Taking Care of the Outer Space Environment: Proposed as an essential Risk Reduction action in the Economic Development of Outer Space

Submission proposed by John K Lee of Careouterspace.org on 25 January 2021, in response to the call by the House of Representatives standing committee on industry, innovation, science and resources regarding an inquiry into developing Australia's space industry.

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INTRODUCTION

This submission is proposed in response to the call by the House of Representatives standing committee on industry, innovation, science and resources regarding an inquiry into developing Australia's space industry, chaired by former deputy prime minister Barnaby Joyce.

SIGNIFICANCE

The significance of this submission is that this submission highlights the current absence of an organised environmental movement in Outer Space activities, both nationally and internationally. Additionally, it proposes proactive action to be taken by the Space Industry, so that the Space Industry is seen to be participating in a balanced program of Care of the Outer Space environment. As a result, the risk of future environmental extremist obstruction to the economic development of Outer Space is reduced.

OVERVIEW

This submission firstly, describes the relationship of the Outer Space environment with respect to the Natural planet Earth environment and the Inner Space environment of Artificial Intelligence. Secondly, focus is on the Outer Space Environment, and in particular, on the need for all parties in Outer Space activities to be seen to be addressing the interests of the general world community. This situation necessitates the formulation of a quasi-independent organisation promoting a unified environmental approach, by acknowledging and adopting to an appropriate extent, a principle of Care of the Outer Space Environment, consistent with agreed values and ethics.

This approach would enable the Space Industry to fill the environmental movement vacuum and facilitate occupation of the moral high ground, in the event that environmental militants were to divert from their current focus on the environmental issues of the natural planet Earth to issues real or imaginary in the Outer Space environment. Thus, expenditure on a program of Care of the Outer Space environment could be considered as a cost of doing business in Outer Space, which is analogous to a Risk Management Insurance policy.

Whilst initial implementation of the Care of the Outer Space environment program is proposed at a National (Australia) level, for this program to achieve long-term success, implementation at a global level is required. An international Care of the Outer Space program would be required to be culturally and geo-politically neutral. Success of such a program could contribute significantly to a reduction in international tensions.

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BACKGROUND

Currently, in 2021 as we progress further into the 21st Century, an increasing number of organizations, both Government and Private, in Australia and internationally, are finessing plans for the exploration and economic development of Outer Space. The "Space Race" is indeed continuing with renewed vigour!

HUMAN INVOLVEMENT IN THE NATURAL PLANET EARTH ENVIRONMENT, OUTER SPACE ENVIRONMENT, AND THE INNER SPACE ENVIRONMENT OF ARTIFICIAL INTELLIGENCE

Environmental Context

Historically, humans evolved in the natural planet Earth environment over some hundreds of thousands of years, commencing our current civilisation a few thousand years ago, and in the 21st century is rapidly transitioning beyond the constraints of the physical world to the inner existence of the mind. Similarly, humans are extending the bounds of physical existence beyond planet Earth, to the Moon and further into the cosmos.

The natural planet Earth environment

Significant impact of humans on the natural planet Earth environment followed the start of the industrial Revolution in the late 18th century and accelerated during the economic boom of the late 20th century. Today, in the year 2021, after two hundred years of churning, the environmental debate of the natural planet Earth involves numerous disparate parties, characterized by adversary and dogma with extensive IPCC (Intergovernmental Panel on Climate Change) influence.

The Inner Space environment

The Inner Space environment can be described as that of Virtual Reality, Artificial Intelligence, Social Reality and Data Science. Historically, World War II initiated the development of the basic electro-mechanical computer. Subsequently, in the mid-twentieth century, the main-frame computer heralded the commencement of Inner Space as an environmental domain of humans. Inner Space is a relatively new industry sector, which is largely unregulated, although there have been recent introduction of severe Government penalties for macro anti-social behaviour applied to Facebook by the US authorities and to Google by the European Union.

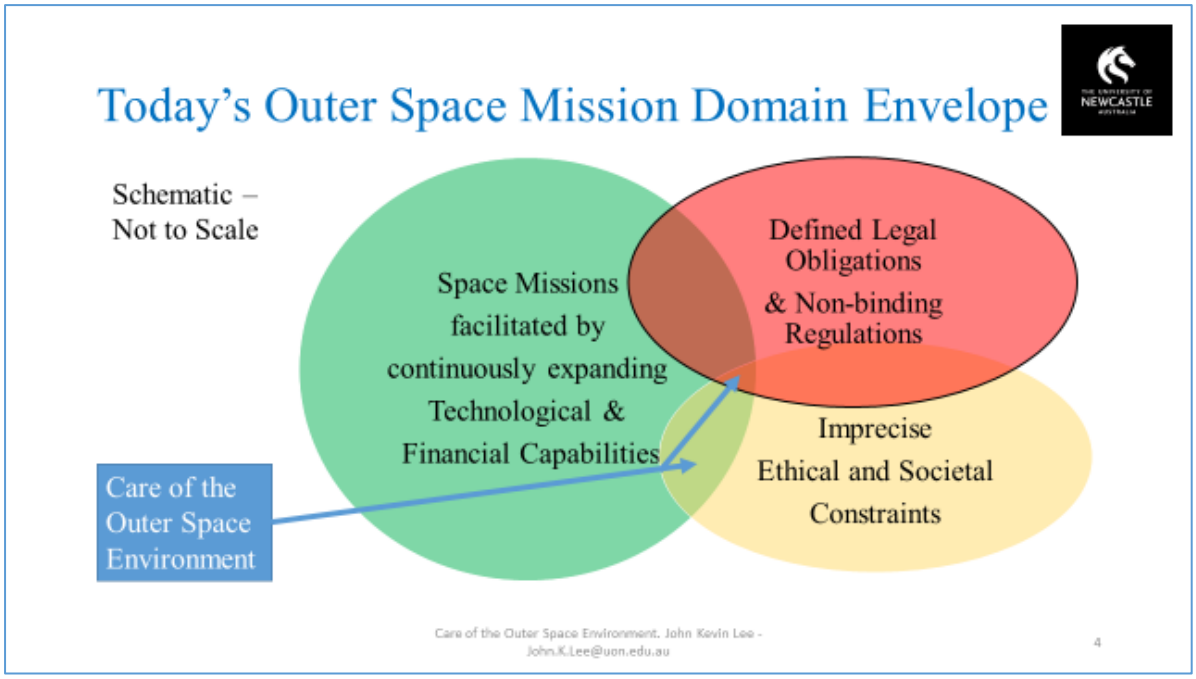
The Outer Space environment

The history of Outer Space development is that the first high-performance space rocket were developed by Germany in World War II and in the mid-twentieth century the

advent of satellites by Russia and Moon astronauts by the USA, launched the human journey into Outer Space. The 21st century shows rapid expansion of capabilities and participants of smaller nations, e.g. the United Arab Emirates and large corporates, e.g. SpaceX. The status of the Space industry in the year 2021 is that some imposed regulation exists, e.g. The Outer Space Treaty of 1967 and other agreements, but predominantly the Space Industry basking in glory of exploration achievements.

AUSTRALIAN (AND INTERNATIONAL) INVOLVEMENT IN OUTER SPACE

As quoted in the Terms of Reference for this Parliamentary enquiry, "The Australian Space Agency has a goal to triple the size of the sector to $12 billion and create an additional 20,000 jobs over the next decade." This position can be represented by the green circle in the below diagram "Today's Outer Space Mission Domain Envelope". From the diagram, it can be seen that the Technological/Financial capabilities are constrained by Legal obligations (in the red oval) and by Ethical/Societal constraints (in the yellow oval). Furthermore, the diagram identifies the need for Care of the Outer Space Environment (in blue) in those situations where Ethical/Societal responsibilities conflict with Technical/Financial capabilities (in yellowish green) and in compliance with legal obligations (in the overlay of red and yellow on green).



Therefore, there is a need for the Space Industry to be seen by the general public to be exercising "reasonable" care of the Outer Space environment, in all actions which contain

elements of ethical, social or legal responsibility. The Australian Space Agency is rightfully focussed on the economic development of the Australian Space Industry. This task requires intensive focus on Technical/Financial/Economic matters, in order to achieve demanding key success criteria. In this scenario, conflicts between Technical/Financial achievement and Ethical/Social/Legal responsibilities are inevitable. A legal regime already exists in the form of the Outer Space Treaty of 1967 and other agreements. However, there is no balanced independent Outer Space ethical/social environmental group in existence. Accordingly, this submission identifies the need for an independent "Care of the Outer Space environment" organisation, together with an Outer Space environment program, and posits essential components of such a program.

ESSENTIAL COMPONENTS OF A CARE OF THE OUTER SPACE ENVIRONMENT PROGRAM

Following are essential components of a proposed Care of the Outer Space Environment five-year program.

Strategic aspects

Regarding the global balance of priorities between exploration, economic development & preservation, currently differences exist between nations. Within nations, there are existing differences between regulators, private actors and state actors.

For Outer Space environmental strategies and practices to be effective, they must be inclusive of, and applicable to all space-faring nations irrespective of spoken language and political ideology.

Tactical aspects

Discretionary missions to be subject to stricter constraints regarding contamination/debris than for exploration missions. Examples of discretionary missions: economic development, off-earth human settlement, tourism, dispersion of cremation-ashes, political, evangelical and other purposes.

Context of the Outer Space Environmental debate

Current difficulties are experienced in the management of the Natural Planet Earth and the Inner Space environmental domains.

Sufficient motivation exists to avoid replication of the Natural Planet Earth and Inner Space environmental discussion difficulties in the management of the Outer Space environment. Therefore the Space Industry must avoid replication of these difficulties in the management of the Outer Space environmental discussion.

The existing Treaties and Regulations as currently enforced, do not provide sufficient protection of the outer space environment. Therefore, it is necessary for any proposed Outer Space environmental group to coordinate closely with relevant Outer Space Legal persons.

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Proposed Framework for Care of the Outer Space environmental domain

The framework is based around a Risk Management process in which Outer Space environmental issues and risks are identified, classified, analysed and individually mitigated. An overview of the process follows:

A. Outer space Issues and Risk items identified and listed, then grouped into three groups of Critical issue/risk categories:

i. Contamination

ii. Projection of the Geopolitical-Industrial-Military contest into outer space

iii. Benefits to planet earth from outer space

B. Each Risk/Issues item is analysed, then a mitigation program is determined. Subsequently, the specific required skills are acquired, and the relevant Space stakeholders are informed and persuaded to participate in the mitigation process.

RISKS AND ISSUES CLASSIFICATION REGISTER

The following classification register is the ongoing result of applying the Framework outlined in the previous sub-section.

1. Contamination

i. Case Study: Tardigrades on the Moon (Risk Item 6)

ii. Outbound biological contamination (Risk Item 3)

iii. Inbound biological contamination (Risk Item 4)

iv. Lunar work-site contamination & debris (Risk Item 7)

v. Cremation Ash Capsule - orbital dispersal (Risk Item 8)

vi. Dealing with corpse(s) in outer space journeying (Risk Item 9)

vii. Radio-active contamination from defunct satellites and space-craft (Risk Item 2)

viii. Effect on earth's atmosphere from orbital debris (Risk Item 10)

2. Projection of the Geopolitical-Industrial-Military contest into outer space

i. Environmental impacts of off-earth Built Environment (Risk Item 11)

ii. Environmental issues regarding use of in-situ lunar water (Risk Item 12)

iii. Environmental consequences of military conflict (Risk Item 13)

iv. Orbital Debris – Kinetic Risks (Risk Item 1)

3. Benefits to planet earth from outer space

i. Includes the over-arching economic, scientific and prestige benefits implied from space activities e.g. GPS applications to smart farming, vehicle navigation, search and rescue.

ii. UNOOSA – United Nations Office of Outer Space Affairs. Space Supporting the Sustainable Development Goals

iii. Effect on earth's albedo from orbital debris and various climate engineering solutions (an opportunity to stabilise earth's climate, long-term) (Risk Item 5)

COMPLIANCE MATRIX OF PROPOSED CARE PROGRAM WITH INQUIRY TERMS OF REFERENCE

The following table identifies the Benefits arising from the proposed activities in the Care of the Outer Space environment, when measured against the five published Terms of Reference of the Parliamentary enquiry.

Parliamentary Enquiry into developing Australia's Space industry - Terms of Reference. Support of domestic and international space related activities including:	Benefits of Care Outer Space Environment activities
Development of space satellites, technology and equipment	Risk Management "Insurance" against environmental extremist obstruction to development activities.
International collaboration, engagement and missions	Transparent international activities viewed as Geopolitically neutral, contributing to diffusion of international tensions.
Commercialisation of research and development, including flow on benefits to other industry sectors	Risk Management "Insurance" against environmental extremist obstruction to commercialisation activities.
Future research capacity, workforce development and creation	Due to reduction in obstructions as described in the three scenarios above, workforce opportunities are increased.
Other related matters	1. Office Headquarters of Care Outer Space Environment can be located in a major Australian regional city. 2. Care Outer Space Environment to promote awareness to Secondary and Tertiary education institutions. 3. The Space Industry will have provided a degree of protection to the Outer Space environment, whilst still achieving its economic objectives.

PROGRAM IMPLEMENTATION

A five-year implementation program is outlined following.

Operational Practice

Operations are to be headquartered in a Regional City possessing comprehensive facilities, such as Cairns, Townsville, Newcastle, and Ballarat or similar, with business conducted via electronic communications rather than physical travel, where practicable.

Implementation Strategy

1. Focus on implementation of Care of Outer Space at a national (Australia) level for the first six months of operations.
2. Commence progressive promulgation the “Australian model” to International actors following six months initial operations at a national level.

Program Schedule

A five-year implementation schedule is proposed on the following page.

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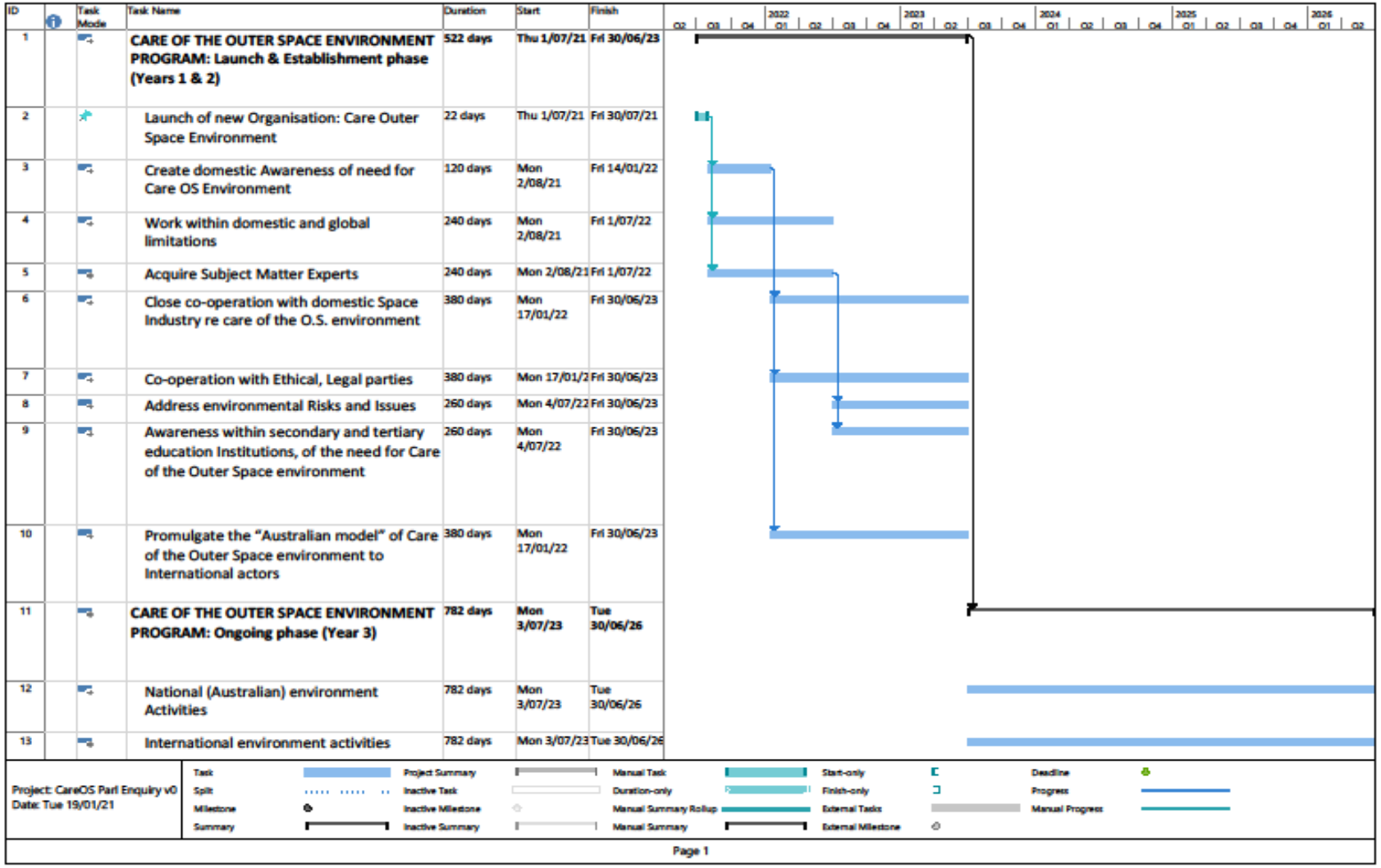

ID	Task Mode	Task Name	Duration	Start	Finish
1		**CARE OF THE OUTER SPACE ENVIRONMENT PROGRAM: Launch & Establishment phase (Years 1 & 2)**	**522 days**	**Thu 1/07/21**	**Fri 30/06/23**
2		Launch of new Organisation: Care Outer Space Environment	22 days	Thu 1/07/21	Fri 30/07/21
3		Create domestic Awareness of need for Care OS Environment	120 days	Mon 2/08/21	Fri 14/01/22
4		Work within domestic and global limitations	240 days	Mon 2/08/21	Fri 1/07/22
5		Acquire Subject Matter Experts	240 days	Mon 2/08/21	Fri 1/07/22
6		Close co-operation with domestic Space Industry re care of the O.S. environment	380 days	Mon 17/01/22	Fri 30/06/23
7		Co-operation with Ethical, Legal parties	380 days	Mon 17/01/2	Fri 30/06/23
8		Address environmental Risks and Issues	260 days	Mon 4/07/22	Fri 30/06/23
9		Awareness within secondary and tertiary education Institutions, of the need for Care of the Outer Space environment	260 days	Mon 4/07/22	Fri 30/06/23
10		Promulgate the "Australian model" of Care of the Outer Space environment to International actors	380 days	Mon 17/01/22	Fri 30/06/23
11		**CARE OF THE OUTER SPACE ENVIRONMENT PROGRAM: Ongoing phase (Year 3)**	**782 days**	**Mon 3/07/23**	**Tue 30/06/26**
12		National (Australian) environment Activities	782 days	Mon 3/07/23	Tue 30/06/26
13		International environment activities	782 days	Mon 3/07/23	Tue 30/06/26

Resourcing Principles

Consistent with environmentally aware principles of frugality:

1. The Principal/Project Manager and Senior Subject Matter Experts (SME) to be sourced and remunerated at approximately 50% of the Market Rate, or as volunteers.
2. SME's required (part-time) in the following fields: Astrobiology, Astrophysics, Space Engineering, Space Environmentalism, Sociology, Ethics, Space Law, Futurism and others.
3. The remuneration rate for the junior SME's to be pitched at market rates.
4. Accommodation for business purposes to be selected from three star equivalent standard.
5. Air travel to be at Economy fare rates.
6. "No strings attached" financial contributions from Donors and Philanthropists are welcome.

Financing Requirements

A five-year financing requirements spreadsheet is shown below.

CARE OUTER SPACE.ORG
FINANCING

ITEM	DETAILS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
		July 2021-June 2022	July 2022-June 2023	July 2023-June 2024	July 2024-June 2025	July 2025-June 2026
		$K	**$K**	**$K**	**$K**	**$K**
1	REMUNERATION					
1.1	Principal (Full-time)	100	100	100	100	100
1.2	SME's (Part-time)	50	150	150	150	150
2	EXPENSES					
2.1	Travel	10	20	20	20	20
2.2	Accommodation	10	20	20	20	20
2.3	Office & Promotional Materials	5	15	15	15	15
2.4	Office Rental	15	30	30	30	30
	Annual totals	**190**	**335**	**335**	**335**	**335**
	Progressive Total	**190**	**525**	**860**	**1195**	**1530**

RECOMMENDATION AND CONCLUSION

Recommendation

This response recommends that the Australian Government sponsors formulation of a quasi-independent organisation, by initially appointing a provisional Principal/Project Manager, and allocating operational funds. This new organisation is to promote to all parties involved in the economic development of the Space Industry, a National and International unified environmental responsibility, by acknowledging and adopting to an appropriate extent, a principle of Care of the Outer Space Environment, consistent with agreed values and ethics. The Care of the Outer Space organisation is required to be culturally and geo-politically neutral.

This approach would enable the Space Industry to occupy the moral high ground in the event that environmental militants were to divert from their current focus on the environmental issues of the natural planet Earth, to issues real or imaginary in the Outer Space environment. Thus, expenditure on a program of Care of the Outer Space environment could be considered as a cost of doing business in Outer Space, being analogous to a Risk Management Insurance policy.

The existing Treaties and Regulations as currently enforced, do not provide sufficient protection of the outer space environment. Therefore, it is necessary for this new Care Outer Space environmental organisation to coordinate closely with relevant Outer Space Humanitarian, Ethics and Legal representatives.

Conclusion

This submission regarding taking Care of the Outer Space Environment complies with the Parliamentary Enquiry - Terms of Reference, and identifies a previously unidentified mechanism to strengthen support of domestic and international space related activities, by a program of taking Care of the Outer Space Environment,