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Playing for Time
on the Edge of the
Apocalypse:
Maximizing Decision Time
for Nuclear Leaders

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**Playing for Time on the Edge of the Apocalypse:
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by

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Synopsis

This paper surveys post-Cold War disputes over the “de-alerting” of nuclear

As a way of breaking the policy stalemate, the author suggests focusing less upon measures to make LOW technically or organizationally impossible and more upon measures to reduce any incentives the nuclear superpowers may still feel to exercise whatever LOW option they may retain. Specifically, the author suggests that territorial ballistic missile defense (BMD) should be continued and improved, and especially that nuclear-related command, control, communications, and intelligence (C³I) survivability be augmented in order to create – arguably for the first time in decades – a credible option of “riding-out” a nuclear attack at today’s reduced armament levels. Even without any change in current launch-ready nuclear postures, these measures could go a long way toward reducing Type B risks, yet in ways that would not seem to entail significant Type A tradeoffs.

I. Introduction

It is common in cinematic thrillers for some enterprising hero to face a terrible crisis in which he or she has bare minutes – or even seconds – in which to make decisions upon which the fate of humanity will hang. Happily, such scenarios are usually just moviemakers’ conceits, dramatic plot devices with which to entertain and enthrall us on the way to an action-packed conclusion in which the lead character’s seat-of-the-pants improvisation and heroism saves the day. The real world, we may be thankful, presents few such situations. But not none of them.

The tense environment of nuclear command-and-control decision-making is perhaps the closest analogue the real world presents to such apocalyptic scenarios in which a small group of people find themselves with the fate of their country and their world in their hands, and may have only moments in which to make an absurdly momentous decision. Yet these nuclear scenarios are not fiction. Nuclear-armed countries *have* faced each other in tense standoffs in the midst of broader crises, fingers poised perilously over the proverbial nuclear “button,” and painfully alert for signs that they might have to press it. On other occasions, officials have confronted warnings of incoming enemy attack, wondering if these signals are a false alarm and trying to decide what to do. On one occasion, a commander-in-chief even got to the point of opening his “nuclear briefcase” in preparation for a possible retaliatory launch in response to what initially looked like an inbound missile – but was not.¹

In nuclear warfighting, as the seminal nuclear strategist Herman Kahn once suggested, we are thankfully all just “theorists” and we hope to stay that way.² At least with respect to the United States and Russia, however – which, despite their vastly reduced post-Cold War stockpiles and the growing arsenals possessed by some other players, still remain the planet’s nuclear superpowers, possessing between them the overwhelming majority of the nuclear weapons presently in existence – there is little that could be called “amateurish” about the countries’ preparations for a possible nuclear crisis. Every minute of every day, expensive and

¹ See, e.g., Lawrence Freedman, *The Evolution of Nuclear Strategy* (New York: Palgrave MacMillan, 2003), at 417.

² Sharon Ghamari-Tabrizi,

nuclear forces with less risk. As one senior U.N. disarmament official put it, for example, de-alerting is also envisioned as a “stepping stone” toward achieving nuclear disarmament.¹⁰

The close connection between de-alerting and disarmament advocacy complicates the policy debate, however, by exacerbating suspicions in the minds of nuclear policymakers about whether de-alerting is even *intended* to be compatible with stable nuclear deterrence during whatever period of time even self-proclaimed abolitionists expect will have to pass before “zero” is achieved.¹¹ This makes it easier for skeptics to dismiss advocates as being disingenuous, and limits the degree to which genuine dialogue can occur about the management or avoidance of accident risks in nuclear policy. If de-alerting is meant to be taken seriously by nuclear decision-makers as a proposal for the avoidance of catastrophic nuclear accidents, it needs to be seen as more than merely an instrumental step one takes after having *already* made the decision to eliminate all one’s nuclear weapons in short order: de-alerting needs to be able to stand on its own. More sophisticated proponents such as Bruce Blair and Scott Sagan indeed provide a thoughtful case in this regard – and one that will be examined closely herein – but the general tone of public debate is notably uneven.

Debates on the subject of de-alerting have also been complicated by a largely unnecessary conflict over whether the United States and Russia presently have a “launch-on-warning” (LOW) policy. In this regard, critics and defenders of current nuclear force postures often simply talk past each other, the former saying or implying that the nuclear superpowers operate on a LOW basis – being set and likely to launch on warning from a “hair-trigger alert” – and the latter denying it. In fact, both sides are both right *and* wrong, and much time and energy has been devoted to talking *around* the real issues.

It is certainly true that the United States and Russia appear to devote much energy and expense to maintaining some nuclear forces on an alert level that would permit launch in a very short period of time. In the late Cold War, some 90 percent of the U.S. land-based Minuteman missile ICBM force was said to be launchable within three minutes of receipt of an authenticated order, while the Soviets were by some accounts estimated to be able to launch up to 80 percent of their force in an equivalent time period. The Soviets first demonstrated the ability to launch an ICBM on tactical warning in 1982, had fully deployed a satellite-based early-warning system by 1987, and by 1988 possessed (and had exercised) the technical option of launching sizeable nuclear forces on warning of an incoming attack. By 1990, according to U.S. intelligence officials, “[m]ost, if not all, Soviet ICBMs could be launched within minutes of a valid launch order.”¹² Years after the head of the Soviet Strategic Rocket Forces first publicly mused about LOW in 1967, there are “strong indications” that Moscow has ensured this option.¹³

¹⁰ U.N. Under Secretary General for Disarmament Affairs Jayantha Dhanapala, “The De-Alerting of Nuclear Weapons: The International Political Context,” remarks in Stockholm, Sweden (October 10, 1998), available at <http://disarmament.un.org/speech/10Oct1998.htm>.

¹¹ See, e.g., Remarks of President Barak Obama, Hradcany Square, Prague, Czech Republic (April 5, 2009), at <http://prague.usembassy.gov/obama.html>.

¹² Blair, *The Logic of Accidental Nuclear War* (Washington, D.C.: Brookings Institution, 1993), at 111, 128, 148 & 207. Soviet mobile land-based missiles were felt to have slower reaction times than silo-based ICBMs, however, on account of their need to go through more complicated set-up procedures. Mobile units were believed to have a “scatter-on-warning” policy, dashing to pre-surveyed launch positions in the field from the garrisons in which most of them spent most of their time, and only thereafter preparing

It is also true that the U.S. officials have long refused absolutely to *rule out* launch-on-

According to strategist Herman Kahn, in fact, it was not entirely clear that an ostensible launch-on-warning policy would in fact deter at all – either because one’s opponent might develop clever ways to spoof or defeat early warning systems, or simply because it might not be *believed* that a U.S. President would in fact take the fateful step of “pressing the button” on the basis of what might be an error. As Kahn summed it up,

the 1960s and 1970s arguably implied this.²⁷ Russia's reliance during the Cold War (and since) upon ICBM missile silos hardened considerably beyond U.S. practice, extensive underground facilities for the protection of leadership assets,²⁸ an SSBN force capable of undertaking deterrent patrols, and a growing arsenal of mobile land-based ICBMs suggests that Moscow also wishes to reserve the option of "riding out" an attack rather than launching its weapons in response to "use or lose" considerations. Bruce Blair himself has argued that during the Cold War, LOW was probably philosophically incompatible with the collective decision-making culture of the Soviet Politburo, and in any event was not as "technically and politically robust" an option for the Kremlin as it was for U.S. planners.²⁹

It seems likely, therefore, that both U.S. and Russian nuclear forces are structured to *preserve* a LOW option but not to *presume* it will be taken. Even the Canberra Commission Report of 1996, while unstinting in its advocacy of de-alerting, conceded that both U.S. and Russian forces were in fact "structured to be able to ride out a first nuclear strike," complaining merely that these forces possessed "'launch-on-warning' or 'launch-under-attack' options."³⁰ Both powers have devoted themselves to building and maintaining systems and institutions to maximize the (admittedly short) decision-making time available to national leaders without precluding LOW, hoping to minimize the risk of accidents while yet maximally deterring the opponent by denying him any conceivable basis for a conclusion that launching a first strike would elicit little or no retaliation. To the extent that the accusation of a "hair-trigger alert" is meant or presumed to imply a launch-on-warning *policy*, therefore, officials are probably right to contend – as the American Ambassador to the CD put it in 2007, for instance – that U.S. nuclear forces are not and have never been on 'hair-trigger alert.'"³¹

Yet this is not the end of the story, for sophisticated advocates of de-alerting measures do not necessarily contend that LOW is actually official *policy*. Rather, scholars such as Blair suggest that *no matter what official policy is*, U.S. and Russian decision-makers face formidable *incentives* to launch on warning *anyway* – as long as that option is technically available – because force and command-system vulnerabilities leave them with no alternative to LOW if they are to inflict the desired level of retaliatory damage on the enemy. Because both sides effectively lack a genuine "ride-out" option, the argument goes, they would be left, in practice, with little choice *but* to adopt a *de facto* LOW policy, which is indeed just as dangerously destabilizing and prone to accident as the mo

military ‘solution’ seemed to require the launch of ICBMs from their silos *before* they were destroyed.” This turned LOW – despite its well-understood instabilities – into “standard operating procedure, written into warplans and operational manuals.”³⁶ To be sure, Blair admits that these operational incentives for launching upon warning of attack would not *necessarily* have produced an actual launch decision. While “the structure, procedures, and biases” of the command system created *pressure* towards LOW, the actual choice would presumably be that of the senior political leadership. It is true that U.S. Strategic Air Command chief Curtis LeMay once blurted out at a meeting with an advisory committee that if he understood a Soviet attack to be coming, he might well order an immediate preemptive strike himself – that is, to undertake launch on warning on his own volition³⁷ – but even Blair stops short of arguing that military planners could or would have overridden contrary political direction in time of crisis.³⁸ Nonetheless, what one might call the “hydraulic pressure” critique of U.S. and Soviet/Russian launch postures remains a powerful one.

This account of pressure toward launch-on-warning postures coincides with a critique – found in the analyses offered both by Blair and (especially) by Scott Sagan – of early-warning and launch-control systems. This critique argues that such systems became steadily more brittle and accident-prone throughout the Cold War, in large part precisely *because* of the powers’ gravitation to LOW postures that required extraordinarily quick reaction times, notwithstanding the considerable effort and expense devoted to preventing false alarms and other accidents.

Sagan’s account builds upon an analytical contrast between approaches to “high-reliability” management of high-risk industries (*e.g.*, nuclear power plants or aircraft carriers) and the work of Charles Perrow and others on the degree to which such organizations may be inescapably subject to “normal accidents.” “High-reliability” theorists generally believe it possible to manage complicated organizations in dangerous lines of work by means of redundant safety mechanisms, flexible and responsive decentralized organizational autonomy, the creation of a comprehensive “culture of safety,” and other expedients. A counterpoint to this thinking, however – which Sagan concludes is more applicable to the context of U.S. and Russian early-warning and command-and-control architectures – may be found in Perrow’s work on how for some types of organization, “serious accidents are inevitable, no matter how hard we try to avoid them.”³⁹

Through the prism of Perrow’s analysis, high interactive complexity and “tight” organizational “coupling” – that is, the degree to which, respectively, a system’s components interact in non-linear ways capable of producing unexpected consequences, and its activities are time-dependent and without the sort of slack in their operational sequencing that would permit improvisational responsiveness to unanticipated events – make organizations highly accident-prone regardless of the intentions of their leaders and operators, and irrespective of the precautions they may take. (The redundancy, decentralization, and intense safety training beloved of “high-reliability” theorists, it is suggested, cannot much reduce these problems.

³⁶ Steven Starr, “High-alert nuclear weapons: examining the risks,” *SGR Newsletter*, no.36 (Autumn 2008), at 1-2.

³⁷ Ghamari-Tabrizi, *The Worlds of Herman Kahn*, *supra*, at 189.

³⁸ Blair, *The Logic of Accidental Nuclear War*, *supra*, at 51.

³⁹ Sagan, *The Limits of Safety*, *supra*, at 31.

warning by setting things up so that it is basically impossible – for physical, technical, or organizational reasons – for either side to launch its nuclear forces on short notice.

B. *The Counter-Narrative*

Not surprisingly, given that – notwithstanding nuclear strategists’ frequent acknowledgement of the likely strategic instability of launch-on-warning as *policy* – both U.S. and Russian officials have continued to go to considerable trouble and expense to preserve a LOW *capability* and have persistently refused formally to rule out its exercise, there exists a counter-narrative to the inadvertence critique’s unhappiness with quick-launch postures. Fundamentally, this counter-narrative asserts the deterrent value of being able to launch on very short notice – which is said to make *advent* war less likely by removing incentives for preemption and ensuring that any attacker would face a formidable retaliatory strike. (According to the U.S. Strategic Command, for instance, maintaining missiles able to deliver a “rapid response” is “an important aspect of our deterrent because it complicates an opponent’s preemptive strike planning.”⁴⁵) It acknowledges the existence of a danger of accidental launch in response to a false alarm, but prefers to stick with approaches to reducing this (*e.g.*, increasing sensor redundancy and cross-verification) that do not compromise the deterrent value that quick-launch capabilities are presumed to provide.

The counter-narrative in no way disagrees with de-alerting proponents that it is important to maximize the effective decision-making time available to national leaders. It does, however, conceptualize this problem quite differently. In this regard, the disagreement between the two positions in large part relates to each side’s identification of the most worrisome risk, and its differing view of what sort of “effective decision-making time” is really at issue.

De-alerting advocates focus upon the extremely short timeframes in which decisions must be taken between the arrival of information suggesting that an enemy attack is in progress and the point by which national nuclear forces must be sent on their way if they are by this method to escape that same incoming attack. These timeframes are very short indeed. U.S. officials, for example, are thought likely to have only about 20 minutes after a NORAD threat briefing until the impact of Russian ICBM warheads – which leaves perhaps only ten minutes in which to make a potential launch decision before devoting a further five to ten minutes to the transmission of launch orders and the execution of missile ignition sequences at the Minuteman missile fields.⁴⁶ (A submarine-launched ballistic missile [SLBM] attack could shorten these times further, since the first incoming warheads would have to travel much shorter distances if launched from deployment areas not far from U.S.

objectives before Tsarist Russia was able to complete its own ponderous mobilization.⁵² With the rival European powers having powerful incentives for reciprocal mobilization in order to avoid being caught unprepared, and Germany fearing that it would lose the military advantage if it waited until the larger Russian army reached full readiness, any one power's decision to mobilize made the escalatory process basically unstoppable and was therefore functionally equivalent to a decision for total war. The skeptics' argument against de-alerting is a classical deterrence-theory critique of crisis stability dynamics, with the Schlieffen Plan as its paradigmatic classical illustration of the catastrophic war-inducing incentives of a mobilization race.

Just as Germany's perceived need to beat its potential opponents to the punch in mobilizing ground troops helped precipitate the ghastly trench warfare of World War One, so the de-alerting skeptics fear that de-alerting measures could ignite a crisis-exacerbating race to re-alert nuclear forces. To be sure, most such skeptics acknowledge real early-warning and control-system accident risks, but – particularly to the extent that some de-alerting steps, such as “de-mating” and separate storage of missile warheads, arguably create *more* first-strike incentives for a potential adversary able to “win” a re-alerting race – they tend to feel that de-alerting could exacerbate crisis instability enough to make this particular remedy more dangerous than helpful.⁵³

Interestingly, despite his ostentatious sympathy for the cause of disarmament and achieving “a world without nuclear weapons”⁵⁴ and campaign pledge to “take nuclear weapons off hair-trigger alert,”⁵⁵ President Obama's administration has recently come squarely down on the side of the skeptics. In its *Nuclear Posture Review* (NPR) of 2010, the administration joined the de-alerting debate, recounting that it had “considered the possibility of reducing alert rates for ICBMs and at-sea rates of SSBNs.” While the United States intended to continue “efforts ... to diminish further the possibility of nuclear launches resulting from accidents, unauthorized

⁵² Writing well before today's de-alerting debates, Herman Kahn used the 1914 mobilization scenario as an example in illustrating how seemingly implausible and unsought war scenarios can nonetheless come to pass as a crisis develops. See, e.g., Kahn, *On Thermonuclear War*, *supra*, at 368-70; Kahn, *Thinking About the Unthinkable in the 1980s*, *supra*, at 128. The 1914 analogy, however, is alive and well today. Kenneth Waltz, “Thoughts on Virtual Arsenals,” in *Nuclear Weapons in a Transformed World*, *supra*, at 309, 314 (voicing concerns about the dangers of great power nuclear force-regeneration races by citing example of First World War mobilization).

⁵³ Oddly, even Bruce Blair seems to concede that in a crisis, having some forces *already* on ready alert may actually be more stabilizing than de-alerted forces that would have to race to regenerate themselves. He has defended “virtual nuclear ar(2)H(wou to 69.2 228.3E)TT11(3)is1e)4(ya 6D.055g)-5(1389 c)5(817(s4k)T.IITv 104d4tv 131j)H

actions, or misperceptions and to maximize the time available to the President to consider whether to authorize the use of nuclear weapons,” however, it had nonetheless concluded that de-alerting steps “could reduce crisis stability by giving an adversary the incentive to attack before ‘re-alerting’ was complete.”⁵⁶ Accordingly, the NPR declared that

“the current alert posture of U.S. strategic forces – with heavy bombers off full-time alert, nearly all ICBMs on alert, and a significant number of SSBNs at sea at any given time – should be maintained for the present.”⁵⁷

The two sides in the de-alerting debate thus seem to have reached something of a stalemate – albeit one that favors the *status quo* of launch-ready postures, because the principal nuclear weapons holders seem to feel that de-alerting would cause more problems than it would solve.

III. *A Conceptual Framework*

As the foregoing discussion suggests, one can thus conceptualize the current debate as taking place between groups that put differing emphases upon two distinct types of risk and instability. De-alerting skeptics tend to worry most about what one might call “Type A” risks that revolve around the sort of nuclear escalation and use-incentives that are the subject of classical deterrence theory. Type A problems involve instability in a deterrent standoff as seen through the prism of potential *choices* to use nuclear weaponry (*e.g.*, in preemption) – what might thus generally be termed the challenges of “advertence.” “Type B” problems, in turn, relate more the sort of false-alarm or accident risks emphasized by Blair and Sagan. Type B challenges, in other words, are those of *inadvertence*.

These types of concern are neither entirely separate nor mutually exclusive, of course, and neither side of the debate dismisses one risk category and focuses exclusively upon the other. Blair’s critique, for instance, involves both dynamics. For him, the problem is that force and command-and-control vulnerabilities that create incentives for a *de facto* launch-on-warning posture (a Type A worry) coupled with the vulnerability of brittle C³I systems to false alarms and other errors (a Type B problem). And de-alerting skeptics – including the Obama Administration, with its worries about and commitment to reducing accident risks – are greatly concerned with the danger of false alarms and loss of control over nuclear forces. Nevertheless, it is analytically useful to think of these as separate categories because differences in emphasis and prioritization go a long way toward explaining the different substantive positions of the two sides.

Those who worry greatly about Type A problems worry less about inadvertence *per se* than about the structure of incentives that could make *deliberate* war – even deliberate *nuclear* war, with all its easily imaginable horrors – seem rational. Such theorists have long worried that deterrence could fail not because anyone necessarily *really* wants war but rather simply when a situation arises in which one side feels that the harm it is likely suffer from attacking would be

⁵⁶ U.S. Department of Defense, *Nuclear Posture Review Report* (April 2010), at 26, available at <http://www.defense.gov/npr/docs/2010%20nuclear%20posture%20review%20report.pdf>.

⁵⁷ *Id.*, at x.

less than that it would face by *not* doing so. Through this prism, as Herman Kahn once put it, deterrent calculations must look not merely to a party's likely "gain" from belligerence – which may, in this context, seem encouragingly small – but also to its estimation of "risk" in times of stress or crisis.⁵⁸ In this respect, the paradigmatic case may be Japan's fateful decision to attack

of system variables increases, and where variables “follow different periodicity patterns and are highly coupled with each other.” As one study of applied Complexity put it, these conditions are “frequently met in organizations,” underlining Perrow’s conclusion that “crises are more the result of complex, tightly coupled relationships than the outcome of inadequate human actions.”⁶⁰

As Complexity Theorists also explain it, however, organizational fitness is a function of a managed tension – of a system’s ability to hover at a sort of “sweet spot” in organizational dynamics, thereby to taking advantage, to some degree, of the advantages both of tight coupling *and* decoupling. According to Russ Marion, for example, fit systems operate at the “edge of chaos ... at a certain point between tightly coupled and loosely coupled.” Their coupling is loose enough that they can “dissipate the impact of perturbations,” because each component can absorb and neutralize small pieces of perturbation “because of the nature of the relationships among units (*e.g.*, redundancy, overlap) and because the individual units have excess resources.” At the same time, such organizations are tightly coupled enough that they avoid being maladaptively “sluggish in response to manipulation. ” (“[L]oosely coupled systems devour change agents.”) From an organizational perspective, therefore, a fit system is tightly coupled enough to be able to respond *as an organization* to direction from its leadership, while yet not being so rigidly interconnected that it cannot “respond in response to modification that it can[r

B risks: while the deterrent dynamics of nuclear weapons possession “may well have made *deliberate* war less likely,” the “complex and tightly-coupled nuclear arsenal we have constructed [for this purpose] has simultaneously made *accidental* war more likely.”⁶⁷

Nor is this sort of risk-balancing something that occurs only at the level of basic system structure: such tradeoffs are also made on a dynamic basis in the day-to-day operation of command-and-control systems. As Sagan has also observed, while nuclear control systems become more tightly coupled in times of crisis – thus increasing accident risks – they do so *deliberately*, because it is important at such times that leaders be especially confident of their tight control over the forces at their command.⁶⁸

nuclear force” of de-mated missiles and warheads, each stored in dispersed and protected positions.⁷¹

Such “de-mating” remedies, however, seem likely to impose formidable Type A risks, not only by precluding any deterrent value that might derive from preservation of a LOW option but by creating new force vulnerabilities and perhaps even incentives for adversary preemption.⁷² Blair’s “reserve nuclear force” envisions SLBM warheads being stored on land, for instance, which would require submarines to return to port – where they would be extremely vulnerable to attack even with conventional weapons – in order to upload warheads. He concedes, moreover, that consolidated warhead storage depots could incite attack, perhaps even by a small nuclear force stealthily brought back to launch-ready alert, by because they would concentrate an adversary’s strategic targets into a small number of locations.⁷³ De-mating would also add a new level of difficulty and uncertainty about second-strike survivability, for the possessor of de-alerted forces would have to ensure adequate protections not just for its de-mated warheads and their associated delivery vehicles themselves but in fact also for the re-mating *process* itself – the integrity of which would of course have to be ensured against adversary efforts to degrade and disrupt it.⁷⁴

De-alerting measures short of full de-mating present less extreme difficulties in these regards, but they are still unattractive to Type A prioritizers because, as they are intended to do, they preclude the option of launching on warning. Some have other difficulties as well. Having ballistic missile submarines deploy without their missiles’ guidance sets, for example – that is,

missiles⁷⁷ might permit onboard re-alerting after somewhat more significant delays, but with similar potential problems and likely opacity to an adversary.

B. *Other Accident-Risk Reduction*

(1) *Innocuous Default Targeting*

Yet not *all* proposals that have been advanced for reducing inadvertence problems and increasing the effective decision-making time available to national leaders seem to require tradeoffs between Type A and Type B risks. The United States (and apparently Russia) already practice “open-ocean targeting,” for instance, which does not meaningfully reduce the time needed to launch ballistic missiles, but which helps ensure – as the 2010 *Nuclear Posture Review* put it – “that in the highly unlikely event of an unauthorized or accidental launch, the missile would land in the open ocean.”⁷⁸ This is only a modest step, of course, and does not squarely address the false-alarm issues raised by Blair and Sagan, but it should not be dismissed.

(2) *Destroy-after-Launch*

Some have proposed another possibility as well: the installation of radio-controlled self-destruct devices aboard nuclear-armed missiles – not unlike those used to destroy errant missiles on test ranges – so that national leaders could abort a launch *after* it occurs and before it lands.⁷⁹ According to Bruce Blair, Soviet SLBMs during the Cold War were fitted with self-destruct devices. (Apparently, they lacked entire confidence in their submarines’ ability to ascertain the

President George W. Bush endorsed the JDEC concept in 2001, and he and President Putin pledged to bring into force the joint center for exchanging data from early warning systems. Since then, however, the JDEC effort has moved neither smoothly nor quickly, being repeatedly held up over a myriad of frustrating issues such as disputes over how to handle legal liability matters related to U.S. contractors stationed in Russia as part of Center operations.⁹¹ It is noteworthy, however, that – as with the reasons RAMOS collapsed – the things that have held up JDEC did not appear to be enormous, unworkable issues. They were, rather, the sort of things that the two governments presumably could work through if they really wished to do so. The liability issues for JDEC, for instance, were roughly analogous to those involved in the U.S.-Russian plutonium disposition program. Those problems were difficult, and held up the plutonium program for years, but they were ultimately resolved in 2006.⁹² Liability is not now considered to be a problem for JDEC, and indeed Moscow has apparently now designated a facility that could be used for this purpose. In theory, after all, both JDEC and RAMOS *already* have the support, in principle at least, of the United States and Russia.

At present, JDEC, at least, may be moving forward. In a June 2009 joint statement, Presidents Obama and Dmitry Medvedev declared that their experts had begun “intensifying dialogue on establishing the Joint Data Exchange Center, which is to become the basis for a multilateral missile-launch notification regime.”⁹³ Particularly in view of the apparent success of NATO work in recent years to develop a coordinated European air traffic system with Russia – a project funded by NATO and supported by U.S. and Russian experts that envisions routine sharing of air traffic information and will create considerable mutual transparency without actually giving participants an operational role in each other’s air traffic control decisions⁹⁴ – there is reason for optimism about analogous mutual-transparency efforts in missile launch awareness. Routine exchanges of early-warning information would by no means address all of the concerns raised by quick-launch critics such as Blair and Sagan, but it would provide an additional means by which to reduce the likelihood, or impact, of false alarms or misinterpretations of early-warning data.

⁹¹ See generally Samson, “Prospects for Russian-American Missile Defense Cooperation,” *supra*, at 12-14.

⁹² See “Signing of US-Russian Plutonium Disposition Liability Protocol,: statement of U.S. State Department spokesman Sean McCormack (September 15, 2006), available at <http://www.state.gov/r/pa/prs/ps/2006/72291.htm>; see also generally Stimson Center, *Plutonium Disposition* (undated issue briefing), available at <http://www.stimson.org/cnp/?SN=CT200705231272#end16>. For an account of the liability disputes that plagued the plutonium program, and cooperative programs in Russia more generally, see Amb. Michael Guhin, testimony before the Strategic Forces Subcommittee of the House Armed Services Committee (July 26, 2006), available at http://www.globalsecurity.org/wmd/library/congress/2006_h/060726-guhin.pdf; Stimson Center, “Liability Issues in Cooperative Nonproliferation Programs in Russia” (undated issue briefing), available at <http://216.197.111.238/print.cfm?SN=CT200706011307>.

⁹³ “Joint Statement by Dmitry A. Medvedev, President of the Russian Federation, and Barack Obama, President of the United States of America, on Missile Defense Issues” (July 6, 2009), available at http://www.whitehouse.gov/the_press_office/Joint-Statement-by-Dmitry-A-Medvedev-President-of-the-Russian-Federation-and-Barack-Obama-President-of-the-United-States-of-America-on-Missile-Defense-Issues.

⁹⁴ See, e.g., Nicholas Fiorenza, “Eyes on the Sky,” *Defense Technology International* (July/August 2010), at 36.

C. *The Political Context*

One aspect of nuclear risk reduction that is often overlooked in discussions of Type B risk relates to the lessening of tensions in the broader geopolitical context in which nuclear decision-making takes place. Significantly, this is true not merely in the obvious sense that countries in a less tense environment makes are presumably less likely to choose to launch an attack in the first place. In addition to that likely reduction in Type A risks, tension-reduction also serves the interests of Type B reduction by coloring how parties are likely to interpret incoming early-warning data.

It has long been observed that “[t]he likelihood of serious accidents is highest during a crisis, when nuclear forces are placed on a heightened state of alert readiness.”⁹⁵ This is true, however, not just because crisis alerts may bring more forces to a state of advanced readiness,

opinion. The commander combines the reports with prior expectations of attack to produce his revised expectation.”⁹⁸

Depending upon prior information and opinion, in fact – that is, the mental states and expectations that leaders bring to the interpretive process – the same incoming data can, in different contexts, produce *opposite* decisions (*e.g.*, to launch or not to launch). Particularly where launch-on-warning is an available option – thus providing the opportunity for only a sharply limited number of what Blair calls deliberative “judgment cycles” – “initial subjective expectations often strongly determine judgment at the point of forced truncation.” Crises thus make command-and-control systems more fragile and susceptible to launch decisions in response to false alarms because they predispose officials to conclude, and to conclude more quickly, that they are indeed under attack.⁹⁹ This is presumably the insight that underlies Lawrence Freedman’s conclusion that

“the balance of terrors rests upon a particular arrangement of political relations as much as on the quantity and quality of the respective nuclear arsenals. Movement on these political relations could prove far more disturbing to nuclear stability than any movements of purely military factors.”¹⁰⁰

The corollary of this, however, is that a *lessening* of tensions in the broader strategic environment will *reduce* the risk of nuclear use in response to a false alarm, *even if launch on warning remains no less available than before*. This suggests that countries could do much to reduce Type B risks – even *without* actually changing anything to do with their force posture – by working more assiduously to resolve outstanding disputes, augment mutual transparency and confidence-building measures, and otherwise lessen tensions between them. (Even Blair admits that destabilizing pressures toward launch on warning “should gradually diminish as relations continue to improve.”¹⁰¹) Given the controversial nature of de-alerting measures, and the tradeoffs they entail with regard to Type A risks, it may thus be that the pursuit of improved transparency and confidence-building measures between nuclear weapons possessors – coupled with more conventional conflict-resolution work – deserves more emphasis.

D.

and delivery systems, and the attention given them within the military hierarchy, may *itself* be increasing accident risks. Already, for instance, it would appear that the gradual attenuation of the perceived importance of nuclear missions within the U.S. military – and the degree to which nuclear specialties have gone from being considered a badge of elite distinction to a career backwater relative to “real” warfighting or exotic emerging arenas such as outer space and cyberspace – has helped produce a more accident-prone culture in the nuclear components of the U.S. military. As even Bruce Blair has admitted, after all, rusty command systems suddenly moving to high alert “without the benefit of recent experience ... in generally managing high-tempo operations, would be more prone to errors and accidents”¹⁰⁵

After an incident in 2007 in which nuclear-armed cruise missiles were mistakenly loaded aboard a B-52 bomber and flown for several hours across the United States – an episode which led to the sacking of the Secretary and the Chief of Staff of the Air Force – official inquiries and Congressional testimony indicated that Air Force nuclear safety standards had begun to slip in the early 1990s, in step with the military’s de-emphasis upon nuclear missions at the end of the Cold War. In 1992, Chief of Staff Merrill McPeak warned of “worsening practices regarding the safe handling and storage of nuclear weapons and directed commanders at every level to review surety programs.”¹⁰⁶ This apparently did not work, and America’s post-Cold War loss of interest in nuclear weaponry led to further problems. According to the head of the blue ribbon Air Force panel looking into the B-52 incident in 2007, its investigators found “a diminished focus on the nuclear mission” that can be traced “back to 1991 and the end of the Cold War.”¹⁰⁷ Paradoxically, therefore, it may be that the progress of disarmament and the clear decline of U.S. interest in nuclear capabilities have been increasing Type B risks, at least in the United States.

Ford/Maximizing Decision

notification of top national leaders on either side¹¹¹ – let alone to the commencement of

option, thus greatly increasing pressures toward the adoption of *de facto* launch-on-warning policies, because even if submarines and mobile land-based missiles survived an assault, they could not thereafter be used effectively on account of C³I degradation and disruption.¹¹⁶

There are certainly those who think Blair overplays the idea of command-and-control vulnerability, but it is worth taking seriously because of its importance to the de-alerting argument – and to a potential way out of the zero-sum tension between Type A and Type B risk reduction. As Blair tells it, the Soviets came to pose a severe threat to U.S. retaliatory capabilities in the mid-1960s, from which point U.S. C³I remained in what he has called a “creaky condition” likely to suffer catastrophic disruption in the event of large-scale nuclear attack. By the mid-1970s, in fact, he claims that the U.S. system “seemed almost designed to collapse under the weight of attack.” The neglect of C³I survivability meant that even by the early 1970s, estimates of American second-strike capabilities were “misleading” because number of *survivable* weapons exceeded the number of *controllable* second-strike weapons “by a factor of two or more.”¹¹⁷

This problem was admitted with remarkable candor by U.S. officials such as Secretary of Defense Caspar Weinberger, who conceded in 1983 that prior strategic analysis had been lamentably “blind to command and control” issues, and that repair to fragile U.S. systems was “perhaps the most urgently needed element” in Reagan-era plans for strategic revitalization. In the name of bolstering deterrence, his defense department sought to develop command, control, and communications systems capable of surviving attack and enabling “controlled nuclear counterattacks over a protracted period while maintaining a reserve of nuclear forces sufficient for trans- and post-attack protection and coercion.”¹¹⁸

Despite considerable efforts, however, it is not at all clear that this program succeeded. Some progress was apparently made in addressing weaknesses in what the U.S. Air Force Chief of Staff described as the “initial communications” needed at the outset of war, but not much seems to have been done beyond that. Blair contnt4(o)9..52 521.28 12.765 0 Ttiesr The svent soned tr
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all, Blair argues that both powers' C³I “lacked the resilience necessary to meet the classic textbook requirements of deterrence based on second-strike retaliation,” and both lacked the effective option of ride-out in response to an enemy first strike “that threatened to demolish the opponent’s command centers and communications tentacles.” As a result, retaliation after “ride-out” was “not a viable option in the real world” for either side.¹¹⁹

Such conclusions presumably did not surprise those analysts who had wondered for years whether it was even *possible* to ensure sufficient nuclear force and C³I survivability in the face of the enormous nuclear barrages that were possible at the height of the Cold War. Desmond Ball

relatively quick employment, as opposed to a more laborious return to service from U.S. “reserve” stockpile – already slated to come down to a maximum of 1,550 on each side under the pending “New START” agreement, and with the numbers of immediately ready-to-launch warheads being even smaller. This, in turn, could make it possible for both sides to develop a credible “ride-out” option – arguably for the first time in decades – thus promoting both Type A and Type B risk reduction by simultaneously ensuring retaliation *and* reducing incentives to implement launch on warning.¹²⁵

The development, at long last, of a credible “ride-out” option would not necessarily lead the nuclear superpowers to abandon their LOW-capable postures. In the interest of providing added assurance against preemption, one or both might retain at least some forces on immediate alert, though perhaps fewer than before. Even were present LOW capabilities to remain entirely unchanged, however, the development of a genuine “ride-out” option on *either* side would seem likely to lessen Type B risks considerably, by reducing the pressure its possessor would feel – *e.g.*, in the event of a false alarm – actually to *use* its LOW capability. This would also serve Type A interests, by avoiding the perils described by Herman Kahn in advocating against “sole reliance” for deterrence on apocalyptic quick-launch decisions that an adversary might suspect that a president would never actually make.¹²⁶

Significantly, the Obama Administration has made noises that suggest that it may be open to doing something along these very lines. Right on the heels of its rejection of de-alerting, the most recent U.S. *Nuclear Posture Review* recommends “further strengthening the U.S. command and control system to maximize Presidential decision time in a nuclear crisis.”¹²⁷ The Report recounts that U.S. officials had examined the effectiveness of “command and control of U.S. nuclear forces as an essential element in ensuring crisis stability, deterrence, and the safety,

strategy that will inform out-year budget submission to Congress.”¹²⁸

(The Report also declared that U.S. officials were “exploring new modes of ICBM basing that enhance survivability and further reduce any incentives for prompt launch.”¹²⁹)

This interest in C³I effectiveness is notable, and provides a fascinating complement to the Administration’s commitment to ongoing nuclear reductions. To be sure, it is not yet clear how seriously the Obama Administration takes such ideas, or whether they would survive the rumored departure of Secretary Gates. Nor have such ideas yet been articulated in terms that would clearly suggest any commitment to “ride-out” and the degree of *de facto* nuclear warfighting capability that real C³I survivability necessarily entails. Nevertheless, these comments suggest an American receptivity to the challenge of reducing incentives for launch on warning even while continuing to reject de-alerting measures designed to preclude its availability. This indicates that it may be possible to develop C³I survivability as a policy option capable of reducing both Type A and Type B risks while garnering support from both sides in today’s de-alerting debates.

V. Conclusion

Building upon the critique of nuclear accident risks suggested by scholars such as Blair and Sagan, this paper has suggested that measures intended to reduce Type B (inadvertence) risks are by no means always costless in terms of Type A (advertence) risks. Effective command-and-control involves maintaining a dynamic balance between usability and non-usability, between tight and loose coupling, and

