



Abstract



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Human extinction scenarios

Bruce Tonn

This paper argues that humanity ought to soberly consider risks to its existence. It cannot be taken for granted that humans are somehow impervious to extinction, a fate that has befallen almost all species that have inhabited this planet. To help humans take this risk more seriously, the risk needs to be quantified, preferably in terms of probabilities. Unfortunately, no systematic, probabilistic assessment has been performed that has resulted in an estimate of the likelihood of human extinction. This is partly due to a lack of a defensible methodology to make this calculation. In response, this paper proposes a methodology to calculate the risk of human extinction.

The human species faces numerous threats to its existence. These include global climate change, collisions with near-earth objects, nuclear war, and pandemics. While these threats are indeed serious, taken separately they fail to describe exactly how humans could become extinct. For example, nuclear war by itself would most likely fail to kill everyone on the planet, as strikes would probably be concentrated in the northern hemisphere and the Middle East, leaving populations in South America, South Africa, Australia and New Zealand some hope of survival. It is highly unlikely that any uncontrollable nanotechnology could ever be produced but even if it were, it is likely that humans could develop effective, if costly, countermeasures, such as producing the technologies in space or destroying sites of runaway nanotechnologies with nuclear weapons. Viruses could indeed kill many people but effective quarantine of 'healthy' people could be accomplished to save large numbers of people. Humans appear to be resilient to extinction with respect to single events.

However, human extinction is much more likely in the face of waves of these types of events over time. To truly assess the likelihood of human extinction, combinations of these risks need to be woven together into 'extinction scenarios.' An extinction scenario needs to posit a time line of events that can cause human mortality on a massive scale. What makes extinction scenarios challenging to write is the need for them to encompass human response, adaptation and even foresight. An airtight and internally consistent extinction scenario is one where human efforts to stave off extinction fail.

While an extinction scenario may be quite unlikely to happen, if everything assumed to happen in the scenario did happen, then the future is known: humans become extinct.

Extinction scenarios are different from strategic or traditional scenarios described by Peter Schwartz in his book *The Art of the Long View*. The latter are generally broadly written and depict life, not typically death, some years into the future. They are plausible stories about possible futures whose authors generally do not care whether they come true or not. What the authors worry about is whether people are prepared to deal with any of the scenarios imagined by the authors. Thus, traditional scenarios gain value as a set; just one traditional scenario would not be of much use to strategic decision makers.

In comparison, extinction scenarios need to be very detailed and could run for many pages. Most importantly, they need to be written to stand on their own. That is, even one extinction scenario would be a valuable contribution to our effort to estimate the likelihood of human extinction. This is because it is proposed that the probability of human extinction be calculated by counting the number of extinction scenarios or paths into the future and dividing by all possible paths into the future. It is assumed that each path into the future is equally likely. It is also assumed that there are billions or even trillions of possible future worlds that would require modeling. It is also assumed that the *acceptable risk* of human extinction needs to be quite low, we argue no higher than one-in-ten billion. Thus, one extinction scenario among a set of less than ten billion human futures would pose an unacceptable risk.

This paper will expand upon the possible worlds method for calculating the probability of human extinction. The paper will also include an example of a human extinction scenario.