

[Existential Risk / Opportunity]

Singularity Management

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Introduction

The following essay is reprinted from the anthology *Visions of the Future*, published by the Lifeboat Foundation. The book is available through Amazon. Lifeboat's members include some top-level science fiction writers and top level futurists, so the book contains both science fiction stories and non-fiction futurist essays. There is a commonality between the two genres. Science fiction by definition envisions the future, and it might be said that any essay about the future is partially fiction. There is also a commonality between Lifeboat's objectives and those of our special interest group. The book is another resource worth consulting when developing a strategic picture of potential futures.

The essay is reprinted with permission. I don't really need that permission since I offered first rights for the original essay, and therefore retain reprint rights. Nevertheless I asked Eric Klien, President of Lifeboat, if he had any strategic objection to republication. Eric likes to facilitate members' projects, so I was not surprised when he approved the project of reprinting here.

One problem with space industrialization is that some versions involve risks: 1) some might develop self replicating elements that evolve badly, and 2) as I say in the essay, quoting Spiderman, "with great power comes great responsibility." However, there are ways to guard against these. If we are mindful and careful about risks, and engage in necessary risks only because they enable greater safety, that should reduce overall risk.

One regret is that I have not had time to promote the challenge prizes I suggest as an example in the essay. Of course, publication was a form of promotion. There is something to be said for trying lots of things in the hope that something works, rapidly prototyping, assessing initial results, and then concentrating on the projects that seem most promising. But despite no big traction from its initial exposure, challenge prizes still seem like a promising idea. Lindberg flew across the Atlantic in response to a challenge prize. Would any readers like to help promote this idea?

Do It Yourself Saving The World

by James Blodgett

It seems audacious to think of ourselves as saving the world. We are not superheroes. But the thesis of this essay is that normal people like you and me can contribute to saving the world, or at least to reducing existential risk, which means approximately the same thing. We can learn current thought about issues related to existential risk. We can contribute to and help disseminate that thought. We can advocate for solutions. We can help others who are advocating. On occasion we might even invent solutions. This is at least an interesting hobby, more fun and more meaningful than many other hobbies. If we make it work it can be tremendously meaningful.

Why does our world need saving? Because there are dangers out there, dangers that could make our species extinct, as has happened to many other species. Asteroid impact, thought to have killed the dinosaurs, could do the same to us. There have been several mass extinctions in Earth's history. Fortunately, natural mass extinctions happen infrequently. However, humans are making major impacts on our world. Extinctions that are side effects of our technology, things like nuclear war, run-away global warming, or unfriendly super artificial intelligence, have not been demonstrated to happen infrequently. Indeed they sound distressingly plausible.¹ Technology is expanding rapidly, bringing immense benefits but also dangers. With great power comes great responsibility. Society needs to think about how to maximize benefits while minimizing risks.²

Our first reaction is often to expect major issues like this to be addressed by large organizations like the United Nations, national governments, large advocacy groups, or "the market." Sometimes these entities do step up to the plate. However, large organizations all too often ignore these issues. The market reacts to these issues as "externalities," things that do not affect the immediate self-interest of the theoretical "economic man," and that therefore do not affect market prices. They are also externalities to large political organizations unless there is voter concern. It is the job of advocates, a role we could assume, to stir up voter concern, and to point out the moral interests that many individuals do care about.

Normal individuals have already contributed to saving the world. Global nuclear war seems less likely today than it did during the Cold War. Gorbachev and Reagan deserve most of the credit for ending the Cold War, but many of their ideas originated with independent intellectuals, and were reinforced by many normal individuals who contributed to public opinion. Another example of amateur contribution is asteroid impact. That risk has been reduced by studies that have determined the orbits of most of the largest Earth-approaching asteroids. We could try to deflect a risky one. None currently seen pose an immediate risk. Amateur astronomers contributed to those studies.

Some readers may feel that the small strides that normal people like us might accomplish are unlikely to make much of a difference. However, if we do accomplish some version of saving the world, that is worth the current population of Earth (seven billion human lives) plus all future lives. That is worthwhile to try even if the odds are low. Hopefully the odds will not always be low. Consider our fathers, "The Greatest Generation," who fought a war (World War II) that might be thought to have saved civilization. The probability of individual effectuality (the probability that one soldier's efforts would win that war) was fairly low for most soldiers. Nevertheless, they put their lives at risk, and each contributed to a group effort that did win the war.

Even if things seem hopeless, it seems gallant to die while trying to live and while trying to save others. However, I hope that things are not that hopeless.

If you are ready for this hobby, what can you do to help? You can start by learning about relevant issues, thinking about solutions, thinking about how to implement those solutions, contributing to general thought about this topic, and lending a hand where that seems useful.

As one example of a solution, space settlement would protect against many (but not all) human extinction risks by backing up civilization in case we all die on Earth. However, in order for this to work, that settlement has to be self-sufficient. That requires major industrialization of space. I used to think that major industrialization of space was a prospect for the far future. If Rees and Wells, who predict disaster soon,¹ are right, that may be too late. However, I have learned that there is enough material in the asteroid belt to build habitats for trillions of people.³ Asteroid belt material could also be used to build other things like space-based solar power satellites that could produce all the power we need on Earth, or a massive sunshade that could solve global warming. In addition, Metzger et al suggest a more-or-less plausible plan for industrialization of space that would enable building all of these things in a fairly short time.⁴

Metzger suggests sending a few tons of automated and remotely-operated machines to the Moon, mining and power-generating machines, and also machines like 3D printers, micro machine tools, and teleoperated robots. These are machines that can make other machines, mainly from lunar materials. The machines they could make would

be crude at first and include Earth components, but each generation of machines would make subsequent generations that would be increasingly sophisticated. With each generation fewer Earth components would be needed. Eventually the operation would be extended to the asteroid belt. Our caveman ancestors started with rocks and sticks. The successive generations of tools and machines made from those rocks and sticks became an industrial revolution that grew exponentially and resulted in today's ubiquitous and sophisticated machine tools.

Metzger's idea is to do the same thing in space, using exponential growth that could fill the solar system with self-sufficient industry in a fairly short time. But this will take work. It requires redesigning many industrial processes so that they will work in the space environment. It requires redesigning many machines so they can be assembled with the available processes and materials. However, unlike many other ideas for large-scale settlement of space, Metzger's ideas do not require new physics. Indeed the inventing required seems on the level of advanced amateurs like the Wright Brothers.

There are a lot of advanced amateurs today. Many have organized "makerspaces," clubs that acquire advanced machine tools that members can use. Challenge prizes might motivate some makerspace people to help design space machines. Amateurs like you and me could help with this design, but even if we are not mechanically inclined we could help organize and publicize the prizes and we could contribute or help raise money to fund them. This effort would also generate publicity that might help motivate larger organizations or nations to contribute the relatively small launch capacity that would be required, small because most of the material for building machines would come from the Moon and asteroids. Amateur contributions could be important because projects to implement Metzger's ideas are not yet funded on a large scale by large organizations. (NASA, private firms, and other countries are proposing or implementing small projects that might contribute to Metzger's project. The limit of these projects is their small or nonexistent budgets.)

This is just one example of a project that might help. There are many other plausible projects that could reduce existential risk and expand existential possibilities. The job is to think of them, and then to help make them work.

What can you do to learn about these issues? There are many relevant books and discussions, and interesting material on the Internet. In order to get started, follow up on this paper's endnotes and check out the Lifeboat Foundation website at <http://lifeboat.com>.

We have to be careful. Our save-the-world projects could have unintended consequences. It is said, "first do no harm." However, that is not quite right. We have to compare the risk of doing something with the risk of doing nothing. The trick is to reduce risks without losing opportunities that are more valuable than the risks. We need to think adequately about that balance, but not to think so long that we stall appropriate action.

ENDNOTES

¹ Lord Martin Rees, Astronomer Royal of Great Britain, estimates in [Rees, *Our Final Hour*, Basic Books, 2003] that humanity's chance of surviving the next century is 50%. Willard Wells makes a similar estimate in [Wells, *Apocalypse When?: Calculating How Long the Human Race Will Survive*, Springer, 2010.]

² Nick Bostrom, Existential Risk Prevention as Global Priority, *Global Policy*, Vol 4, Issue 1 (2013): 15-31. Also available at: <http://www.existential-risk.org/concept.html> . Dr. Bostrom is Director of the Future of Humanity Institute at Oxford.

³ For example, Dr. John Lewis makes a rough estimate that there is enough iron in the asteroid belt to build a habitat for 10,000,000,000,000,000 people in [Lewis, *Mining the Sky: Untold Riches from the Asteroids, Comets, and Planets*, Perseus Publishing, 1997, pg. 194.] All of the other elements necessary for industry and life are also available in abundance.

⁴ Philip Metzger et al, "Affordable, Rapid Bootstrapping of Space Industry and Solar System Civilization," *Journal of Aerospace Engineering*, April 2012. A preprint is available at: <http://data.spaceappschallenge.org/aerospace.pdf> . Dr. Metzger is an NASA physicist and an expert in extracting resources from lunar regolith. [At the time of this reprint, he has retired from NASA and is now a planetary scientist with the Florida Space Institute at the University of Central Florida.]