

Blog 1001 'The Future is Now' dealt with the third thousand years in the history of modern man. This story is about the next million - indeed the next billion - years. It is based on chapter 8, 'Our Potential' of Toby Ord's book, who in fact does not wish to make predictions about the future - this is not about what he thinks will be - but he talks about the potential of humanity's future.

In my essay PRECIPICE I repeat a quote by Barak Obama: "The very spark that marks us as a species - our imagination, our tool-making etc. - also gives us the capacity for destruction. Technological progress without an equivalent progress in human institutions can doom us. The scientific revolution that led to the splitting of an atom requires a moral revolution as well." Toby Ord: "We need to gain this wisdom, to have this moral revolution ... because we cannot come back from extinction. And because gaining wisdom or starting a moral revolution takes time, we need to start now." Humanity stands at a precipice.

Our life span is limited primarily by the existential catastrophes we are striving to prevent. If we get our act together and make safeguarding humanity a cornerstone of our civilisation, then there is no reason (other than through the effects of non-anthropogenic external risks, such as asteroid collision, lethal gamma-ray burst, hostile extraterrestrial life) that we should not be able to bear witness to the unfolding of the grand themes of the universe.

In this chapter my premise is that humans have moved away from the brink ... the precipice. We have met the challenge of gaining wisdom and we have implemented a revolution.

Moving on from the year three thousand, we can now look at the future, as far ahead as a million years or perhaps even further ... because that is humanity's potential.

Human history so far has seen two hundred thousand years of Homo Sapiens and about ten or twelve thousand years of civilisation. The fossil records show that typically mammalian species survive for about a million years.

As we have been able to address the threats we posed to ourselves - the anthropogenic existential risks like climate change, nuclear war, antagonistic artificial intelligence, destructive bio- or nanotechnology - we should be able to look forward to a life span of millions more years.

What does that mean for humanity, and our home ... Earth?

This time scale is enough to repair the damage we have done to our planet. Let us assume that within a hundred thousand years the natural systems will largely have been repaired and our present refuse will have decayed away.

If we can avoid any further pollution, the oceans and forests will have recovered, most of the carbon we have released into the atmosphere will have been absorbed and the climate will be restored and balanced; even the damage we have inflicted on biodiversity will have healed.

Oceans and forests will be unblemished once more.

Let us trust that humans will address pollution and biodiversity-loss quickly; that sooner rather than later we will actively remove as much as we can the pollution we have caused and conserve the species threatened by extinction.

It is comforting to know that Earth - with humans as a cooperative agent - can heal the damage that had been inflicted largely on its own. Over this span of time - a million to ten million years - roughly half of Earth's species will naturally become extinct; however, new species will keep arising in their place.

A life span of one million years is typical for a species, but not necessarily a limit, and humanity is atypical in many ways; we may be able to survive much longer. Many species are not wholly extinguished but are succeeded by their children on the evolutionary family tree and the story of humanity may be similar; the end of the species Homo Sapiens may not be the end of genus Homo ... indeed, we may just be passing on the baton.

We know of species that have survived almost unchanged for hundreds of millions of years, like the horseshoe crab or the nautilus. Such a life span would bring us to geological timescales. We could live to see continental shift reshape the surface of the Earth. Our continents will merge again, to form a supercontinent, like Pangaea two hundred million years ago.

What might humanity witness if we - or rather our descendants - were to last as long (or longer) as the humble horseshoe crab?

These spans of time would see changes on an astronomical scale. The star constellations will be altered, as the nearby stars drift past each other. In two hundred forty million years our Sun will complete the grand orbit around the centre of our galaxy - a period known as a galactic year.

Our star - the Sun - is middle aged, being about four and a half billion years old. It has been getting brighter continually, thus posing a problem for Earth, which will remain inhabitable for one or two billion more years; but eventually Earth will get too warm for human habitation.

Humans may be able to save Earth from the effects of the brightening Sun, but in about six and a half billion years the Sun will balloon out beyond the Earth's orbit and either swallow our planet or fling it out further into space.

Our Sun will die in about eight billion years, and any prospect of humanity surviving would be much brighter elsewhere. By travelling to other stars we could bring with us a cache of seeds and cells with which we could preserve Earth's species on other planets.

The main obstacle to leaving our solar system is surviving for long enough to do so. We need time to develop the technologies and to harvest the necessary energies, to eventually make the journey and build a new home at our destination.

A civilisation spanning a million generations would have time enough and we should not be daunted by the task. Our galaxy will be inhabitable for an almost unfathomable span of time. Stars last billions, even trillions of years ... and there will be millions of stars to follow.

This is deep time. If humanity survives on such a cosmological scale, life today will be considered in its infancy; the present era will seem astonishingly close to the very start of the universe. But we know of nothing that makes such an astronomical life span impossible, or even unrealistic; we only need to get our house in order.

The discovery of the true scale of our cosmos dramatically raises the potential of what humanity may achieve. We once thought ourselves limited to the Earth but we now know that vastly greater resources are available to us, which will present currently unthought of opportunities.

Not immediately, of course; exploring all of our galaxy would probably take a hundred thousand years and to reach the furthest limits of the universe as we know it, perhaps millions or billions. This raises profound questions about what might be achievable over huge time scales.

We have seen that the future is vast in space and time. Looking back we have seen that human life is much better today than ever before. Compared with our ancestors we have less to fear from disease or hunger ... or indeed from each other.

Our children have opportunities that would astound our ancestors. They can contemplate truths about the cosmos unknown to our most learned predecessors. Nevertheless, human life - currently at its very beginning in cosmic terms - could be dramatically better than it is today.

Our descendants would most likely develop and enhance existing human capabilities, such as intelligence, cognition, imagination, memory, concentration, empathy, compassion and charity. These enhancements would make possible entirely new forms of human culture.

We may have millions of years - maybe billions or even trillions - to go much further, leading to unimaginable vistas of what can be known and can be understood.

How strange would it be if we - this species of apes, equipped by evolution with this limited set of cognitive capacities - ended up anywhere near the maximum possible quality of life, after only a few thousand years of civilisation. It is much more likely that we have barely begun the ascent.