like Tara O’Toole’s “Dark Winter” and “Atlantic Storm,” where the rates of contagion used are often significantly higher than those in historical cases of natural outbreaks (71).

### AT Food Wars

#### No ag impact

Steven **Pinker 11**, Prof @ Harvard, Steven Pinker: Resource Scarcity Doesn’t Cause Wars, <http://www.globalwarming.org/2011/11/28/steven-pinker-resource-scarcity-doesnt-cause-wars/>

Once again it seems to me that the appropriate response is “maybe, but maybe not.” Though climate change can cause plenty of misery… it will not necessarily lead to armed conflict. The political scientists who track war and peace, such as Halvard Buhaug, Idean Salehyan, Ole Theisen, and Nils Gleditsch, are skeptical of the popular idea that people fight wars over scarce resources. Hunger and resource shortages are tragically common in sub-Saharan countries such as Malawi, Zambia, and Tanzania, but wars involving them are not. Hurricanes, floods, droughts, and tsunamis (such as the disastrous one in the Indian Ocean in 2004) do not generally lead to conflict. The American dust bowl in the 1930s, to take another example, caused plenty of deprivation but no civil war. And while temperatures have been rising steadily in Africa during the past fifteen years, civil wars and war deaths have been falling. Pressures on access to land and water can certainly cause local skirmishes, but a genuine war requires that hostile forces be organized and armed, and that depends more on the influence of bad governments, closed economies, and militant ideologies than on the sheer availability of land and water. Certainly any connection to terrorism is in the imagination of the terror warriors: terrorists tend to be underemployed lower-middle-class men, not subsistence farmers. As for genocide, the Sudanese government finds it convenient to blame violence in Darfur on desertification, distracting the world from its own role in tolerating or encouraging the ethnic cleansing. In a regression analysis on armed conflicts from 1980 to 1992, Theisen found that conflict was more likely if a country was poor, populous, politically unstable, and abundant in oil, but not if it had suffered from droughts, water shortages, or mild land degradation. (Severe land degradation did have a small effect.) Reviewing analyses that examined a large number (N) of countries rather than cherry-picking one or toe, he concluded, “Those who foresee doom, because of the relationship between resource scarcity and violent internal conflict, have very little support from the large-N literature.”

### AT Science Diplomacy

#### Science diplomacy fails

Dickson, 10 (David, director of SciDev.net (science for the developing world) and 20+ years in science policy journalism, 6/28/10, “Science in diplomacy: “On tap but not on top,” https://scidevnet.wordpress.com/2010/06/28/the-place-of-science-in-diplomacy-%E2%80%9Con-tap-but-not-on-top%E2%80%9D/)

There’s a general consensus in both the scientific and political worlds that the principle of science diplomacy, at least in the somewhat restricted sense of the need to get more and better science into international negotiations, is a desirable objective. There is less agreement, however, on how far the concept can – or indeed should – be extended to embrace broader goals and objectives, in particular attempts to use science to achieve political or diplomatic goals at the international level. Science, despite its international characteristics, is no substitute for effective diplomacy. Any more than diplomatic initiatives necessarily lead to good science. These seem to have been the broad conclusions to emerge from a three-day meeting at Wilton Park in Sussex, UK, organised by the British Foreign Office and the Royal Society, and attended by scientists, government officials and politicians from 17 countries around the world. The definition of science diplomacy varied widely among participants. Some saw it as a subcategory of “public diplomacy”, or what US diplomats have recently been promoting as “soft power” (“the carrot rather than the stick approach”, as a participant described it). Others preferred to see it as a core element of the broader concept of “innovation diplomacy”, covering the politics of engagement in the familiar fields of international scientific exchange and technology transfer, but raising these to a higher level as a diplomatic objective. Whatever definition is used, three particular aspects of the debate became the focus of attention during the Wilton Park meeting: how science can inform the diplomatic process; how diplomacy can assist science in achieving its objectives; and, finally, how science can provide a channel for quasi-diplomatic exchanges by forming an apparently neutral bridge between countries. There was little disagreement on the first of these. Indeed for many, given the increasing number of international issues with a scientific dimension that politicians have to deal with, this is essentially what the core of science diplomacy should be about. Chris Whitty, for example, chief scientist at the UK’s Department for International Development, described how knowledge about the threat raised by the spread of the highly damaging plant disease stem rust had been an important input by researchers into discussions by politicians and diplomats over strategies for persuading Afghan farmers to shift from the production of opium to wheat. Others pointed out that the scientific community had played a major role in drawing attention to issues such as the links between chlorofluorocarbons in the atmosphere and the growth of the ozone hole, or between carbon dioxide emissions and climate change. Each has made essential contributions to policy decisions. Acknowledging this role for science has some important implications. No-one dissented when Rohinton Medhora, from Canada’s International Development Research Centre, complained of the lack of adequate scientific expertise in the embassies of many countries of the developed and developing world alike. Nor – perhaps predictably – was there any major disagreement that diplomatic initiatives can both help and occasionally hinder the process of science. On the positive side, such diplomacy can play a significant role in facilitating science exchange and the launch of international science projects, both essential for the development of modern science. Europe’s framework programme of research programmes was quoted as a successful advantage of the first of these. Examples of the second range from the establishment of the European Organisation of Nuclear Research (usually known as CERN) in Switzerland after the Second World War, to current efforts to build a large new nuclear fusion facility (ITER). Less positively, increasing restrictions on entry to certain countries, and in particular the United States after the 9/11 attacks in New York and elsewhere, have significantly impeded scientific exchange programmes. Here the challenge for diplomats was seen as helping to find ways to ease the burdens of such restrictions. The broadest gaps in understanding the potential of scientific diplomacy lay in the third category, namely the use of science as a channel of international diplomacy, either as a way of helping to forge consensus on contentious issues, or as a catalyst for peace in situations of conflict. On the first of these, some pointed to recent climate change negotiations, and in particular the work of the Intergovernmental Panel on Climate Change, as a good example, of the way that the scientific community can provide a strong rationale for joint international action. But others referred to the failure of the Copenhagen climate summit last December to come up with a meaningful agreement on action as a demonstration of the limitations of this way of thinking. It was argued that this failure had been partly due to a misplaced belief that scientific consensus would be sufficient to generate a commitment to collective action, without taking into account the political impact that scientific ideas would have. Another example that received considerable attention was the current construction of a synchrotron facility SESAME in Jordan, a project that is already is bringing together researchers in a range of scientific disciplines from various countries in the Middle East (including Israel, Egypt and Palestine, as well as both Greece and Turkey). The promoters of SESAME hope that – as with the building of CERN 60 years ago, and its operation as a research centre involving, for example, physicists from both Russia and the United States – SESAME will become a symbol of what regional collaboration can achieve. In that sense, it would become what one participant described as a “beacon of hope” for the region. But others cautioned that, however successful SESAME may turn out to be in purely scientific terms, its potential impact on the Middle East peace process should not be exaggerated. Political conflicts have deep roots that cannot easily be papered over, however open-minded scientists may be to professional colleagues coming from other political contexts. Indeed, there was even a warning that in the developing world, high profile scientific projects, particular those with explicit political backing, could end up doing damage by inadvertently favouring one social group over another. Scientists should be wary of having their prestige used in this way; those who did so could come over as patronising, appearing unaware of political realities. Similarly, those who hold science in esteem as a practice committed to promoting the causes of peace and development were reminded of the need to take into account how advances in science – whether nuclear physics or genetic technology – have also led to new types of weaponry. Nor did science automatically lead to the reduction of global inequalities. “Science for diplomacy” therefore ended up with a highly mixed review. The consensus seemed to be that science can prepare the ground for diplomatic initiatives – and benefit from diplomatic agreements – but cannot provide the solutions to either.

## Solvency

### Multilat Fails

#### Multilateralism fails – countries won’t cooperate, causing fragmentation.

**Young et al 13** (Kevin Young, Assistant Professor in the University of Massachusetts Amherst’s Department of Political Science, Thomas Hale, Postdoctoral research fellow at the Blavatnik School of Government, Oxford University, David Held, Professor of politics and international relations at Durham University, “Global Cooperation Buckling Under Past Successes,” The Globalist, Global Cooperation Buckling Under Past Successes, *\*fc*)

A Systemic Crisis While the need for global cooperation continues to grow, the ability of multilateral institutions to deliver the policy coordination we need has not kept pace. The provision of effective global governance isn’t just lacking in one area — like, say, climate change. It is systematically underperforming across a range of issues. These include the management of the global economy to human security and environmental problems. While many have pondered the many pressing global dilemmas facing the world today, there is a paradox accompanying the global situation as a whole. We are failing under the weight of our own success. Decades of multilateral agreements, new institutions and an increasingly robust system of international law have enabled a radical increase in economic globalization, with substantial benefits for a wide range of countries. But our ability to manage all this complexity of progress has not kept pace. Our more integrated global economy demands more, and more effective, collective management. The problems that confront us now are challenges we never would have encountered without the progress made by the existing network of institutions. The various committees based in Basel, the IMF, the G20, and beyond facilitated a sharp deepening of financial interdependence. When the crisis arrived, they proved adequate — albeit just adequate — to coordinate a minimally sufficient series of policy responses to avoid another Great Depression. Instead of an unmitigated disaster we got a mitigated one. They were of course unable to prevent the crisis from occurring in the first place and have not been able to take the measures needed to prevent the next one. Moreover, just as existing international institutions are useful vehicles for cooperation, they can also come to hinder it. International institutions like the IMF, for example, contain a vast array of resources and expertise for addressing global problems. Yet because of their past behavior and the lock-in of US dominance that was secured over six decades ago, many countries do not trust the IMF as a global governor. Newer institutions like the G20 are a testament to successful development of countries like Brazil, India and China, who have been able to strategically engage with economic globalization in recent years. Yet, with a greater plurality of voices at the negotiation table, cooperation becomes more difficult. Fragmentation From Cooperation When institutions proliferate, the overall system may slide toward dysfunctional fragmentation. Our current set of institutions arose from ad hoc crisis management over the postwar period. Each crisis saw the addition of a new committee, a new joint task force or some other institutional addition. But the sum is not greater than the parts. Indeed, the lack of coherence in global economic governance is directly responsible for a number of the challenges we now face. For example, the reform efforts surrounding complex financial instruments like derivatives are as complex as the instruments themselves. There is not one international institution handling the reform process. Rather, there are five different organizations all handling different pieces, separate initiatives at the EU level and a panoply of different countries all acting simultaneously. Some claim that global economic governance has utterly failed, pointing to the worst financial crisis since the Great Depression and a sluggish recovery. Others regard global economic governance as “good enough.” They point out that we averted an even worse disaster and — despite a global recession — didn’t collapse. In fact, both views are correct: global economic cooperation is failing under the weight of its own success. Across a range of issue areas, the remarkable success of global cooperation in the last several decades has made human interconnectedness weigh much more heavily on politics and the economy than it did in the past. But that process of growing cooperation has now stalled, unable to manage the deep interdependence it has created.

#### Multilateralism empirically fails

Naim ‘9 (Moises; 6/21/09; Distinguished Fellow at the Carnegie Endowment for International Peace; “MISSING LINKS Minilateralism The magic number to get real international action,” accessed 6/26/16, http://foreignpolicy.com/2009/06/21/minilateralism/)

Never say never. Because of the global economic crisis, habits that seemed unalterable are suddenly being altered. Americans are now saving more and consuming less. Financial institutions are no longer betting the house on risky investments they do not understand. Wealthy oil-exporting countries are tightening their belts. At least some emerging markets long prone to financial accidents are behaving with uncharacteristic prudence. Everywhere, change is in the air. Everywhere, that is, except in the way humanity responds to its most menacing threats. You know the list: climate change, nuclear proliferation, terrorism, pandemics, trade protectionism, and more. Not one can be solved, or even effectively contained, without more successful international collaboration. And that is not happening. When was the last time you heard that a large number of countries agreed to a major international accord on a pressing issue? Not in more than a decade. The last successful multilateral trade agreement dates back to 1994, when 123 countries gathered to negotiate the creation of the World Trade Organization and agreed on a new set of rules for international trade. Since then, all other attempts to reach a global trade deal have crashed. The same is true with multilateral efforts to curb nuclear proliferation; the last significant international nonproliferation agreement was in 1995, when 185 countries agreed to extend an existing nonproliferation treaty. In the decade and a half since, multilateral initiatives have not only failed, but India, Pakistan, and North Korea have demonstrated their certain status as nuclear powers. On the environment, the Kyoto Protocol, a global deal aimed at reducing greenhouse gas emissions, has been ratified by 184 countries since it was adopted in 1997, but the United States, the world’s second-largest air polluter after China, has not done so, and many of the signatories have missed their targets. The most recent multilateral initiative successfully endorsed by a large number of countries was in 2000, when 192 nations signed the United Nations Millennium Declaration, an ambitious set of eight goals ranging from halving the world’s extreme poverty to halting the spread of HIV/AIDS and providing universal primary education—all by 2015. Although some progress toward achieving these goals has been made—mostly thanks to Asia’s spectacular economic performance—the failure of rich countries to fully fund these efforts, execution problems in poor countries, and the global economic downturn make the achievement of the goals by 2015 unlikely. The pattern is clear: Since the early 1990s, the need for effective multicountry collaboration has soared, but at the same time multilateral talks have inevitably failed; deadlines have been missed; financial commitments and promises have not been honored; execution has stalled; and international collective action has fallen far short of what was offered and, more importantly, needed. These failures represent not only the perpetual lack of international consensus, but also a flawed obsession with multilateralism as the panacea for all the world’s ills. So what is to be done? To start, let’s forget about trying to get the planet’s nearly 200 countries to agree. We need to abandon that fool’s errand in favor of a new idea: minilateralism. By minilateralism, I mean a smarter, more targeted approach: We should bring to the table the smallest possible number of countries needed to have the largest possible impact on solving a particular problem. Think of this as minilateralism’s magic number. The magic number, of course, will vary greatly depending on the problem. Take trade, for example. The Group of Twenty (G-20), which includes both rich and poor countries from six continents, accounts for 85 percent of the world’s economy. The members of the G-20 could reach a major trade deal among themselves and make it of even greater significance by allowing any other country to join if it wishes to do so. Presumably, many would. Same with climate change. There, too, the magic number is about 20: The world’s 20 top polluters account for 75 percent of the planet’s greenhouse gas emissions. The number for nuclear proliferation is 21—enough to include both recognized and de facto nuclear countries, and several other powers who care about them. African poverty? About a dozen, including all the major donor countries and the sub-Saharan countries most in need. As for HIV/AIDS, 19 countries account for nearly two thirds of the world’s AIDS-related deaths. Of course, countries not invited to the table will denounce this approach as undemocratic and exclusionary. But the magic number will break the world’s untenable gridlock, and agreements reached by the small number of countries whose actions are needed to generate real solutions can provide the foundation on which more-inclusive deals can be subsequently built. Minilateral deals can and should be open to any other country willing to play by the rules agreed upon by the original group. The defects of minilateralism pale in comparison with the stalemate that characterizes 21st-century multilateralism. It has become far too dangerous to continue to rely on large-scale multilateral negotiations that stopped yielding results almost two decades ago. The minilateralism of magic numbers is not a magic solution. But it’s a far better bet at this point than the multilateralism of wishful thinking.