

Creating A Solar Civilization

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As we climb from our Earthly nest to live in the Solar System, must we take our destructive ways on Terra into space, or can we create a new society among the stars?

Our lonely planet floats in the velvet night of space like a rare oasis, where life thrives and the human species has emerged to look out among the stars and wonder. Though the Earth is a relatively safe place for life, this is a deceptive mask that hides a much darker reality. We know better now than to pretend that we are safe in our Earthly nest from natural disasters and extinction level events.

Hawking's Warning

Stephen Hawking, Lucasian Professor of Mathematics at Cambridge University, father, grandfather and best selling author of 'A Brief History of Time', recently called on humanity to look to a future in space. While on a lecture tour in Hong Kong with his daughter Lucy, Professor Hawking warned that we must reach for the stars in order to survive, citing dangers such as sudden global warming, nuclear war and a genetically engineered virus potentially threatening the future of humanity on Earth.

The human race has rocketed from the Stone Age to the Space Age in a dizzyingly short period of time, from chasing mammoths over cliffs to tourism in the International Space Station. The human appetite for adventure and exploration in space could prove to be well founded in the light of the dangers that can come crashing in through the atmosphere, such as the innumerable giant asteroids that fly around the Solar System. The last mountain-sized rock to visit Earth 65 million years ago abruptly ending the reign of the dinosaurs. Unfortunately for them, they had failed to develop a space program, leaving only a legacy of fossilised bones. In the face of cosmic dangers and Earthly threats, do we need to give greater thought to our future survival? Should a killer asteroid strike a hammer blow to the Earth and knock our species off the evolutionary tree, we too may leave naught but a legacy of bones for all our troubles.

A Danger to Ourselves

We now possess the technology to expand into the Solar System, a move that would increase the survival prospects of our species, but will the present window for space remain open? Many civilizations have risen up through history to challenge infinity, only to topple down again, leaving little but their ruins for archaeologists to ponder upon. Though our present global civilization appears invincible, our growing population and hungry technology are stressing the planet's ecology and should

there be too much critical environmental damage, our civilization could also be at risk. Professor Jared Diamond has explored this question in great detail in his book 'Collapse', in which he warns that our global civilization could be at risk for the same historic reasons. Should one key nation in the global economy undergo collapse, this could begin a knock-on effect, like a row of dominos. As the World's societies and economies are now globally interlinked, the impact of a collapse would also be global. Should we lose our present technological edge for space, there is no promise written in time that our species would again be able to build a space program?

The plight of the survivors of such a collapse would be terrible, knowing that they could have been star travellers, but became prisoners on a rock in space. Their fate would make a mockery of all our present industrious efforts to build this amazing civilization that we are so proud of and think could never end. If our window of opportunity to expand into space should be narrow, then inaction now would threaten the future survival of our species. Until we have established sustainable human settlements in space and begin to open the way to the stars, we are at the mercy of a rather dangerous and unpredictable Universe, just like the dinosaurs.

Toward a Solar Economy

One daunting challenge to building human settlements in space is the extremely high level of expense involved. On the other hand, if expanding into space helps to ensure our survival, our success would be an insurance policy that we cannot afford to ignore. Fortunately, our Solar System is an exceptionally wealthy place. Once human settlement and industry were established in space, a line would be reached where there would no longer be any need for further supplies and materials from the Earth. With unlimited solar energy from the Sun and materials gathered around the Solar System, a Solar economy would in time far outgrow the economy of the Earth. This line could be described as the Solar Economy Liberty Line and could be helpful in promoting a permanent and sustainable presence in space. Our challenge, therefore, becomes a much simpler process of connecting the need for a space survival insurance policy with the amazing Solar economy that is waiting to be realised.

There would be many immediate spin-off benefits from the massive effort required to expand human settlement and industry into space, including the employment created, technical advances, new discoveries, the expansion of human civilization into space, accessing the wealth of the Solar System for the benefit of the Human family and opening the way to the stars. Most manufacture in the future could be located in space, where automated factories would produce any desired product, with energy from the Sun and resources gathered around the Solar System. As the Earth is located at the bottom of a gravity well, there is little expense involved in delivering products from space to Earth and this could help to reduce the human pressure on the Earth's environment and allow the planet to begin to recover from the stress of the centuries of human endeavour.

Another benefit of expanding human society into space could be the complete sidestepping of a tragic collapse of our global civilization that may otherwise be just around the corner. A failure to undertake maximum effort to expand into the Solar System could result in the total loss of all we have gained and that would be an exceptionally high price to pay for inaction. The investment involved in extending our society and economy into the Solar System would generate fabulous wealth, the like of which has never been seen before in human history. If we direct our progress wisely, we could also create a new society in space and on Earth that is fully inclusive and turns poverty and starvation into spectres of the past only found in museums.

Seeking Settlements in Space

Planning is now underway to return to the Moon and establish a lunar base for scientific and industrial research, but as a location for permanent human settlement, the Moon presents a number of difficulties. The gravity of the Moon is only one sixth that of Earth and a long-term lunar resident would develop lighter bones and weaker muscles, making a visit to Earth for a day at the beach a hazard to their health. Scientists working at the Moon base would need to regularly return to Earth to maintain their Earth gravity fitness, or spend many hours per week in a centrifuge. Also, the Moon's 672 hour long night would limit access to solar energy from the Sun for two weeks at a time.

Mars offers more hope for human settlement, but the red planet is far from ideal. With a gravity just over a third that of Earth, the same problem arises as with the Moon's lighter gravity, with future Martians also developing lighter bones and weaker muscles, turning a holiday on Earth to climb Mt Everest into a serious health risk. This situation would be comparable to a resident of Earth going to a planet with a gravity that is two and a half times that of Earth. Regularly returning to Earth to maintain Earth gravity fitness would hardly be an option with Mars being so far away and at times on the far side of the

Sun. Centrifuges could be provided on the surface of Mars, but if the population grows into the millions this could become a tricky option, especially for children, who may need permanent exposure to acquire full fitness in an Earth gravity.

The gravity on Venus is only slightly lighter than the Earth, so it would feel the same as walking on Earth, but, with a surface temperature that can melt lead and gale-force winds howling through the planet's poisonous atmosphere, there is hardly a welcome mat out for human settlement. We could design machines and robots that could survive on the surface, undertaking research, development and mining, but a remote camera may be the only safe way to visit our sister planet. In time we may tame the violence of Venus and turn the planet of passion into a pleasant land, but that would be in the far distant future.

An option for human settlements in space that overcomes the gravity problem is the construction of space station style human settlements. These could be in the form of a wheel, also called a torus, where an artificial Earth-like gravity is provided on the inside of the wheel by centrifugal force generated through rotation. If you have seen the space station in Earth orbit on the film '2001: A Space Odyssey', you will have an impression of what a space station settlement would be like, though they could be much larger and offer far wider open spaces. In the 1970s Professor Gerard K O'Neill of Princeton proposed large drum shaped habitats for living in space and much research has been undertaken into these designs, including a study by NASA.

Space station settlements scattered around the Solar System could in time offer living space for a population much larger than that of Earth and could overcome the gravity problem of Mars, providing the benefits of Earth gravity in orbit with commuting access to the planet below and allow the best of both worlds. By all human settlements in the Solar System maintaining the Earth gravity standard, there would be an easy flow of travel between the space settlements around the Solar System as well as to Earth, without fear of health problems or broken bones. Space settlements offer the freedom of the Solar System to the Human family and in time could also open the way to human settlements being located around any friendly star system, whether or not an Earth-like planet is found there.

Solar Arks

Beyond the Solar Economy Liberty Line, automated factories in space could manufacture space station human settlements with no further cost to Earth. Physically, it would be possible to build lifeboats in space where the human population of Earth could take shelter in the event of a major catastrophe, such as the arrival of a monster asteroid that is too large to turn aside. Like the mythical story, selections of the animal populations may also be given shelter in the celestial arks.

Celestial Fields

Much research is currently underway into a range of food crops that can be grown in space, both in the International Space Station as well as around the world, including wheat, sweet potato, peanut, soybean, pinto bean, winter squash, beetroot, papaya and bananas. In time all the produce that can be grown on Earth will be harvested in the celestial fields in space, with the benefit of the unlimited energy from the Sun, though the emphasis will probably be on a vegetarian diet. With the potentially unlimited capacity to manufacture built environments in space, the potential for Solar agriculture would also be vast and able to meet all human needs. The skills developed in growing food for space settlements could also be put to work on Earth, perhaps in the near future, to begin eliminating starvation around the planet.

Security in Space

Michael O'Hanlon of the Brookings Institute recently warned that the equivalent of a car bomb in space could take the economy back to the 1950's (New Scientist, 23 June 2006). "We are in an unusually good moment for the US in space, and it won't last," he said, "It can't last." Human settlements in space would be fragile bubbles in a vacuum and highly vulnerable targets in a conflict or terrorist attack. Space is already dangerous enough with the need to design for solar radiation, cosmic rays, meteoroids and asteroids speeding through the Solar System, without having to add the human danger to the mix. In the current environment it would be necessary to include the full range of security precautions in space developments as are now filling airports around the World, but there is also another and long-term solution to this problem that could be considered.

In 1967 the nations of Earth signed "The treaty on principles governing the activities of states in the exploration and

peaceful uses of outer space, including the Moon and other celestial bodies." When the Apollo astronauts went to the Moon in 1969, they left a plaque behinds declaring, "We came in peace for all mankind." Their spaceship, Eagle, landed in the Sea of Tranquillity and the site of the Moon landing is called Tranquillity Base. Human hostility has not yet exploded from the Earth to infect the celestial realm and it may be hoped that this will never happen, but wishing alone will not make it so. We now have an opportunity at our fingertips to lay the foundation of a whole new society in the Solar System, building on peace and cooperation, just as the International Space Station has brought many nations together. This same spirit of cooperative exploration could now extend to the Moon base and the first human expedition to Mars. The chief of NASA, Michael Griffin, recently invited the space agencies of Russia, Europe, Japan and Britain to participate in the Moon base as well as the Mission to Mars (New Scientist, 19 July 2006).

Once human settlement and development expands into the Solar System, all the problems of Earth would soon follow, including conflict and terrorism. The only way to stop this happening would be to tackle the problem at its source. It may be more effective, in the long-term, to ensure security in space by working toward peace on Earth. Achieving such a peace could only happen by making social and economic changes that allow the Human family to become a fully inclusive society. As we strive to ensure our survival by extending the human adventure into the Solar System and toward the stars, we can also start to view all the children of the Earth as members of the same family and just like a family, take a proactive interest in the welfare of all our kin.

In practical terms, half the effort of extending human society into space may need to involve working for peace on Earth, as the best way to ensure security in space could be by achieving peace on Earth. The success of this endeavour would create a new and inclusive society in the Solar System, one in which all the children of Earth can participate. By opening the way to opportunities in space and a good quality of life for all, the old reasons for conflict, war and terrorism would be swept aside into the dustbin of history. This future is possible, because the Solar System is a fabulously wealthy place. An intrinsic aspect of working for peace on Earth can include a view of how each child of the Earth can be connected to this fabulous Solar wealth, which might also be viewed as their right and their heritage.

The alternative could be to witness terrorism in space that would cause a great deal of harm to the space program and potentially strike a fatal blow to the effort. Our choice now is to consider how we can create an economy that serves the needs of all members of the Human family, leaving none in poverty or to starve. If we neglect this challenge, the alternative could be an inevitable gold rush by nations and corporations to lay claim to the wealth of the Solar System. Unfortunately, with no alternative vision for our future in space, the result will predictably be the perpetuation of the conditions that create starvation, poverty, conflict, war and terrorism on Earth extended into the Solar System. We now have a golden opportunity to write a new chapter in the human saga, one that is completely different to the tear-soaked pages of our past and present.

Flying from Our Earthly Nest

Many have written on the giant statues of Easter Island, including Jared Diamond in his recent book 'Collapse', seeking to understand what happened with this Polynesian population of a few thousand people on a small isolated island in the South Pacific. The Easter Islanders developed a civilization with a growth industry in statue building, with the statues steadily became larger over the years, the largest of all still lying in the quarries. The Easter Island civilization was so focused on honing the skills involved in carving, moving and erecting their giant statues, that they were blinded to the need to care for their environment. When all the trees were cut down, the degradation of their environment led to the collapse of their hard-won civilization into civil war and cannibalism, with the survivors pushed over and breaking in half many of the great statues. When Dutch traders found Easter Island in 1722, they saw a diminished people struggling to survive in a degraded environment and were amazed at the sight of the great statues, wondering who could have made them.

Is the fate of Easter Island a warning for the modern world? Why were the Easter Islanders blind to the need to care for the environment that they depended on for their survival and prosperity? Unfortunately, the pattern of behaviour on Easter Island has been repeated many times through history, where civilizations have risen up, built mighty works, but were blind to the needs of their environment. Jared Diamond sites similar examples with the Maya and the Anasazi, but there are many more and we can wonder if the situation is being repeated in the modern world, where a growing human population and demanding technology has been and is still causing immense damage to the global environment. It may be wondered why human societies keep repeating this same pattern.

One possible explanation could be found in the natural laws of the Universe. When our cosmos began in an explosive birth called the Big Bang 13.7 billion years ago (recent research is now suggesting an age of 15.8 billion years, New Scientist, 4 August 2006), the laws that would determine the unfolding of events in the cosmos were in full working order, causing matter to form, stars to ignite and shine, planets to exist, life to evolve and at least one conscious species to emerge and

wonder about it all. Where did the laws come from? Cosmologists now suggest that our Universe could be located in a super-cosmic environment that they describe as the multiverse and could be one of an infinite number of other universes, like trees in a forest ('The Elegant Universe', Brian Greene, page 364 to 370). In reality, the laws of the Universe originate in a situation that transcends our cosmic home. Though particular outcomes are not pre-determined, we live in an Earthly nest where patterns are being played out, patterns driven by natural law that originate in the transcendent realm.

When James Lovelock was working on the Viking missions in search of life on Mars in the 1970s, he came to realise that life doesn't fit into existing environments, but actually shapes the environment to improve the situation for life. In his Gaia hypothesis he states, "This postulates that the physical and chemical condition of the surface of the Earth, of the atmosphere, and of the oceans has been and is actively made fit and comfortable by the presence of life itself." ('Gaia' J E Lovelock, 1979, page 152). The Earth started off as a poisonous and hostile planet, but through the functions of life has been made into a pleasant and comfortable place to live. Natural law, working through life, has kept a balance through time, so that no species oversteps their bounds to endanger others. The balance can be devastated by an asteroid's arrival, as when the dinosaurs received their departure ticket, but life resurged in greater diversity than before and opening the way for the arrival of a conscious species of mammal to run the gauntlet of survival.

Where natural law, through methods such as instinct, governs the natural world, it must be wondered why the human species is not subject to the same rules as other animals. As our species became conscious, we appear to have been liberated from the long-standing control mechanisms that govern all other species of life. Or have we? Though we have a strong sense of liberty to do as we please, is natural law still actively working through human society and creating outcomes that we can observe in the world?

The working of natural law is not a conscious process, but is an outflow of patterns that create outcomes. All that we observe in the Universe and experience in life is the working of these patterns. Some aspects of life are cooperative, as James Lovelock observed and describes in his Gaia theory. Other aspects are more competitive, as revealed by Charles Darwin in his theory of evolution. It is through the competitive survival of the fittest that new species emerge and are refined, but the competition cannot happen without the ground of life's cooperative processes being in place. The same outflow of patterns that used early life forms on Earth to transform a poisonous planet into a pleasant place to live, would also have wired into it the basic detail that consciousness would be at risk of extinction on a planet. That which natural law allows, such as the arrival of an asteroid to kick out the dinosaurs, would be intrinsically part to the patterns of natural law that flows through space and time to generate new beginnings.

The dramatic departure of the dinosaurs made way for the mammals and from the mammals a conscious species has emerged in the Earthly nest, but Nature never rests, ever seeking new ways of expression through the working of the patterns of natural law, spreading the seeds to maximise the chances of survival. In the case of our species, there is a risk to the survival of the only conscious life form that our Earth may ever produce, if it remains clinging to the nest. The risk to our survival is real, as we now well know, so how would natural law change the patterns that govern life to enable the spread of the seeds of consciousness and maximise the chances of our survival?

Loosening the bonds of instinct would be a first stage, which would go together with the emergence of consciousness in the natural world. Having the natural controls loosened would enable humans to damage the environment and cause the extinction of other species of life. This outcome we observe in the world today as well as down through time. If a pattern is wired into nature for a conscious species to go into space and spread among the stars to maximise their chances of survival, then they would need to develop into a society that is able to drive new technologies and create great works. Only with such a propensity could a conscious species have a chance of climbing from the nest and learn to fly into space and spread among the stars. This propensity is observed in human society. Furthermore, wealth and access to resources would be focused in the hands of a minority, as building a space program is extremely demanding of resources. This situation would create poverty in the world and this we observe in the world today.

When we observe the rise of civilizations building great works, we may actually be seeing the outflow of the patterns that could lead to the building of a space program, as with the Egyptian pyramids, the mediaeval cathedrals, the skyscrapers of the modern era and also with the statues of Easter Island. In effect, the Easter Islanders may have been gripped by a pattern of natural law that was for them an evolutionary dead-end and highly destructive for their society. Jared Diamond points how Europeans in the 1500s woke up to their destructive behaviours toward the environment and changed their ways, as did the Japanese in the 1600s, replanting their rapidly disappearing forests and in so doing avoided much environmental degradation that would have undermined their civilizations ('Collapse', page 294 on). This illustrates that human society is not always held hostage to the outflow of natural law. If the Easter Islanders had awakened to their plight,

they could also have acted to create an entirely different future for themselves. Alack, they did not see.

The subtle working of natural law through human society, generating outcomes that can lead to expansion into space, could be described as an evolutionary impulse. The working of this impulse can have destructive impacts on the society and the environment and in our case, the global society and the World environment. By becoming aware of this evolutionary impulse seeking to spread consciousness into space, like seeds from a pod, like birds from the nest, we can work with Nature rather than fighting Nature. With awareness of the outflow of this pattern of natural law, we can work to achieve expansion toward the stars and at the same time consider how we can work toward ending poverty, starvation, the extinction of species of life and the damage that we are causing to our World's environment. As with the recovery of the Earth after the last great meteor impact that caused the extinction of the dinosaurs, the Earth will recover in time from the damage that we are causing. What may not be recovered is our chance to expand into space, if we lose this opportunity by thinking too low and like the Easter Islanders, end up in an evolutionary dead end.

If these observations are accepted, it can be wondered if the Universe is offering a clear message for our survival and progress. To survive we need to fly from the Earthly nest into space. To ensure our survival in space we need to raise our awareness of how we relate to all members of the Human family. By raising our awareness we can achieve peace on Earth and change from a juvenile stage to the mature level of conscious life, a level much better fitted to survive in space and roam among the stars. Should we fail to make the change to maturity and attempt to be juveniles in space, it is possible that we could doom our survival and our hopes for space. Part of the process, it appears, is that we must make the choice, individually and collectively and act on it. The Universe is a harsh mistress and we may swim against the currents of natural law at our peril. Clinging to juvenile behaviour and failing to shift our conscious outlook to one of mature responsibilities, could, unfortunately, result in an evolutionary dead end for our species.

Celestial Values

In scientific discussion we now read of the Universe being described as an event that is happening in a vaster and mysterious environment, one that transcends space and time and is referred to by cosmologists as the multiverse. This view of our Universe could be described as being like a space-time bubble floating in the multiverse. We are accustomed to thinking in terms of past, present and future, but our experience of time is confined to the Universe. Any realm beyond our Universe is also beyond space and time and cannot be approached or understood by the rules and laws of science, which are confined to events within the space-time continuum. Though the Universe might be thought of as a bubble in a multiversal ocean, our cosmos could hardly be separate to the multiverse, no more than a mother's womb could be seen as separate to her body. For our Universe to exist in the multiverse, it would be made of and sustained by the multiverse, just as a mother's womb is part of her body.

Cosmologists are also suggesting that there are other universes in the multiverse, perhaps infinite in number, like trees in a forest. Our Universe has unfurled from its bud like a flower to reveal great beauty and our emergence in the Earthly nest is an intrinsic part of Nature's revelation flowing out from the multiverse. Though we may not be able to examine the multiverse directly, being creatures confined to a single tree of this transcendent forest, could there be qualities of the forest that would assist in our appreciation of the reality of the multiverse, like the sun that shines through the branches of an Earthly tree, or the scents that drift among its leaves from the surrounding forest?

In our experience of life we know happiness, love, beauty, joy and compassion, which may be described as higher qualities in life that do not appear to depend on natural law, but are essential for life and bring meaning to existence. Where natural law has created the Earthly nest in which we find ourselves, we may now wonder if the higher qualities of life transcend our Universe and flow through the cosmos as the breeze drifting through the trees of a forest. Should this be the case, pursuing the higher qualities of life could be the way to approach the multiverse and appreciate the transcendent realm beyond our Universe. This potential relationship between our Universe and the multiverse via the higher qualities of life could reveal that there is more to consider for the role of consciousness than being a clever hunter, fierce warrior, smart trader or tribal wizard. The practical application of the higher qualities of life could offer a window through which we can see into the multiverse and beyond our cosmic tree.

The prospect of the multiverse, revealed through science, is a frontier to challenge in the spirit of discovery and adventure and a subject worthy of research, discussion and debate. As with relativity and quantum mechanics, the Universe teases us with strange realms where normal laws appear to go out the window. Though natural law appears to vanish in the multiverse, the study of Nature can take us to the borderlands of the Universe, where we can wonder about the reality

beyond space and time, the meaning of life and our role in the great scheme of existence.

In the world at present we have come to embrace competition as the primary way to run business enterprises in the bear pit of the survival of the fittest. This way of life focuses on the individual to compete, to be a winner, or to be a loser. Is this the best way to run a world? The exceptionally high levels of poverty that now exist around the planet, even in the midst of wealthy nations, is not a good look or necessarily a sign that the ferocity of competition delivers the best outcomes for all members of the Human family. The current situation may be better understood when the proposed evolutionary impulse is taken into account, where individuals can be unaware of how the subtle outflow of patterns from natural law would be affecting the collective decisions of individuals, politicians and business leaders. As with the examples of Japan and Europe in the late Middle Ages, we can know that it is possible for a society to wake up to the process and identify an alternative and preferable way forward. This has also happened in the modern era with the development of human rights and alternative business practices, such as cooperatives.

The pattern for a balanced society can be found by observing Nature, which employs both cooperation to sustain life and competition to drive evolution. With the momentum for competition being so powerful at this time in human history, it may require a much more determined application of the higher qualities of life to achieve an alternative direction that assists our survival on Earth and in space. Compassion, for instance, may be the quality that we need to apply to build a healthy and inclusive society. Becoming aware of the need for compassion could be the critical step that we must make to achieve the transition from a juvenile to a mature conscious species. If compassion were set down as the basis for economics, then the bottom line would be a fully inclusive economic environment for all Earth's citizens. To allow any member of society to suffer or to be denied participation in the social fabric would be contrary to the basic principle of compassion and would therefore be unacceptable in an inclusive and mature society.

Greed is often cited as the face of competition and the expression "Greed is good" became a catch phrase at one time. There are many who see greed as the main problem in the world today. Greed, however, is only a mask concealing the real face of the situation. Rip the mask away and the hidden face can be seen of the unbridled drive to survive, a drive originating with the evolutionary impulse seeking to maximise the opportunity for the conscious children of Nature to expand into space. Only through greed and its associated blindness to the suffering caused to others can wealth and resources be sufficiently focused in a technologically advanced society. In the larger picture, greed is an aspect of the juvenile stage of consciousness and can be left behind as we become aware of the forces at play and work toward consciously building the new balance between human society and Nature as we establish our civilization in space. Greed is good for the survival of the juvenile form of consciousness, but would be an anachronism to mature members of a space faring civilization.

Under the banner of compassion, ways would be found for all members of the Human family to engage in the social fabric and share in the collective benefits. This approach would not exclude the ways of competition, which are vital for improving technology and making new discoveries. Competition is, however, only one half of a natural and balanced way of life, where the other half is cooperation. With all members of society actively participating and fairly benefiting, the economy as a whole is stronger and more robust. Unemployment, underemployment and poverty are clear signs of a society that is immature, juvenile and a danger to itself, as fear and hopelessness grow where people are denied access to the social fabric. It is out of suffering, fear and hopelessness that the spectre of terrorism emerges to haunt our world and pose a threat to future human settlements and developments in space.

Green Space

Unlike the Easter Islanders, we are all too aware of the problems in the World today, but the will to act in a timely fashion still appears to elude us. Understanding the evolutionary forces that are driving human societies and collective behaviours would be a good start to solving our Earthly woes. If space is an intrinsic part of a whole environmental solution, then space will also be part of the green solution for the Earth. As we develop ways to provide healthy air, water and food for space settlements, we could also apply those solutions for communities anywhere on Earth. With people liberated from starvation, critical reasons for the harm caused to local environments are removed. Starving people have little reason to care about the Earth's environment or plan for the future.

For many decades ecologists like Professor Charles Birch have sought to promote ways for our society to become "socially equitable and ecologically sustainable." ('Confronting the Future', 1993 edition, page 2). Equity and sustainability are like two sides of the same coin. Social equity is achieved in an environment where all Earth's children have a good quality of life and opportunities for the future. Equity, however, cannot happen by only thinking and writing about it. The practical application of compassion in human communities and economic practice is the only way that poverty can be planned out of our thinking as critically bad economics and a key threat to environmental sustainability and global security. Birch suggests that we must

make "the transition from the exploitative 'cowboy economy' stage to the 'spaceship economy'." and come to know that "the role of nature in economics is that nature is the economy's life support system." (both from page 19). In 1969 Buckminster Fuller presented his 'Operating Manual for Spaceship Earth', because the Earth had recently been viewed from the Moon and it was so obvious that our planet was a closed system with a limit to growth and if the planet began to burst at the seams, the life-support systems would be at risk and our survival would be in danger.

We now know that there is a limit to technological solutions that will save us from our destructive behaviour on the Earth and this also applies to space. Our ability to survive in space depends upon ensuring air to breathe, water to drink and food to eat. We need healthy systems to maintain a healthy life. Wealth is useless without a healthy life and pleasant environment and the lessons gained in space will also help us to ensure that life on Earth is also healthy and pleasant. After all, the Earth is and will probably always be our most important spaceship in the Solar System, our home planet, the greenest place in space.

Solar Peace Corps

Imagine a future where the vision for peace on Earth and in space is succeeding, where our Solar economy is being built on a foundation of compassion that allows all to participate and where our love of the Earth translates into the care that heals the damage that industrialisation and population growth has caused to our planet. In this environment an organization could be active where citizens of the Solar System could spend time on Earth to help improve the home planet. It may form part of a Solar citizens education to serve a tour on Earth, to understand our living Earth and discover human history and culture. It would take time for the benefits of an economy built on compassion to become established in all parts of human society, but the fact that it is being worked toward would offer hope where there is now dread. The more that hope spreads, the happier the hearts of people in the world will be and the roots of conflict and terrorism will steadily wither and hopefully, disappear. The concept of a Solar Peace Corps, or similar, could be considered now as part of building a better world on Earth and in the Solar System. As we look to our odyssey among the stars, we can begin the work of becoming a mature and compassionate species of conscious life and worthy ambassadors of Sol. While there is homelessness in wealthy nations, starvation in poor countries and environmental damage remaining around the planet, there is much work to be done toward achieving peace on Earth and ensuring security in space.

Interstellar Exploration

In May 2006 the Voyager spacecraft left the outermost layer of the heliosphere surrounding the Sun, 9 billion miles from Earth, to enter interstellar space. Launched on their tour of the planets in 1977, Voyagers 1 and 2 should not be the last craft from Sol to head out to the stars. Of the many propulsion systems now available to send an explorer to the stars, one method could prove highly effective. Solar sails could be large and very light and with the push of a powerful laser beam, a solar sail could slowly but steadily achieve a very high velocity, allowing arrival at a nearby star within decades rather than centuries or millennia.

Solar sails were proposed by Dr Louis Friedman in the 1970s while at NASA, as a way to rendezvous with Halley's Comet. The concept was not used then but in 2001 the Planetary Society sought to test a sail in Earth orbit. Unfortunately, the mission failed, as did a second attempt in 2004, before the sail could be unfurled. The technology is so simple and logical; it must only be a matter of time before it is successfully tested.

Because of the high velocity, such flights to the stars would be fly-by missions, but would return the most amazing amount of information to Earth on alien star systems. Endless numbers of interstellar explorers could be sent out to thousands of stars, mass-produced in automated factories in the Solar System. As the explorers head away from Sol in every direction, they would also serve as a giant and expanding eye for Astronomers to look deeper and in more detail into the Universe and in the search for planets with life and possibly, an intelligent species and civilization may be found.

When a way is found to reduce the velocity of interstellar explorers when arriving at their destination, it will be possible to design craft that would contain a host of tiny machines that, once on a rock, could set to work to build larger machines and construct a communications station to send an endless stream of information back to Sol about the new star system. The machines could also be able to make copies of themselves and construct their own automated factory to build explorer craft to send out around the new star system and return all this knowledge to Sol. When this happens, the Universe will become a much smaller place, with only time between our Solar civilization and the distant stars.

One potential method to slow the velocity of a stellar probe with a solar sail would be to design the material of the sail to be a solar energy collector, with the energy running down the rigging to the probe where it can be stored and used. As our stellar probe approaches the nearing star, it could swing around so that it heads toward the star with the sail working like a parachute. If a laser can be included in the design of the probe, then the energy collected from the new star could be used to direct a laser beam to the sail to further slow the probe. The double effect of the stars solar wind and the onboard laser could be enough to slow the velocity of our stellar probe so that a suitable rock could be found to land on and begin the construction of an interstellar communications base

Stellar Web

Once it is possible to have our interstellar probes construct an automated factory in a neighbouring star system, then our star station could mass-produce their own stellar explorers to send on to other stars by solar sail, a process that could continue from star to star, with the numbers of Sol star stations growing in the hundreds and thousands and eventually, in the millions. Each star station could be in communication with each other, as well as with Sol, creating a great web among the stars, sending back observations and discoveries, as well as serving as early warning stations for any dangers that may lie out there in the stellar deeps. It is amazing to consider that with technology now on the table and under development, the human hand could reach across the Universe within the blink of a cosmic eye. With the computing capacity of each star station growing as the web develops, the most complex problems could be put to the stars to fathom and reply.

Starward Ho!

Future astronomy in the Solar System will produce the most amazing discoveries of neighbouring star systems and distant galaxies. Should we discover a fast way of travelling through space, manned missions will kick the alien dust and establish branches of the Human family among the stars in the short term. If it turns out, however, that it will take centuries or even millennia to travel to the stars, would we still go?

If our only option were a slow trip to the stars with the propulsion systems available, then refining the construction and life support systems in space station settlements would prove to be an essential foundation for future star travel. Rather than thinking of a small number of adventurers setting off for a chosen star, the journey could involve a fleet of large star ships, all with an artificial Earth-like gravity and living area large enough to hold a small nation.

By having a large number of star travellers setting off in a fleet of star ships, the social life of over generations would be much the same as living in the Solar System, with nearly all the same life opportunities at hand. The star fleet would also be in constant communication with Sol, receiving all the latest news, fashions and discoveries from across interstellar space. Our fleet could also be in touch with other star fleets heading out from Sol and the great web of communications spreading among the stars. The denizens of interstellar space could be involved in scientific research, astronomy and the arts, challenging the frontiers of human knowledge and understanding. The denizens of deep space may make an unexpected discovery, such as a faster way to travel to the stars. There may be many star fleets that are upgraded a number of times with improved propulsion systems on their journey to the stars, shortening their time of arrival.

Some of the fun will disappear for star travellers arriving at a new sun, as a star station will have already been established for many years, decades or even centuries and whole cities could be designed in flight and built by machines in preparation for their arrival.

A fundamental reason to plan for star travel and encourage related research is the same as the need to expand into the Solar System. Living in a dangerous Universe, should a nearby star suddenly go nova, the wave of radiation would be as lethal to life as the mountain from space that ended the reign of the dinosaurs. Expanding to the stars is another insurance policy for the future of human survival and will keep the spirit of adventure and discovery very much alive in the hearts of the children of Sol.

Missing ET

Though our astronomers are able to detect and describe planets orbiting distant stars, no alien civilization has yet been found in space. So far the stars are silent and there could be four possible reasons for this. Firstly, we are the only conscious life form in the Universe and if this is the case, we had better be a bit more diligent about ensuring our survival. Secondly,

extra terrestrials are out there, observing our progress and waiting to see if we will be an acceptable addition to the cosmic community, or a demonic species that will need to be contained. Thirdly, other conscious species that came close to expanding into space may have failed to make the transition from the juvenile stage to becoming mature beings able to assure their survival. A fourth possibility is that we are the first conscious species to be able to expand into space and there are others out there among the stars that are on the way. Should we reach the stars by the fast route or the slow boat, how will we behave toward other life forms? Earth's history is littered with tribal conquests and the expansion of imperial powers at the expense of those less able to defend themselves. It may be hoped that if we find other conscious life forms on our travels in space, we will be moving among the stars as a mature and compassionate civilization, more like angels silently watching and willing to help.

Earth Citizen's Space Initiative

Would you like a say in the society that is about to be created in space? Should a large enough number of people in the World express a common view on their preference for the future of human society in space, their collective voice would have an impact on decisions by governments and corporations. If this body of people, sharing a similar vision, were to form an organization founded on their concerns for human survival, assuring security in space and advancing our civilization in the Solar System and among the stars, they could consider raising funds to initiate their own space program. If they viewed space station settlements as a key objective, the construction of the first of these could be a primary objective. If this initiative began to succeed, it would become a strong motivation for governments and corporations to also increase their efforts for space development. The Earth citizen's organization would become stakeholders in our future in space and be in a good position to influence the decisions that shape the emerging Solar society.

An Earth citizen's vision for space may begin with a few good-hearted folk, but to have an impact, participation and support would need to grow to a million strong and beyond. In this way the vision for space could become a mainstream activity with a view to involving Human society as a whole in working toward our survival and prosperity in space, as well as peace on Earth and security in the Solar System. The benefits of space must reach the whole Human family for that vision to be realised. With a large participation of people working toward practical outcomes on Earth and in space, it will be possible to consider serious fund-raising to drive an Earth citizen's space initiative from the Earth to the stars. If our survival matters, then the challenge ahead is to tell the story that inspires participation and action. If compassion counts, then that is a very good place to begin the discussion of how the action will happen.

The funds of an Earth citizen's space initiative could be available for research and development with:

- The design of the first space station settlement.
- The development of efficient and cost-effective ways of flying into space – CATS (Cheap Access To Space).
- The training of space construction workers.
- Investment in the development of robotic methods to assist construction in space and other space activities, such as mining.
- Training and preparation of those who will live in the space settlement.
- Designing the shape of the Solar economy that serves the needs of the Solar society, including Earth and the Human family.
- Construction of the first space station settlement.
- Development of space industry.
- Development of resource gathering on the Moon, Mars and asteroids.
- Considering the design of the second, third and many more space station settlements to follow and to be located around the Solar System.
- Begin the effort of ensuring security in space by achieving peace on Earth, seeking out the ways each child of Earth will have access to all the opportunities that life should offer a child of the stars.

Among the Stars

We now have a golden opportunity to consider our future on Earth and in space. Our fate is in our hands, but should we miss this chance to fly from the Earth and among the stars, we may only have ourselves to blame. It will be a huge effort to succeed, but succeed we must, if we would like to ensure our survival on the home planet, as well as in space. It may only be by flying from our Earthly nest that we can begin to realise our full potential as children of the stars and like a butterfly breaking free of its chrysalis, emerge as mature and compassionate beings, strengthened by the struggle and ready for the

celestial challenge in the Solar System and beyond.

“Our television documentaries and books show us in graphic detail why the Easter Islanders, Classic Maya, and other past societies collapsed. Thus, we have the opportunity to learn from the mistakes of distant peoples. That’s an opportunity that no past society enjoyed to such a degree. My hope in writing this book has been that enough people will choose to profit from the opportunity to make a difference.”

‘Collapse’, 2005, Jared Diamond, page 525.

“The problems that beset each nation and the global community will be resolved either by human intelligence or by the modern horsemen of the apocalypse; famine, environmental deterioration, disease and war. The choice is ours.”

‘Confronting the Future’, 1975, Charles Birch, page 350 – revised edition 1993, p. 322.

“There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.”

‘The Origin of Species’, 1859. Charles Darwin, page 460, 1985 edition.

Kim Peart, born in 1952, is a visual artist living in Tasmania, an island state down under Australia, who has a keen interest in the human condition, our future in space and realms beyond the Universe. He joined the L5 Society in 1976, which offered hope for human settlement in space as the high frontier. Over the years Kim has been seeking to understand how our civilization could live in harmony with the Earth and has been active with local community and environmental concerns, as well as human rights and global issues. Delving down through many layers, Kim came to see that evolution is alive and well and playing an active role in human behaviour and is determining the shape of our society in the world, concluding that our expansion into space is not just a novel thought, but will play a critical role in our survival and realising our full potential.

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