Existential Risk / Opportunity Singularity Management

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Seed Ship Existence Proof Considerations

by James Blodgett

In an article titled "The Hobby of Improving Our Human Future" in the July 2020 issue of EROSM, I presented an existence proof for seed ships that might get humanity to the stars. I said then that "Existence proofs do not prove that all implications of a proposed device will work as promised, but they do prove that something like the proposed device is plausible."

When we try to manage singularities, it is important to consider the probability that the proposed technology will actually do the job. I have found a reason why the seed ships I proposed seen less probable than I had first thought. However, this current article is not an errata, because seed ships still might work, and similar strategies might also work. A low probability is not a reason to give up if the reward is large because of the logic of expected value (probability times value, a good way to bet). However, a low probability is a reason to consider alternatives. When managing it is important to evaluate reality and to adapt to reality, even when that reality is disappointing. There are often several ways a task might be accomplished, so when the reward is large, it is usually good strategy to try a lot of things in the hope that something works.

The seed ships I proposed are conceptualized as being very small, perhaps the size of a large natural seed. (Given this specification, it could be as large as a coconut.) One of them can grow a whole biosphere. Trillions might be fired at the stars. They contain artificial intelligence, nanotech, cell templates, and the DNA of many species. (To avoid radiation damage, DNA might be stored as error correctable data since DNA can be reassembled from data.) Nanotech consists of molecular machines that can reproduce and build larger things. When arriving at an appropriate source of materials and energy, the artificial intelligence directs the nanotech to reproduce and to build infrastructure, then the DNA of many plants, animals, and finally humans are inserted into cell templates, grown in infrastructure incubators, and then raised and (in the case of humans) educated by infrastructure robots. Voila, we are there!

I presented existence proofs for each of the components. My existence proof for nanotech was the many nanotech machines in a biological cell. Our cells are filled with molecular machinery made out of atoms, machinery that would be called nanotech if it had been designed rather than having evolved. As an example, there is a cute video at https://www.youtube.com/watch?v=y-uuk4Pr2i8 of a kinesin protein walking on a microtubule, and there are many similar videos of biological nanotech.

These videos are an existence proof that molecular machines can work, but when I think about a seed ship that would need to use this biological version of nanotech, I realize that its use for this application presents a difficult challenge. Drexler's original idea of an assembler would be molecular in size, would work in a vacuum, and could build a copy of itself or of other structures using atoms of diverse elements. Biological nanotech requires water and appropriate nutrients, materials that need to be found, assembled and contained using appropriate infrastructure. The problem is that any infrastructure that would not fit in a seed ship would have to be built by nanotech, and biological nanotech could not build infrastructure without first being facilitated by the infrastructure it would have to build. Drexler had a famous debate with Smalley in which both agreed about biological nanotech, but differed on whether there could be a non-biological version that could work in a vacuum. We don't yet have an existence proof for Drexler's version. See http://pubsapp.acs.org/cen/coverstory/8148/8148counterpoint.html?

This impasse does not prove that the seed ship idea will not work, but it makes it less likely. There are still several ways it might work. Drexler still thinks his version will work. Even if it does not, there are things that could be done with the biological version. For example, if we got really good at making DNA that would translate into structure in biological organisms, we might be able to tailor an organism that would grow from seed into a biological body that contained a biological laboratory that would provide infrastructure to complete this project.

Note that the deliverable seed ship would need to be transported on a larger craft that can change velocity to steer to and rendezvous with or land on plausible targets in another solar system. Plausible targets could be planets or asteroids.

Note that Earth plants generate many seeds, and that only a few find fertile ground and grow. We might have to use that strategy.

There are other similar strategies. Philip Metzger et al[1] suggest that we might be able to industrialize our solar system starting with a few tons of machinery shipped to the moon, miniature machinery that could process small batches of lunar material to make things via 3d printing and similar techniques. Our moon is close enough so that teleoperated robots could be operated from Earth, and they also could be smart enough to make things on their own. At first sophisticated parts could be shipped from Earth, but the goal is to improve infrastructure until everything can be made in space. Technology grew exponentially on Earth, and could also do so in space. Eventually rockets could be made that would extend the operation to places like the asteroid belt. Eventually the technology, refined by years of experience, might be sent to other solar systems in a much larger version of our seed ships.

Generation ships are another thing that might work. They are ships that carry lots of people, people who live on the ship for generations until they reach another solar system. For example, Gerard O'Neill designed large habitats that we might build in space. If we have thousands or millions of O'Neil habitats, a few might choose to get a gravity assist from a planet or from our sun that would throw their habitat onto a trajectory to another solar system.

Some of us will not give up because of improbability. However, it is motivating to have existence proofs because they suggest a higher probability of success, that motivates more people, and that makes the success more likely, so let's not give up on developing existence proofs if we can find them.

[1]Philip Metzger et al, "Affordable, Rapid Bootstrapping of Space Industry and Solar System Civilization," Journal of Aerospace Engineering, April 2012.

Regalia Delphi Results

by James Blodgett

In the October 2020 issue of EROSM, I conducted a Delphi exercise about regalia. I presented a badge as a form of regalia, and I said that it would be a successful market test if I could convince several members to make one of them. That did not happen. That does not bother me since I was ambivalent about the idea. It might work better later, or for another group.

However, one member, Liam Sweeny, did design a neat new version that is a wonderfully creative twist on my basic idea. It evokes a sort of magic steam punk science fiction, a world where people are demigods who can twist the nature of reality, where both people and machinery have magic powers, and where we might need magic superheroes like Dr. Strange and Harry Potter to police potentially evil magic.

I like the art, but it doesn't feel like us. It looks like a cop's badge. We are intellectual advocates, not cops, and our focus is the future, not a magic past.

My strategy is to try a lot of things in the hope that something works. Part of that strategy is to move on when test marketing does not produce stellar results. That is good strategy most of the time. It is not good strategy if the idea seems really good. Sometimes it is worth several tries to get a good idea to work.

For now, I am passing on promoting regalia. However, the idea might work later.