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To Mars... or Die

The Existential Threat

Once Upon a Time: There was a Big Bang... Cause/Effect - Cause/Effect - Cause/Effect and fifteen billion years later we have this chunk of cosmos weighing in at a couple trillion tons, screaming around our solar system, somewhere, hair on fire and at a million miles a day on course to the subjective center of the universe. Left to its own fate, on impact, this rock would release the kinetic energy equivalent of one Hiroshima bomb for every man, woman and child on the planet. Game Over... No Joy. Restart Darwin's clock - again. No happy ever after. No Better Luck Next Times. It's just all there is, forever... gone.

There is simply no empirical logic or any rational argument that this could not be the *next* asteroid to strike Earth or that the next impact event could not happen tomorrow. That would only be the product of an Expectation of Good Luck. Even though we have long been aware of this threat and had the theoretical technological ability, we can only imagine a handful of dubious undeveloped and untested tactics we could employ in our defense. There is nothing we could remotely consider to be a standing and effective capability to defend ourselves. Nothing we have actually prepared to do in response to this credible and perpetually imminent threat.

From an empirical analysis of the dynamics and geometry of our solar system, we have come to understand that the prospect of an Earth/asteroid collision is a primal and ongoing process: a solar systemic status quo that is unlikely to ever change. The problem here is that the distribution of these events is completely aperiodic and random both in their occasion and magnitude. From abstract averaged relative frequency estimates we can fairly project that over the course of the next 500 million years in the life of Earth we will be struck by approximately 100,000 asteroids large enough to warrant our consideration. Most will be relatively small - 100 to 1,000 meters in diameter - millions of tons: only major city to nation killers. 1,000 or so will be large - over 1,000 meters - billions of tons and large enough to do catastrophic and potentially irrecoverable damage to the entire planet: call them global civilization killers. Of those, 10 will be over 10,000 meters, trillions of tons and on impact massive enough to bring our species to extinction. It bears repeating: these events are in fact aperiodic and random in both their occasion and magnitude.

All these asteroids are out there, orbiting the sun... now. Nothing more needs to happen for them to go on to eventually strike Earth. As individual and discrete impact events, they are all, already events in progress. By any definition, this is an Existential Threat.

Fortunately, our technological potential has evolved to a point that if we choose to do so we have the ability to deflect asteroid impact events. Given a correspondingly evolved political will, we can develop this ability into a manifest capability and effectively manage this threat to the continued survival of our species. But since these events are aperiodic and random, and the next asteroid impact can occur at any time, we can not simply trust that an enlightened political will will somehow, spontaneously/naturally develop before we are faced with the challenge of responding to this reality. If we would expect to deflect the *next* impact event a deliberate, rational, punctuated equilibrium of the evolution of our sociopolitical will is required *now*.

TNLA: The abstract averaged relative frequency perspective described above, or any derived random-chance statistical probabilistic assessment, in itself, would be strategically meaningless and irrelevant. After all, just how many extinction level events can we afford?. However, indirectly it can be constructive in illuminating the existential and perpetual nature - and by extension, our need to develop and maintain an existential and perpetual response to this threat... Given that the most critically relevant strategic increment of this threat can be narrowly defined as the next "evergreen" 100 years, it would follow that the strategic expression of the existential risk of asteroid impact in its most likely rational postulate would be for one and only one large asteroid to be on course to strike Earth in the next 100 years...

Further, in that our concern, our *fear,* here would be the next asteroid impact event. In that all that is required for one asteroid impact event is only one asteroid, all that is required for the risk of one asteroid impact to persist complete and unmitigated is the mere possibility of only one undiscovered asteroid or the dramatic perturbation of any asteroid of any class discovered or not.

If we do eventually choose to respond to this threat, clearly there is no way we can address the dynamics and/or geometry of the Solar System so there is no systemic objective we can respond to here. We can not address 'The Threat of Asteroid Impact' as such. We can only respond to this threat as these objects present themselves as discrete impending impact threats: one Rock at a time. This leaves us with the only aspect of this threat we *can* effectively respond to - a rationally manifest first-order and evergreen tactical definition of this threat:

The Next Large Asteroid on its way to strike Earth.

Which unfortunately, as a product of random-chance, includes the prospect for our extinction. Asteroid impact is a randomly occurring existential condition. Therefore the next large asteroid impact event is inevitable and expectable, and that inevitable expectability begins... *now*.

Ad Martem

Mars: Is an old cold red dead ball of rock that will kill you for just being there... Yet, from the perspective of defending the planet from asteroid impact, both tactically and strategically, a strong case can be made for the manned conquest and colonization of Mars.

Tactically, from here and now, it would be the height of technological hubris, if not criminally negligent, to presume we could *successfully* execute a mission to deflect even a small asteroid impact threat autonomously or remotely while we sit safely here on Earth. There will always be some new subsection of Murphy's Law to deal with on the fly and as the man said "*A human being is the best computer available to place in a spacecraft...*" Werner von Braun

After all, if it is your children and grandchildren at Ground Zero would you want the deflection mission to be Manned or would you trust solely in some piece of technology designed and build by the lowest bidder? Manned missions to asteroids should not be merely become a thing we have done before but an expertise that has become second-nature... a survival trait.

Strategically, think Worse Case Scenario and Launch Windows... The logic to only address anything less than the worst case scenario here would be founded solely on random chance and an Expectation of Good Luck. When you appeal to Luck the only tool at your disposal for a desirable outcome is Hope. And a Planetary Defense based on Hope is little more than a formula for our sooner-or-later Suicide by NEO. We can only ever afford to Hope for the best after we have prepared for the worst.

That said, if we use the recent Marshal Space Flight Center study used to inform NASA's Near Earth Object report to Congress as a baseline, we can project that under ideal conditions a single Ares V mission with a 7 MT nuclear payload can divert a 500 meter asteroid threat. From that we can extrapolate that at 8 times the mass and all else being equal, it would require 8 such missions for any 1,000 meter threat. A 10,000 meter Chicxulub Class impact threat, at 8,000 times the mass, would require 8,000 Ares V missions. If we set aside the obvious myriad of first-order political, economic and industrial challenges in building such an effort in whatever time we will have between detection and impact, the strategic question will still be whether or not we will be able to get them all off the ground *effectively*? Will we have enough suitable launch windows available for 8,000 simultaneous Ares V asteroid interception missions? From here and now there is no way to even know if we will even have the *one* launch window we will need when the time comes to defect some 500 meter impact threat let alone windows enough for 8,000. And if it rains on the day we have to save the world... we lose. The gods will laugh.

Given the magnitude of this challenge when approached technologically, consider the Orbit of Mars: specifically, Sun/Mars L3, L4 and L5, as the only strategically rational point - the NEO high ground if you will - for Earth to pre-deploy and implement an asteroid deflection mission from and have a reasonable expectation of success. Planetary Defense stations pre-positioned in a circumstellar orbit serviced from a dedicated forward base on Mars...

From the perspective of defending the planet from asteroid impact, both tactically and strategically, the Moon is nothing. And in going back to the Moon we can learn nothing about going to Mars that we cannot better learn by going directly to Mars. If colonizing Mars and manned asteroid missions are essential to dealing with the threat of asteroid impact then going back to the Moon only serves to retard the development of the dedicated capabilities and the expertise we need to develop in order to defend Earth from asteroid impact *Now*! The distraction of going back to the Moon effectively becomes a threat in itself.

All things considered, unfortunately there is no way to know just how this new administration will regard the last administration's Moon/Mars Initiative. They may choose to abandon all of its goals or even NASA itself. So if Mars if the prize here, do you want to continue along that dusty old discretionary pork-barrel path, preaching enervated blue-sky justifications and painfully hollow rhetorics that although may still sound good to the dedicated Martian choir, but have lost whatever public appeal they ever had decades ago? Or would you better rely on the primal compulsion of Survival of The Species to get the policy to avert our Extinction by Asteroid Impact and justify the funding to get Man to Mars?

Even though there may be nothing there worth going there to get, when you understand that Mars is nothing less than the path and means to saving Mankind from the Cosmic Promise of Extinction by NEO all budget appropriations and mission priority concerns become irrelevant. After all, how much should We The Species be willing to spend to preserve all-there-is-forever?

The colonization of Mars will facilitate and evolve mankind's fundamental capabilities for Earth's Planetary Defense. However, it would be the Planetary Defense of Earth that affords the justifying rationale for the colonization of Mars. How is this not a marriage made in the heavens?

A Million Miles A Day

The U: Unfortunately, between the statistical sophistries, academic slights-of-mind and absence of any rationally informed executive decisions the prospect of asteroid impact is rapidly becoming a man-made threat. So at least keep in mind that no matter what we do or do not do, no matter what we want or do not want - no matter what we think... The Next Large Asteroid on its way to strike Earth is coming.

Science and technology have advantaged the evolution of our understanding of our place in the cosmos. One product of this emergent awareness is the recognition of an inherent vulnerability to some concurrent and seemingly exigent and existential threats. Since the clearly credible and perpetually imminent threat of asteroid impact is a threat we can conceivably manage, and since it will always include the prospect for our extinction, *which* asteroid is The Next Large Asteroid on its way to strike Earth will always be the most important thing mankind will ever know. And deflecting it will always be the most important thing mankind will ever do.

The Universe is a dangerous place. It does not suffer dilettantes gladly. At the very least we should be capable of defending ourselves from the bits of cosmic stuff left over from the creation of our own solar system. The question here and now is, even though our science and technology has evolved to the point we can, in fact, do this: are We The Species *smart* enough, are We *bold* enough, are We *wise* enough, are *We The Species* in fact evolved enough to actually *do* this?

Will We assume this small measure of responsibility for the continued existence of our own selves or stay to the cheap and easy path cowering on our little blue ball and hope everything goes well? Either way, The Next Large Asteroid on its way to strike Earth is coming... at

A Million Miles A Day...

R. Dale Brownfield
Gaiashield Group

A Million Miles A Day: Speaking For The Worst Case Scenario
<http://gaiashield.com/AMMAD/>

Three Executive Decisions: An Open Letter to The President
<http://DearPOTUS.Com>

Cosmic Promise: Logic and Arguments Justifying a National Planetary Defense Policy
<http://Gaiashield.Com/CosProm/>

To Whom This Should Concern: Arguments Towards a National Planetary Defense Authority: NASA vs. DoD
<http://Gaiashield.Com/NPDA/>

NEONet: To Catch a Falling Star
<http://Gaiashield.Com/NEONet/>

Waging War on TNLA: The Next Large Asteroid on its way to strike Earth
<http://Gaiashield.Com/TNLA/>

NEOShiva: Unacceptable Risk/Detection/Interdiction/USS Chicxulub/Mars: Tunguska Base
<http://Gaiashield.Com/NEOShiva/>

GaiaShield: The Sky Is Falling Now!
<http://Gaiashield.Com>

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