

Space : The Final Frontier?

Case Study of Evolution of Technology & its relationship with Social Structures

Research Introduction

A New Space Race characterised by:-

- Technological Innovations
- Resource Appropriation & Commercialization of the Commons
- Perpetual “Growth” Paradigm

Case Study

- Satellite Mega-constellations to provide space-based 'low-latency, high-bandwidth' global internet connectivity
- SpaceX's **Starlink*** and at least 8 other commercial plans for networks in Very Low-Earth Orbit

Technology and Economics

- **Reusable Rockets*** + In-Situ Resource Utilisation → drastic cost savings
- Incentives: free resource appropriation, microgravity enabling new production possibilities (ZBLAN fibre optics, 3D printing human organs), tourism, weaponization etc.
- Near term: Number of active satellites expected to growth from current ~ 2000 to ~ +20000 in 5 years
- Longer term: Asteroid Mining (e.g. 'Made in Space'*)
- **Narrative***: “First Trillionaire(s) will be Made in Space”; externalise energy and material footprint of production

- Proclaimed goal: connect 'under-served communities' but affordable access for low-income regions is challenging
- Business-case: **high-frequency trading*** → lower **latency** compared to terrestrial broadband for distances over 3,000km (e.g. transatlantic) (**Handley, 2018***) (speed of EM Waves in space around 40% higher than optical fibre cables)
- By some estimates, “If Starlink Succeeds Then SpaceX Revenue Will Be More Than Double NASA’s Budget”
- "A key stepping stone on the way toward establishing a self-sustaining city on Mars and a base on the moon.” - Musk*

Governance

UN Outer Space Treaty* of 1967:

- “Exploration and use of outer space...shall be carried out for the benefit of all countries...and shall be province of all mankind” - Article I
- “Outer space...is not subject to national appropriation by means of use, occupation, or by any other means.” - Article II

unilaterally super-seeded by

US Space Act* of 2015:

- ““US citizens...shall be entitled to possess and sell...space resources”

SpaceX alone has permission for the launch of 12,000 satellites + 30,000 more pending for approval → first come first (re)serve!

ITU is scrambling to keep up with the **free** appropriation of RF spectrum; unlike auctions for corresponding terrestrial licences (3G/4G/5G) that generate **billions in public revenue***

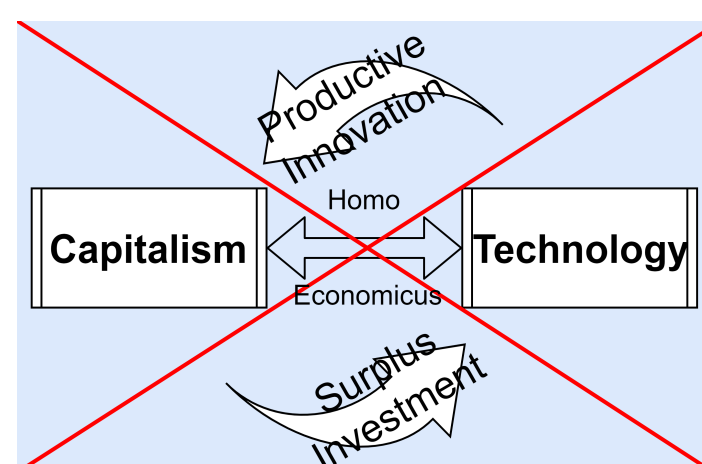
Space Debris: "If we don't take action now, we will be as responsible as those who have not taken care of climate change" – Dr. Schrogl, Chief Strategy Officer for European Space Agency (SCIAM, 2019*) #kesslersyndrome

Epistemic Framework for Appropriating Technology

Contemporary Thesis:

Flat Ontology of so-called
(cancerous) Growth Paradigm →

Not Even Wrong!



- Unable to incorporate social ecology and bio-physical limits
- Unable to contain risks induced by exponential technology
- Tendency to amplify destructive aspects of human nature

Integral Synthesis:

Depth Ontology +
Critical Realist methodology

Analyse underlying structures &
mechanisms and apply
Counter-factual thinking

Explicitly normative: structures
should amplify mechanisms and
aspects of human nature that
promote collective well-being

Realistic appropriation of
technology ↔ cognitive and social-
ecological transformation

