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Charles Perrow, author of *Normal Accidents*, noted 26 years ago that the more conflicts an institution has with regard its goals and approach in managing complex high technology systems, the more these organizations are prone to disappoint in achieving their mission. Such organizations, he warned, may actually end up contributing to the very disasters they were established to prevent.[1]

Given that the International Atomic Energy Agency (IAEA) has several conflicts in both its various missions and in how it must conduct its safeguards business, Dr. Perrow's analysis recommends itself when thinking about how best to build support for the IAEA's safeguards mission. With regard to other agency goals that are in tension with its safeguards mission, two come to mind.

First, the IAEA's membership has generally affirmed the Nuclear Nonproliferation Treaty (NPT) goal of the superpowers reducing their nuclear weapons arsenals. Many members have done so, however, to the point of viewing IAEA safeguards (which unlike nuclear disarmament, are clearly a part of the IAEA's legal mandate) as an unfair burden to bear so long as the superpowers retain their nuclear arms.

Second, although the agency's membership is enthusiastic about agency's mission to expand the number of states enjoying peaceful nuclear energy, few, if any members are anywhere near as enthusiastic about the agency's mission to safeguard these programs. Nearly 64 states are now telling the IAEA that they want a power program on line by 2030 and are seeking IAEA assistance in this regard. This number is more than double the number of states that currently operate nuclear power plants. In addition, India's recent safeguards agreement with the IAEA has immediately increased the number of plants that the agency must be inspect. The U.S. and other major nuclear suppliers, meanwhile, believe that even more should be done to encourage the sharing of civilian nuclear energy and are working with the IAEA to assure such a result. These developments are producing a potential safeguards shortfall. In fact, the IAEA has imposed a safeguards budget freeze and agency staff has been asked to plan this year on a five percent safeguards budget cut.

As for how the agency currently conducts its safeguards business, it has a clear mandate to detect possible military nuclear diversions but will not allow a false alarm rate any higher than five percent – hardly what air travelers tolerate every day they go through security to board their planes. In addition, the IAEA must keep track of nuclear materials that are of direct use to make nuclear weapons. Yet, it keeps materials accounted for (MAF) and even some of the specifics about materials unaccounted for (MUF) from the public. The agency's safeguard department also must assure it has the resources it needs and to convince its board of governors if it needs more. Yet, it keeps its own assessments of what it costs to inspect each country's declared facilities and what it costs to inspect specific kinds of facilities confidential.

Finally, as an international institution, the agency has a clear desire to operate in as nondiscriminatory a fashion and as much by consensus as possible. Yet, because of its lack of resources to fund its safeguards activities, is drawn to focus its inspections more on facilities in "trouble" countries than those it deems are "trustworthy," which, in turn, has produced controversy.

All of these problems make it more difficult for the Agency to achieve its safeguards mission, much less to build support for it. On the other hand, these challenges are not insurmountable. At the very least, three thoughts emerge about how one might hedge against the worst (e.g., a bomb being exploded that used "safeguarded" materials). The first is political: If you are worried that your organization may disappoint in achieving one of its key missions, you can always be vague about what failure or success is in achieving this

mission. This standard bureaucratic tactic is employed extensively in educational institutions and in large governments where there are few clear metrics for performance. When it comes to important security related issues, though, it is a bad habit to get into.

Fortunately, for the IAEA its metrics for minimal safeguards success are quite specific. One need only go to the IAEA glossary and look up what the listings for timely detection, timeliness detection goals, conversion times, significant quantities, etc. to see just how precise the IAEA's criteria are for achieving its safeguards mission. Whether or not these metrics (which have numerical values assigned to them) are current or accurate and whether or not the IAEA really can safeguard all that it monitors either by meeting its own standards or some more rigorous set of inspection requirements, though, is another matter. I will come back to this shortly. In any case, fudging what IAEA safeguards success or failure might be ought not to be an option.[2]

The second idea for dealing with these challenges is corporate or corporatist: It is to throw massive amounts of money in support of the organization's activities in order to assure that something succeeds in a big way and to spotlight such successes so that the organization's failures fade in relative significance. A clear advantage of this approach that it is much more attractive than freezing or reducing spending. If money is hard to come by, though, this approach may not be an immediate option. Indeed, with institutions facing difficulties when their budgets are frozen or declining while their workloads are increasing, there is natural defensive tendency to circle the wagons bureaucratically against any new idea (sound or unsound) especially if it entails more spending. Normally, in such cases, the organization's conflicting goals are accentuated to help justify why one actually lives in the best of all possible worlds – i.e., that things are not as bad as they look. This vicious cycle of reduced spending, accentuating existing contradictions and operational tensions to justify the status quo, followed by ever worsening imbalances of resources to workload, though, only reduces the organization's odds of ever reaching any higher levels of performance.

This, then, brings us to three specific recommendations.

First, it would be useful for the IAEA to increase the scope and level of transparency regarding what materials are being safeguarded and what it costs to safeguard IAEA inspected facilities and materials. The agency currently assesses what is required to inspect specific kinds of declared nuclear facilities. It also keeps track of what it costs to inspect declared facilities in each of the state member nations. Finally, it keeps track of how much MAF and MUF each state member has. What it fails to do, however, is make this information public.

The original reason for keeping much of this information proprietary had to do with fears that revealing it might jeopardize the competitive industrial edge states hoped they might gain in developing more advanced nuclear power and nuclear fuel technologies. These worries now seem outdated. Instead, the reason agency officials give today for keeping this information confidential is that revealing it might prompt a debate among member states over who should pay how much for inspections and who is more of a safeguard burden to the agency. Such debates, IAEA hands argue, would produce a "whittling down" effect on the safeguards budget rather than any demand to increase safeguards funding.

None of this, however, sounds entirely right. For many years it was common for the agency to compute the number of person days of inspection (PDIs) for different kinds of declared nuclear facilities – light water reactors used to require about 5-7 PDIs/year, reprocessing plants about 1,000 PDIs/year. Given the onset of new technologies both for safeguarding and for evading safeguards, these estimates need to be updated, discussed, and debated, preferably in public. Similarly, some political entities are currently assessed for the inspections the agency conducts. Taiwan is one such example. Also, the US is assessed for the inspections the IAEA does of some of its facilities. Finally, as the world and the agency pays greater attention to nuclear security, with summits in Washington and Seoul, being as mum as the IAEA is about the specifics regarding MUF and MAF makes less and less sense.

This brings us to a second recommendation.

Armed with information about what materials and facilities require safeguarding and what safeguarding costs, the IAEA should encourage its members to consider new ways to meet these requirements. One way suggested by Tom Shea and amplified in my center's two-year study, *Falling Behind*, is to make the nuclear user pay for IAEA safeguarding of his nuclear goods.[3] Towards this end, it

would be helpful if several major nuclear operating states that currently give the IAEA supplemental safeguards contributions started to explain that these supplemental contributions were actually based on a percentage of the amount of nuclear electrical capacity they had within their borders. This “surcharge” approach would raise safeguards monies on the basis of a fee levied as a percentage of installed, declared nuclear capacity. Once enough states used such justifications for their supplemental contributions, the agency might suggest that this approach be used in addition to the current UN-style assessment that is already made of each IAEA member state. This additional fee would be used exclusively for IAEA safeguards activities. Ultimately, adding such a safeguards surcharge to the existing IAEA assessment would tend to hit the US hardest followed by major European and Asian states all of whom have significant installed nuclear capacity. In some cases it would hit nuclear weapons states that currently don’t have all of their civilian plants inspected by the IAEA. None the less, there would be a reasonable equity in such assessments: The nuclear weapons states have the most to gain from keeping other states from acquiring nuclear weapons so they ought to pay the most even if their own plants are not the ones being inspected.

Initially, the percentage formulas for determining this surcharge could be kept modest so as not to increase total contributions to the agency significantly. But over time the aim would be to make the formula more demanding to generate much more safeguards funding. At the very least, states like Italy that have no power reactors should not be paying more towards safeguards as states, such as South Korea, that have 20 power plants. Second and in addition to this nuclear capacity safeguards assessment, there should be special additional fees based on how safeguards-intensive specific nuclear facilities – e.g., nuclear fuel making, HWR reactor systems, etc.— might be. These add-on safeguards assessments should be made on a prorated basis derived from the number of person days of inspection such safeguards intensive systems require per year.

Finally, it would help if the IAEA could be more candid about the safeguards system by doing an assessment of what the agency can actually safeguard effectively and reliably to assure timely detection of possible military diversions. Currently, the agency’s timeliness detection goals for nuclear fuel making are not being met. Instead of safeguarding these facilities by providing timely, reliable detection, which is not possible, we need to talk about how we might achieve the more modest goal of monitoring such facilities. Also, in light of 40 years of technical innovation, all of the numbers associated with the IAEA’s goal of being able to detect nuclear diversions before the conversion of the material into insertable subcritical masses ought to be scrubbed. Are the conversion times, timeliness detection goals, significant quantities, etc. set four decades ago correct today? The IAEA and its membership need to reconsider this question. The aim would be to clarify routinely what criteria must be met to meet the agency’s safeguards mission, what we can do to upgrade our current safeguards efforts, and where no amount of additional authority or money can assure timely detection.

Some, of course, will complain that even these modest suggestions are too controversial. Perhaps this is so. If true, however, the long term implications for the IAEA achieving its safeguards mission, much less building support for it are, at best, uninviting.

1. See Charles Perrow, *Normal Accidents: Living with High-Risk Technologies* (Princeton NJ: Princeton University Press, 1984), pp. 9 ff.

2. See, e.g., Henry D. Sokolski, editor, *Falling Behind: International Scrutiny of the Peaceful Atom* (Carlisle, PA: Strategic Studies Institute, 2008), pp.24-32, 100-20.

3. See Thomas E. Shea, “Financing IAEA Verification of the Nuclear Nonproliferation Treaty,” in Sokolski, ed. *Falling Behind*, pp. 323-36.