Planetary Defense:
Operations & Execution

Michael Potter

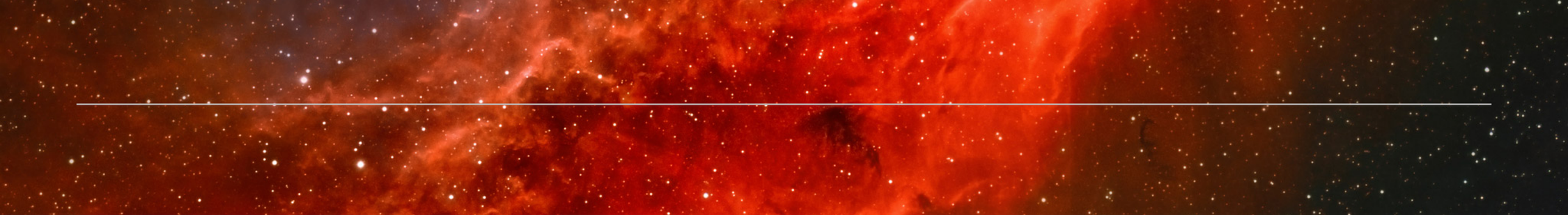
Forward

In December 2014, the European Space Agency held the organization's first asteroid impact drill. Many weakness were discovered during the exercise including the need to interface with local authorities, but in particular the necessity to communicate and coordinate with global organization such as the United Nations.

Also in December, Russian Deputy Prime Minister Dmitry Rogozin urged the global community to pool efforts to ensure protection of the Earth from asteroid threats. He argued that this initiative should be pursued in an international context.

The current focus related to planetary defense concentrates on detecting cosmic hazards. However, the largest gap in planetary defense is the organization of an appropriate response revolving around operations, command, and control and execution of a planetary defense mission against all threats to the world today. This need for a global response capability applies whether this involves an asteroid, a comet, or a coronal mass ejection of some other threat.

There is a need for clear management and control structures that are built on a framework that is based on multilateral enforcement and peacekeeping conventions. Some action has recently been initiated within the United Nations framework via the Committee on the Peaceful Uses of Outer Space at the behest of the General Assembly. But this is really an initial step that must be considered as inadequate in terms of implementing a truly full-scale global response to a major and potentially devastating event with a potentially global impact. Without such framework it is not possible to begin to properly plan for operationalizing planetary defense.



“Here we will learn that each of us bears responsibility for our actions and for our failure to act. Here we will learn that we must intervene when we see evil arise. Here we will learn more about the moral compass by which we navigate our lives and by which countries will navigate the future.”

President George Bush, February 15, 1991

*At the opening of the U.S. Holocaust Museum

Most experts spend a significant amount of time trying to bring attention, first to the larger existential issue of space threats, and secondly to the challenge of building systems of detection and early warning of space hazards.

Certainly there is a sequential logic to emphasizing public awareness and support, and there is absolutely a requirement for the development and deployment of detection and alert infrastructure.

It is also logical to argue, that beyond detection, and beyond alert, actually the greatest gap in planetary defense is that at this moment, there is no effective planetary defense infrastructure.

It is embarrassing to note that the asteroid 2012 DA14, with the potential impact power of 1,000 atomic bombs, that missed the Earth on the same day that the completely undetected Chelyabinsk meteor hit Russia, was not detected by a ministry of defense, or a national space agency. It was in fact, discovered by an amateur Spanish oral surgeon. **Apparently this surgeon represents a significant part of our planetary defense detection infrastructure**. And further, perhaps it could be argued that the citizens of Chelyabinsk and the inhabitants of Tunguska, where an asteroid, with the power of 1,000 Hiroshimas hit 106 years ago, are also essentially human cogs in our planetary defense system.

Assuming that humanity can progress on the space hazards detection and warning front, the next critical question is what is the next step from an operational and execution point of view?

In the near to medium term there are two realistic response scenarios. A response that is effectively dominated by a single country or region, or a response that is truly multinational in substance.

If one views the common dilemma that many national leaders confront, it is not unusual to be presented with two options, both being bad options, but hopefully one option, being slightly less worse than the other.

In the case of actively confronting a planetary hazard, the first challenge would likely be assessing relative probabilities of risks. How likely would the hazard effect the planet? What sort of danger does it present? How many lives are at stake? What sort of economic impact and dislocation might it cause? How much will it cost to mount a defense, and what are some of the consequence from mounting a defensive mission? Will the action from the defensive measure adversely effect one nation or population more than another? Is there a possibility that a defensive action can create more future hazards? Could mounting a mission to target a smaller more immediate threat, make it difficult to respond to a larger less immediate threat?

Assuming that a leadership team can satisfy themselves with the above issues, I would argue that a response mission dominated by a national or regional player will still involve a great deal of international communications and cooperation. Nevertheless, ignoring the scientific and technical challenges for a moment, simply from a mission command and control point of view, the operation would very much resemble a space agency mission, or a military tactical operations.

A planetary defense mission is extremely complex due to its international leadership and integration implications, including design, development and testing and the scale of its operational execution requirements, not to mention funding. Huge challenges in today's political environment. Additionally there is the issue of the dual use technologies that are interconnected to planetary defense. The same technologies that can protect the planet, can also provide offensive military capabilities.

Under current national political realties, one must try to imagine what scale of space hazard, the magnitude of cost, and the scope of complexity. The larger the scale and complexity the impulse to stimulate a more robust international response.

In the area of multilateral peacekeeping, it is not necessarily the scale of the actual task that drives internationalism, but often the political complexities and political sensitivities of a particular region or mission. While international peacekeeping, for example, may be broad in terms of international participation, in terms of command and control it is often less efficient, then the command and control of a single nation, that might be carrying-out the same sort of activities.

Internationalism, almost by definition carries more administrative and leadership overheads and costs than a go-it-alone approach would have.

Often with international mega science and technology projects, when the lofty project mission and vision statements are stripped away, we see them, dominated by issues really involving the development of national industrial base. Industrial base, while arguably required to support current mission capability or future missions, can often be translated as awkward industry subsidies and inefficiencies.

I believe a key question involving the scope of a global response to a space hazard, will revolve around the size of the hazard and the amount of time that we on Earth have to respond to the hazard.

The larger the hazard and the period of time, I believe will most likely lead to a great global participation in terms of the response to the space hazard.

I believe that a smaller specific hazard, on a shorter time horizon, that is capable of being effectively dealt with, by one or two players is more likely to be done in an efficient unilateral or limited multilateral fashion.

Often multinational mega-science projects seem to revolve more around job creation and building indigenous industrial capabilities, than executing the original intended goal of the project itself. National political and economic concerns often trumping issues of execution.

Currently no nation has a powerful, focused national space strategic plane for making humanity a multi-planetary species nor for establishing a robust planetary defense. Space agencies need to update their strategic plans to include both of these activities. In fact a multi-planetary species would also be a plan B in case we fail at plan A in defending our planet.

Depending on the planetary threat, money may not be the most significant issue.
Planetary defense is not so much a technical issue, as it is a national and international political, priority, and allocation of funding set of issues.

Recently, NASA launched two initiatives the 100 Year Starship and Fragile Oasis. Fragile Oasis is inspired by the “overview effect,” the awareness of the fragility of our planet, when viewing the Earth from outer space. The 100 Year Starship project is an initiative which challenges thinkers and policymakers to strategize the key issues that would be involved with running a multigenerational project to launch a starship. The two initiatives seem to dovetail nicely together. Both inspiring the logical conclusions of

planetary defense and pursuing the goal of becoming a multi-planetary species.

A reanalysis of historical observations suggest Earth narrowly avoided an extinction event just over a hundred years ago. Billion-Ton Comet May Have Missed Earth by a Few Hundred Kilometers in 1883. Each fragment was at least as big as the one thought to have hit Tunguska. “So if they had collided with Earth we would have had 3275 Tunguska events in two days, probably an extinction event.”

Planetary defense should be viewed as both morally right, and technically feasible. For those who are not interested in defending the planet, they should start to build their memorial parks, to honor the millions that they essentially have condemned to death through lack of understanding and inaction.

Operational action plans should be developed for response when a space hazard is discovered. Demonstration test missions should be designed and flown to demonstrate and validate the most promising defense options for planetary hazards.

I am not convinced that the UN COPUOS efforts to develop a framework for international decisions and coordinated actions are sufficient or desirable. I think the model of multilateral enforcement and peace keeping mechanisms may be a more efficient starting point.

The strength of multilateral peacekeeping is that the objective is usually humanitarian, with a tremendous focus on political and legal legitimacy and positive impact.

The weakness of multilateral peacekeeping generally revolves around:

- “Mission Creep”
- “Exit Strategy”
- Discipline and professional conduct of ones own troops
- The frailties, complexities and dangers of dealing with competing local religious, tribal, warlord, and other constituencies.

Chapter VII of the Charter of the United Nations provides the framework within which the Security Council may take enforcement action. It allows the Council to "determine the existence of any threat to the peace, breach of the peace, or act of aggression" and to make recommendations or to resort to non-military and military action to "maintain or restore international peace and security.”

For over a half of a century, the United States has utilized chapter VII military sanctions under U.N. authorization. Desert Shield/ Desert Storm in the early 1990s represented, only the second

such American initiative, one which provided a U.N. license for the use of force without restricting the manner in which the U.S. led coalition was to “secure Iraq’s immediate and unconditional withdrawal of its forces from Kuwait.” While required to provide periodic updates to the U.N. Headquarters, the coalition was allowed full planning and operational freedom to use “all necessary means” to execute the mission. This may indeed, be the model and the framework for organizing a mission to defend against cosmic hazards.

In addition the UN should declare that the all people should be able to lead their lives free from fear of preventable space hazards. We ought to insist that this should be a fundamental human right.

Those who undertake efforts to protect humanity from space hazards, ought to be able to do so free of the threat of legal liabilities and concerns relating to compensation, a sort of cosmic good Samaritan legal standard. This should of course be further developed and incorporated in to the existing legislation and conventions on launch liability.

An obvious datapoint in terms of both international space activities and cost, is the International Space Station (ISS). By the time the ISS is decommissioned within the next decade, between $150 Billion and $200 Billion dollars will have been spent, in a fully cost loaded analysis. Compared to the International Space Station, planetary defense, must be viewed as a low cost global insurance policy.

The B612 Foundation has pioneered the use of the non-profit model for the detection of Near Earth Objects. In fact, developing a plan for a global grass roots planetary defense initiative can be accomplished in a very efficient and cost-effective manor.

Initiatives such as “Open Source” hardware and software development can be an important factor in helping to save our “fragile oasis.” In the global computer technology ecosystem, hundreds of billions of dollars have been saved through open source initiatives.

With clear management and control structures, that are built on the framework that we have previously seen with existing multilateral enforcement and peace keeping conventions, we can close the largest piece of the planetary defense gap, and ensure that humanity has a fighting chance of defending life forms here on planet Earth.

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