Reinvigorating the USAF Nuclear Enterprise

By Mark Stout

When a private enterprise fails, it is closed down; when a government
enterprise fails, it is expanded
-- Milton Friedman

Note: this article originally appeared in the 24 December 2009 edition of Air University's The Wright Stuff.

What will it take to reinvigorate the USAF nuclear enterprise? To paraphrase one former commander in chief, that depends on what you mean by reinvigorate. If the Air Force wants to achieve the compliance-driven/inspection-focused standards of the Strategic Air Command era, significant progress has certainly been made. Conversely, if the Air Force instead wants to build its nuclear enterprise into what organizational theorists describe as a "high reliability organization" (HRO), more work remains.

Scott Sagan, author of *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons,* summarized four important causal factors that will be required for the Air Force nuclear enterprise to be considered an HRO: 1) when nuclear safety and reliability are goals of both political and organizational leadership, 2) when high levels of redundancy are present in personnel and technical safety measures, 3) when a culture of high reliability is developed in decentralized and continually practiced manners, and 4) with sophisticated forms of trial and error organizational learning. While Sagan wrote largely from an "avoiding World War III" point of view, many of his observations are pertinent to the Air Force's nuclear reinvigoration efforts.

First, having had to deal with the organizational turmoil, embarrassment, and rework associated with two errors of great significance (we'll call them Minot and Taiwan for expediency's sake) and because it's the right thing to do, there is little doubt Air Force leaders are now committed to walking the nuclear walk. This means properly resourcing and organizationally addressing weaknesses that called the Air Force's nuclear stewardship into question. While these Air Force-level adjustments are well underway, Sagan might point out that the goals of our political leadership regarding the nuclear enterprise also come back to definitions, this time in establishing just what "safety" and "reliability" mean.

Even as the President has advocated for a world without nuclear weapons, he has also acknowledged this is unlikely to happen in his lifetime. This acknowledgement holds the door open for the Reliable Replacement Warhead (RRW) program that, if funded, would be a major initiative to improve the nuclear weapons in the Department of Defense's inventory. However, the RRW has had its funding effectively zeroed every year and there seems to be little current political consensus or will for its necessity. While the RRW program would improve every

aspect of nuclear safety, security, and efficacy, given its contentiousness and high cost (estimates up to $100 billion), it's almost certain to avoid a significant place in the DoD portfolio for some time.

Next, Sagan's issue of nuclear redundancy affects both personnel (with the Personnel Reliability Program, PRP) and technical measures (weapons requiring unlock codes, multiple launch votes, and built with insensitive high explosive designs, fire resistant weapons components, and the likes) which have been in place for many years and are unlikely to change significantly as a result of the Air Force's reinvigoration. Still, redundancy is an important nuclear theme, as it allows the creation of reliable systems even if subsystems (standing alone) cannot achieve desired reliability standards. For example, a security subsystem with a failure chance of one in a thousand when combined with another security subsystem with the same fail rate should together reduce the odds of simultaneous failure to one in a million. These types of improvements have been used to improve the physical security and surveillance of nuclear weapons, but without the aforementioned RRW, few other technical changes will be forthcoming. On the human side, the PRP program does not seem to be broken in terms of effectiveness even though the administrative burden of the program is high, as is its inspection profile.

There is still room for continuing improvement in the nuclear enterprise for both a culture of high reliability and for organizational learning, which are Sagan's third and final factors. As serious as they were, the Minot and Taiwan incidents were just that--they were incidents and were not accidents. In HRO terms, the events can be considered as near-miss opportunities that have allowed the Air Force to build a better organization, one capable of avoiding more serious errors.

Just as a new Air Force command, Global Strike Command, has been created (versus SAC being resurrected), and just as the GSC is headquartered at a new base (at Barksdale and not Offutt), it seems the Air Force does not want to limit itself to the mere recreation of the SAC regime and is instead desirous of an HRO-type nuclear enterprise. GSC's mission is to develop and provide combat-ready forces for nuclear deterrence and global strike operations that are safe, secure, and credible, in support to the President and combatant commanders. Beyond these requirements, a very real goal of the nuclear enterprise should be not just to avoid errors, but rather to achieve true excellence. Among other things, this means organizational incentives to under-report or non-report nuclear shortcomings must be banished and a culture of shared and rigorous self-assessment must be fully developed.

In nuclear operations, where standardized operations and established guidance rule the day, HROs have to consider the detrimental effects of routine efforts and even boredom, which are capable of reducing vigilance and can lead to carelessness and error. These pitfalls can be avoided with ongoing organizational processes that solicit continuous work place and task improvement, test individuals and teams with meaningful and realistic routine and emergency simulations, and provide challenging workloads. High-fidelity simulations can give rise to previously unforeseen shortcomings and errors without actually endangering operational nuclear systems. Without these simulation-induced errors, learning is less likely to occur. Thus, competitions between and among nuclear units (using simulators and the likes, so it isn't as

scary as it sounds) may help create very useful learning environments and contribute to overall nuclear surety, as would nuclear conferences, cross talks, and the likes. A desire to learn and improve by our nuclear Airmen is essential.

These sorts of nuclear HRO-enhancers do not come cost-free and even have to be dealt with in the midst of the uncertainty associated with the upcoming release of DoD's Nuclear Posture Review and the arms control negotiations that are associated with the follow-on to the just-expired START treaty. However, the Air Force can and should make a compelling case to invest in and build this powerful culture of reliability and organizational learning. This can be done by programming for more Airmen at the nuclear units, and by laying in funding for competitions, high-fidelity simulations, and travel to support such endeavors. Success can also be enhanced with more clearly understood career paths, common experiences, and training and educational opportunities that are not yet mature.

As the Air Force nuclear enterprise works to become a high reliability organization, it will be well advised to consider its progress through the findings of cognitive researcher Dietrich Dörner. Dörner, in his book, *The Logic of Failure: Recognizing and Avoiding Error in Complex Situations*, has discovered several shortcomings that may weaken our effectiveness in solving problems, such as the march to become an HRO. Dörner suggests when we work to solve problems, we streamline the effort to save time and energy (we tend to be in a hurry); we try and repeat past successes (we tend to be mechanical) and are biased towards unchanging mental models (we tend to be lazy); and, we often ignore the problems our solutions create (we tend to gloss over unintended consequences). As such, in addition to more resources, continued diligence and senior organizational leadership will continue to be required across the board.

The flip side of an HRO is the "normal accidents" organization.   The normal accidents organization and its associated theory--which appears to have been at work during the Minot and Taiwan events--holds that accidents (or incidents) are inevitable in complex systems such as the Air Force's nuclear enterprise. This is because the normal accidents type of organization has diffused and competing organizational priorities, tends to encourage inappropriate risk-taking, leads to a denial of responsibility, and is poor at organizational learning. Obviously a 'normal accidents' approach to nuclear operations makes no sense for the Air Force as an institution or to the nation as a whole.

Mark Stout is a researcher and analyst at Air University's [National Space Studies Center](#) and sometimes posts at the blog [Songs of Space and Nuclear War](#). The opinions expressed here are those of the author alone and may not reflect the views and policies of the US Air Force or the Department of Defense.