Imagining a Multiplanetary Future – Elon Musk's Impact on the Sustainability Discourse

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Summary

This Master's thesis project explores the impact of Elon Musk on the discourse of sustainability. His accomplishments in industry and innovation make him one of the most important and influential actors of the 21st century. Musk is renowned for redefining technology, challenge conventional thinking, and sparking debates about the future of sustainability. To comprehensively understand his impact on sustainability debates, it is necessary to take a closer look at his vision. Employing a mixed-method approach, this research analysed a corpus of 151 tweets authored by Musk and 141,115 responding quote tweets from 2009 until 2023. The analysis reveals that Elon Musk develops a socio-technical imaginary of making life multiplanetary which creates a rivalrous discourse to conventional understanding of sustainability. His future vision triggers a division among Twitter users in proponents and opponents. While proponents support the multiplanetary notion of sustainability by extending life beyond Earth to ensure its long-term survival, opponents contend that 'planetary' sustainability, which means staying within planetary boundaries, should take precedence. The implications of the findings suggest that sustainability discourses may increasingly embrace a focus on extending life beyond Earth, which could pose new challenges for policymaking and governance. Finally, this research project attempts to contribute to the broader understanding and the potential future implications of the emerging sustainability discourses that seek to utilize extraterrestrial environments.

Key words: sustainability, socio-technical imaginaries, multiplanetary, Elon Musk

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Table of Contents

1. Introduction

Since the beginning of outer space exploration in the late 1950s, the anthropogenic impact in space has been increasing dramatically. During the past decade, plans on commercialization of space resources (Tepper, 2019; Tronchetti, 2015) and space tourism (Billings, 2006; Forganni, 2017) gained prominence. Recently, Elon Musk's (2017) controversial ambition to send manned spaceflights to Mars and potentially build a permanent settlement for humans on the red planet spurred a societal debate about the future of humanity at the earth-space interface. In this context, Musk has been picking up on what NASA and others have been describing already with the notion of space as the 'new frontier' (Griffin, 2007; O'Neill, 1987). It seems that the idea of expanding life to other planets is becoming a more prominent image when talking about the future. However, this development is also concerning for many scholars and non-academics because it is not yet clear what impact the shift in attention towards a multi-planetary human presence could have on the discourse of sustainability (Yap & Kim, 2023)

So far it has not been investigated to what extend powerful rich private actors such as Musk are able to influence and shape how people make sense of sustainability. However, it has been observed that Musk is disseminating a certain vision of the future where technological advancements in the space industry will support a new configuration of societal life in a multiplanetary scenario (Platt et al., 2020) Musk is not only consolidating and sharing his imaginaries via interviews and statements, but he refers to them also vividly and frequently via his Twitter account. At the beginning of January 2023, Musk account lists more than 125 million followers and over 22,000 tweets, making him one of the most influential persons on the platform. The effect that his vision has on the public discourse of sustainability on Twitter and beyond remains unexplored.

A growing number of publications estimate that future space activities are going to have an increasing impact on sustainability on Earth as well as in space (Miraux et al., 2022; Newman & Williamson, 2018; Yap & Kim, 2023; Yap & Truffer, 2022). Scholars argue that a paradigm shift from 'planetary' to 'multi-planetary' is happening and bring forward 'earth-space sustainability' as a framework to conceptualize the increasing interdependencies that arise between Earth-bound and space-based activities (Yap & Kim, 2023; Yap & Truffer, 2022).

Space actors, however, seem to frame the discourse differently. Although they are mentioning sustainability concerns in their proposals and ambition statements for further space exploration, the kind of earth-space related discourse they are presenting seems unaligned or occasionally opposing to what academics mean when they refer to earth-space sustainability.

To understand this discourse conundrum and its potential implications better, there is a need for more empirical evidence on how the people are framing the issue of sustainability of future earth and space related activities. For example, to what extent are novel discussions emerging compared to the more conventional understanding of sustainability? This research project attempts to fill this knowledge gap by exploring how Elon Musk, as arguably one of the most influential individuals and most prominent private space actor, is influencing the discourse of sustainability in a period of increasingly intertwined earth-space activities. Therefore, the objective of this research project is to explore what impact Elon Musk's socio-technical imaginary has on the sustainability discourse of other people. Therefore, the following central and two sub-questions operationalize the research objective and guide the research project.

Central research question:

How does Elon Musk's sociotechnical imaginary impact the sustainability discourse?

Sub-questions:
1) What is the socio-technical imaginary that Musk seeks to advance?
2) What impact does his socio-technical imaginary have on Twitter users' discourse of sustainability?

The first sub-question seeks to understand how Elon Musk imagines the socio-technical life and order of the future. It investigates relevant tweets to form a narrative of his vision. Sub-question two discusses and maps Twitter user's responses to his narrative to explore what impact Musk's vision had on how people frame and attribute meaning to sustainability. The findings to these sub-questions will ultimately help to delineate what impact Elon Musk has on the sustainability discourse. Thus, this study attempts to provide two key results. Firstly, a comprehensive understanding of Elon Musk's socio-technological vision of the future. And secondly, an overview of the social actors and their thematic responses to his vision in relation to sustainability.

To accomplish the research objective, a mixed-method approach will be employed, integrating methods of computational data collection and text analysis such as natural language processing, sentiment analysis, topic modelling with the qualitative interpretive analysis methods of coding, Argumentative Discourse Analysis, and network analysis. Twitter data over a 14-year period is the unit of analysis in this project. Consequently, a mixed-method research approach allows for a comprehensive analysis of the breadth and depth of twitter data.

Incorporating interplanetary concerns into sustainability governance research is an innovative and recent development (Yap & Kim, 2023). It recognizes that progress towards a more sustainable society needs to consider the impact of space activities as well. Therefore, it becomes scientifically relevant to map and understand better how different driving forces influence and shape which vision or discourse of sustainability becomes dominant in the future. Musk's ambition to make (human) life multiplanetary and terraform planets could have an impact on how the sustainability discourse is going to take shape in the future. Furthermore, portraying Mars and other celestial bodies as a future habitat and resource depository could undermine or support efforts of staying within Earth's ecological boundaries, which science regards as an important indicator for sustainability (Meadows et al., 1972; Rockström et al., 2009).

This research is societally relevant as it aims to reveal how Elon Musk may impact society's perception about the future trajectory of sustainability. Discourses and framing of concepts like sustainability shape which desired imaginaries become performative in the future. Realizing that there are competing visions trying to influence the discourse of sustainability in certain directions, people can be more aware of them and could interact with them more critically. Furthermore, it is a political question of who is able to shape the direction of the sustainability discourse. Musk, whose endeavours are perceived to be at the forefront of the emerging Earth-Space frontier, has the potential to shape political decision-making and policy outcomes due to his huge followership and financial power. Therefore, the findings of this research project could be used to comprehend how rich powerful actors like Musk and their framing could determine the pathway of sustainable development in the future. Ultimately, this study could potentially initiate a broader and more participatory discussion about which socio-technical imaginary of sustainability we as humanity wish to become performative in the future.

Conceptually, the research project follows a linear structure. Firstly, key theoretical concepts are introduced and elaborated through literature review. Additionally, a thematic framework of sustainability is developed that is used to structure the discourse analysis. Secondly, the method chapter elaborates on the research design of this study. This includes presenting an analytical framework and the qualitative and quantitative methods that have been applied in the stages of data collection and data analysis. Thirdly, the results are presented in two parts corresponding to the sub-questions. A narrative of Musk's STI is constructed based on his tweets. Thereafter, the selected quote tweets and their discourse of sustainability are analysed. The result chapter ends by summarizing the main findings to the sub-research questions. Fourthly, the discussion reflects on the findings, demonstrates theoretical

implications, and discusses the limitations of the research. Finally, the conclusion provides a concise summary of the research project and answers the research questions.

2. Operationalization of variables

This chapter presents the operationalization of variables. Firstly, the socio-technical imaginaries as independent variable is described in context of this research project. Secondly, the dependent variable, sustainability discourses, is conceptualized by delineating the academic 'discourse' of sustainability and presenting it in a thematic framework. It is important to note that this section does not aim to provide an exhaustive exploration of sustainability as a multifaceted concept, as this would exceed the scope of the project. Instead, the intention is to draw upon key theoretical insights from the sustainability science literature.

STIs and discourses are both connected, as they are influencing each other (Hermann et al., 2022). Discourses can be thought of as verbalized manifestation of STIs. This assumption is based on the notion that, both, STIs and discourses share the communality of being collectively performed (Jasanoff & Kim, 2015).

In that sense, the transition from STIs to discourse encompasses the moment when cognitive visions develop into to collectively verbalized utterances. Therefore, discourses are perceived as the initial verbal manifestations of imaginaries. As this manifestation through language progresses, discourses (as verbalized imaginaries) can become dominant and subsequently institutionalize into policies and laws (Hajer, 1993, 1997). Therefore, understanding STIs and the way they are expressed through discourses enables a comprehensive understanding of the interplay between societal visions and technology in shaping our discourses of collective futures.

2.1 Socio-technical imaginaries

Socio-technical imaginaries (STIs) as an analytical concept have been delineated by Jasanoff and Kim (2009, 2015) to illustrate how the interplay of the social and technological sphere co-produces visions of desired futures. The concepts premise is that in our modern world collective socio-political imaginations cannot be separated from the futures enabled by the advancements of science and technology (Jasanoff, 2020).

Technologies have become deeply embedded and to some extent even indispensable elements of social life and order. Observing that technological progress seems to always be preceded by human imagination, Jasanoff and Kim (2015) argue that the social and technological sphere engage with each other in a two-way dynamic, forming an inseparable way of co-producing the future. Hence, they define this phenomenon as STIs, which are

"collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff & Kim, 2015, p. 4). Unlike simple ideas or thoughts, STIs are desired by collectives, persistent over time, and capable of being realized. Nevertheless, they are also temporally and culturally specific (Jasanoff & Kim, 2015). In simple terms, STIs could be summarized as the visions of the present specifying what socio-technical configurations ought to unfold in the future. The relevance of this concept is that it offers an analytical lens to explore how imagined futures gain momentum and transform into tangible, performative realities (Oomen et al., 2022).

According to Jasanoff and Kim (2015), the formation of a particular STIs can be related to the visions of larger communities, but also to small collectives and, to a lesser extent, even individuals. Sometimes individual visions are so influential they are taken up by society and become then collectively held objectives. In case of an individual actor establishing a single, cohesive *socio-technical imaginary* (STI), the authors argue that the individual's vision can only become a collectively held vision when this actor is able to mobilize the required resources for making the vision durable. In this instance, those individual actors must have not only accumulated the necessary material resources to make their vision performative but, in addition, also utilize symbolic or cultural elements such as imagery and language to their advantage (Jasanoff & Kim, 2015). It can then be asked how these potent and powerful actors are able to shape the public imagination toward specific types of socio-technological futures. This research project assumes that Musk's wealth and influence suffice to consider him as an individual capable of creating a STI.

2.2 Sustainability and discourses

Discourses are commonly referred to as the ways of making sense of reality and giving meaning to phenomena (Benton-Short & Short, 2000; Hajer, 2006; Jørgensen & Phillips, 2002). They guide actors' perceptions of the world and lead to certain situations becoming framed as problems and others referred to as solutions (Hajer, 1993). Studying the language that is used in discourses enables one to understand how the framing of a certain issue takes shape. Discursive patterns can over time become dominant and institutionalize in particular practices (Burchell et al., 1991; Hajer, 1993). Discourses are guiding actors in their perception of the real world, leading to certain situations becoming defined as problems and others referred to as

solutions (Hajer, 1997). In that regard, it is less a phenomenon at hand that is important, but the way in which society makes sense of this phenomenon.

Sustainability is a very broad and inclusive concept which pertains to many types of discourses. Although academics have highlighted the ambiguity of the meaning and the prospects of sustainability (Toman, 2006), it can be argued that the concept's 'fuzziness' serves the purpose of incorporating multiple perspectives to work collectively towards its achievement. This section delineates the 'scholarly' discourse of sustainability as referred to in the academic literature to establish a scientifically based thematic understanding of the concept as dependent variable in this research project.

The modern notion of sustainability has been conceptualized as meeting the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). In the academic literature, sustainability has become understood as encompassing three major interdependent dimensions: the environmental, the social and the (techno-) economic sphere (Kuhlman & Farrington, 2010). It will be delineated hereafter what academics perceive under sustainability by shortly outlining important aspects of each of the three dimensions.

Environmental stewardship, as an important sub-domain of the environmental dimension of sustainability acknowledges that humanity has become a global geophysical force on the environment. The onset of this Anthropocene age underscored the need for effective stewardship of the environment to ensure long-term sustainability (Steffen et al., 2011). Environmental stewardship has been described as being concerned about the responsible management of natural resources for intrinsically-ethical reasons as well as for extrinsically-economic reasons (Bennett et al., 2018). From a systems thinking perspective, two major approaches to environmental stewardship have been identified: the *engineering approach* and the *complexity approach*. In the engineering approach, Earth is perceived as a 'planetary spaceship' which can be managed trough geo-technocratic means, such as geoengineering. The complexity approach, however, opposes this notion and emphasizes the significant role of socio-ecological interdependencies in achieving environmentally sustainable outcomes (Mathevet et al., 2018).

Moreover, researchers argues that the scope of moral consideration in environmental stewardship varies along a continuum, ranging from a human-centred to a more biosphere-centred standpoint (Worrell & Appleby, 2000). Consequently, environmental stewardship encompasses a range of diverse perspectives with the extremes of the spectrum reflecting an

extrinsic, engineering-human-centred stance on one end and an intrinsic, interdependence-biosphere-oriented perspective on the other end.

Research on the social dimension of sustainability, suggests that **social equity and justice** issues need to be incorporated to make sustainability a truly transformative process (Agyeman, 2008). However, equity and justice are often used interchangeably causing analytical challenges in distinguishing them without ambiguity. While both concepts aim to create fair and beneficial societal outcomes, research suggests subtle differences in their approaches: Social equity recognises the different circumstances of individuals and aims to provide the necessary opportunities for achieving beneficial societal outcomes for all. Social justice, on the other hand, focuses on the underlying systemic structures that contribute to beneficial societal outcomes (Stivers et al., 2023). For the purpose of this thesis project, however, explicitly distinguishing between equity and justice will be done only when it is relevant and necessary. For creating a concise overview of both concepts and their relationship to sustainability, the subsequent elaboration and thematic framework considers both terms interchangeably.

Firstly, equity and justice issues are usually classified between different subjects of concern. Typically, sustainability research has been referring here to equity and justice issues between present social groups (*intra-generational*) and future generations (*inter-generational*) (Agyeman, 2008; Eizenberg & Jabareen, 2017; Leach et al., 2018).

Secondly, it is argued that different dimensions of equity and justice exist. Leach and colleagues (2018) distinguish between two dimensions of equity and justice: distributional and recognitional. The *distributional* dimension refers to how resources are shared and allocated. *Recognitional* equity or justice is concerned about how identity, ethnicity, gender, values, and rights are acknowledged. Together, the subjects of concern can be combined with the equity and justice dimension to form an analytical framing. For instance, distributive intergenerational justice/equity explores how resources are shared and allocated amongst existing social groups.

The techno-economic sphere, particularly the capitalist model and its premise of economic growth, has played a significant role in facilitating the modern way of living at the cost of raising social and environmental problems (Meadows et al., 1972). However, the inclusion of **techno-economic development** targets within policy frameworks such as the Sustainable Development Goals still indicates their continued relevance in the context of sustainability governance (UN General Assembly, 2015). Within the realm of sustainability science, two major contrasting perspectives exist regarding the role of economic and technological development: one characterized by optimism and the other by criticism.

Ecomodernism represents the optimistic view, promoting the idea that technological innovation will lead to positive sustainability outcomes by decoupling economic growth from environmental degradation (Asafu-Adjaye et al., 2015; Dalby, 2016). In contrast, *Degrowth* as the critical perspective challenges this view and advocates for a deliberate reduction of the consumption of materials and resources (Kallis, 2011). In that regard, critics perceive the three spheres of sustainability also not as equal entities as in the Triple Bottom Line model (Elkington, 1994), but rather as a nested model with the economic sphere embedded within the social and the environmental sphere (Martinez-Alier, 2015).

Figure 1 integrates the conceptualization of the three sustainability dimensions into a thematic framework.

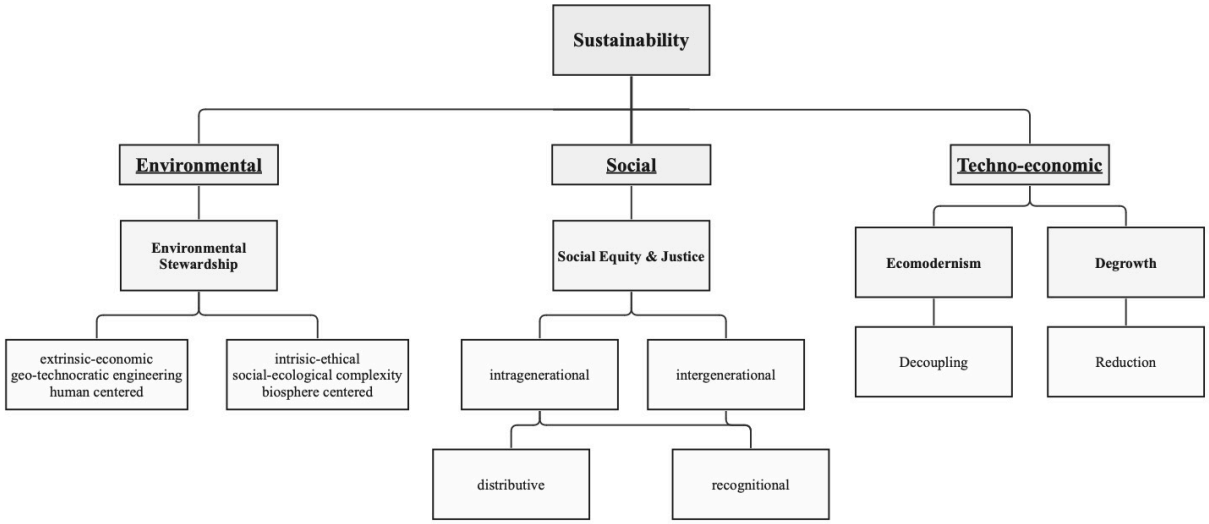

Figure 1: Thematic framework conceptualizing the key dimensions of sustainability.

3. Methods

Chapter 3 explains and substantiates the research methodology employed to investigate the research questions and achieve the research objective. It is structured into three sections: Sub-chapter 3.1 present the research approach and the analytical framework. Sub-chapter 3.2 explains the data collection process, while sub-chapter 3.3 delineates the steps taken for data analysis.

Using Twitter to study STIs and discourses has several compelling reasons: Twitter provides access to real-time and historical data; enabling ,both, longitudinal studies (Qayyum et al., 2023) and immediate analysis of ongoing events (Gross & Johnson, 2016). With a large userbase of approximately 368 million monthly users (Dixon, 2022), Twitter serves as a valuable source to explore public debates and gain insights into individual socio-political worldview. For instance, the analysis of textual data such as hashtags can facilitate the identification of novel emerging themes and issues (Debnath et al., 2023). Previously, researchers were supported with free and unrestricted access to large datasets of Twitter's archive. However, the current status of accessibility to data remains uncertain. Particularly important for the scope of this study is Elon Musk's strong presence on Twitter. His high level of engagement on Twitter provides an opportunity to gain a comprehensive understanding of his imaginary and the impact on the public discourse.

3.1 Research design and analytical framework

The complexity of the research objective required a mixed-method research design consisting of several quantitative and qualitative methods (see figure 2).

The data collection was enabled through access to Twitters archive and informed through keywords derived from an important Musk publication. Then, an R script has been written based on the keywords to collect relevant tweets of Elon Musk from the archive. After that an iterative, interpretative coding process were used to describe Musk's STI. The Musk tweets used for that were used as input to collect quote tweets via an R script. Finally, the analysis of quote tweets happened in multiple stages starting with sentiment analysis and topic modelling using R and progressed to a coding based Argumentative Discourse Analysis and visualizations of the finding via network analysis.

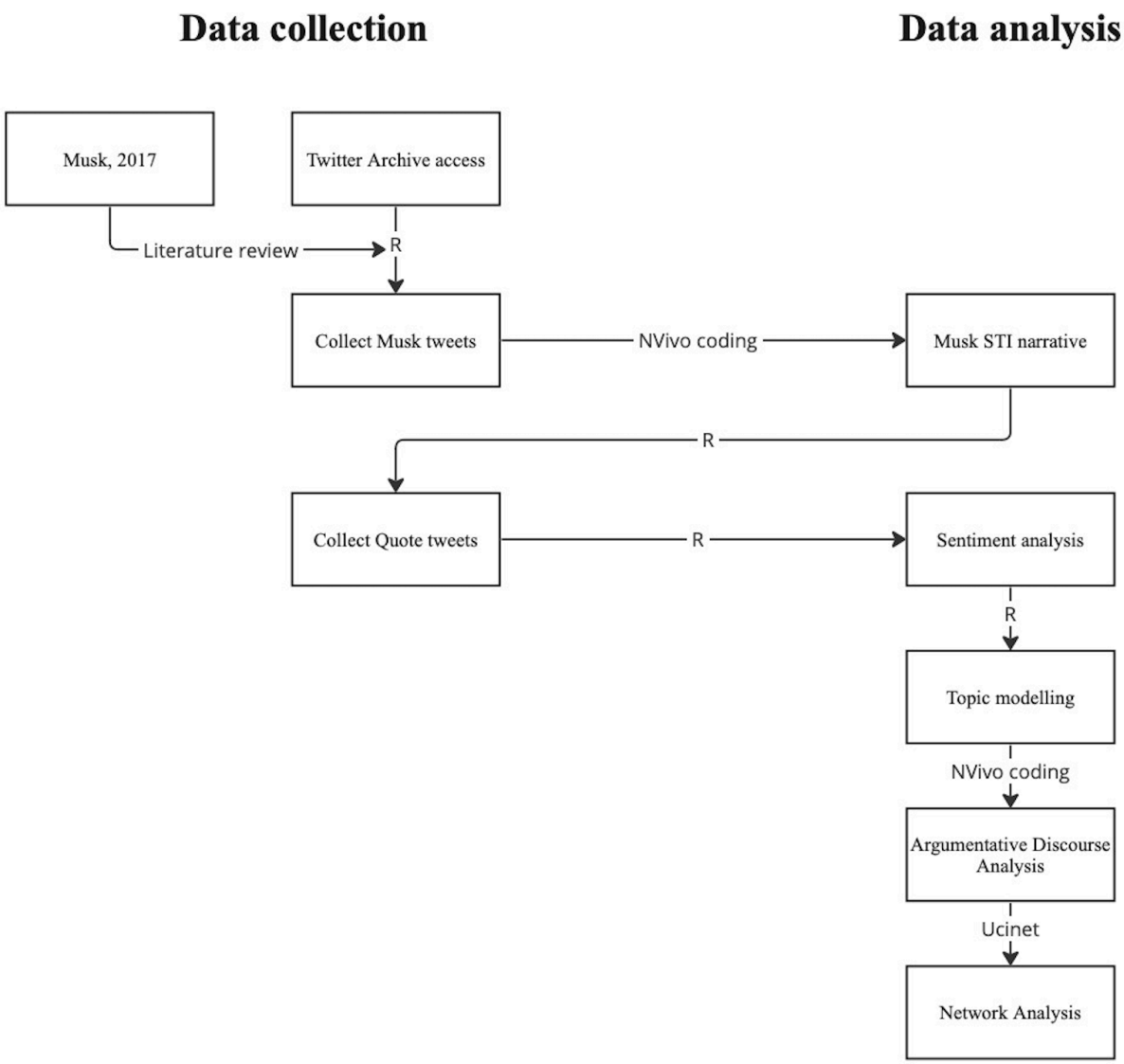

Figure 2: Analytical framework describing the research design.

3.2 Data collection

This research project is based on tweets as data units. A tweet is a message or post on the social media platform Twitter, consisting of up to 280 characters which can include text, images, videos, links, and hashtags (Twitter, Inc., 2023a). To collect tweets, a programmatic approach has been chosen as this allows the automated collection of large datasets generated on social media platforms. Twitter's API (Application Programming Interface) provided programmatic access to search and manage tweets through Twitter's developer platform. Twitter API v2 has been used as the latest version. It offered several tiers of access. This research project

successfully obtained 'academic research access' through a formal application and subsequent approval process by Twitter.

Academic research access had several of advantages over the other access types: Firstly, it grants access to full-archive search of historical and real-time public Twitter data. Secondly, ithas a monthly tweet cap volume of 10 million tweets. Thirdly, the researcher is able to set more precise filters for data collection (Twitter, Inc., 2022). These reasons make it highly suited for conducting academic research.

However, as a result of the developments following Elon Musk's acquisition of Twitter, new applications for academic research access have been closed since 27.03.2023 (Twitter, Inc., 2023b). Meanwhile, all pre-existing projects have been discontinued by Twitter without prior notice. While this had no impact on this research project, it poses challenges for the replicability of this study.

To access and request historic Twitter data from the API, R has been selected because of the researcher's familiarity with it. R is an open-access programming language for statistical computing, data analysis, and graphical visualisation (R Foundation, 2023). To work with R, the widely used R Studio has been employed as an integrated development environment. An alternative programming language that would have been equally well-suited is Python. To query and collect tweets from Twitter's v2 API, the R package 'academictwitteR' developed by Barrie and Ho (Barrie & Ho, 2021) has been used. This package has been particularly designed for Academic Research Track users. This research project used version 0.3.1 of academictwitteR. The package consists of programmatic functions that enable the researcher to collect tweets from specified users or tweets containing query terms. The retrieved data has been stored in the JSON file format (Barrie & Ho, 2021).

Data collection Musk tweets

Firstly, data of Elon Musk's profile on Twitter has been collected using the *get_user_profile* function of academictwitteR. Table 1 shows Musk's Twitter profile information (at 12:03 UTC+1 on 08.01.2023)

Username	Created at	Followers count	Following count	Listed count	Tweet count
elonmusk	2009-06-02	125,066,418	167	10,7027	22,007

Table 1: Basic user information for the Twitter account of Elon Musk on 08 January 2023.

Next, it was important to determine appropriate keywords that Musk uses to describe his STI. These initial set of keywords stemmed from a publication of his speech "Making Humans a Multi-Planetary Species" held at the 67th International Astronautical Congress in Guadalajara, Mexico, September 26–30, 2016 (Musk, 2017). This article is a crucial document, because Musk is referring explicitly in it to his personal vision of the future. The keywords extracted from this article have been determined based on their frequent use and researcher's inductive evaluation of their value for the aim of this research project. These keywords were:

- Mars
- colony
- extinction
- space-bearing/space-faring/space-based
- civilization
- multi-planetary/interplanetary species
- self-sustaining
- reusability
- Starship
- space
- future

Since this research project has been focused on the impact of Musk's STI on the sustainability discourse, the more common keywords of 'sustainability', 'emissions', 'climate', 'resources', 'Earth', and 'environment' have been added to the list without empirical evidence found in Musk (2017). To ensure that the final set of keywords captured the intended tweets, variations in writing of the keywords (e.g. 'multi-planetary' and 'multiplanetary') and words that carry the same meaning (e.g. 'red planet' for 'Mars') have been included. The final set of keywords and their variations were then used as query string input for the R script. The *build_query* function has been integrated with the *get_all_tweets* function to collect all Musk tweets containing at least one term of the query string. The parameters were set to collect Musk tweets and quote tweets and exclude replies and retweets that would match the query string. Quote tweets are tweets sharing someone else's tweet along with the additional comments from the user who quote tweeted it (Twitter, Inc., 2023a). This adjustment was made deliberately to limit the number of non-essential data units.

Tweets and quote tweets are generally viewed by scholars as more meaningful for expressing content compared to replies and retweets. Other research also excluded these tweet

forms when conducting tweet-based discourse analyses (Wignell et al., 2021). The *exact_phrase* parameter was set to NULL to collect tweets with key words insensitive of their capitalization. The time period for the query was set starting at the date of Elon Musk's user profile creation until January 1, 2023. *n* specified the number of tweets to be collected. It was set to the overly exceeding number of 100,000 to ensure that all tweets matching the query string were collected. The combined query resulted in a data set containing 410 tweets and quote tweets of all of Elon Musk's 3909 tweets and quote tweets during the selected time period between 02.06.2009 and 01.01.2023.

Following this initial step of data collection, Elon Musk's tweets have been analysed using qualitative interpretative methods. This process is further described in sub-chapter 3.3. At the end of the analysis a final set of 151 Elon Musk tweets emerged. Thereafter, other user's quote tweets commenting on the 151 Musk tweets were collected.

Data collection Quote Tweets

The data collection of quote tweets followed a similar structure as the collection of Elon Musk's tweets. Firstly, using R studio and the academictwitteR package, an R script has been written to connect to Twitter's archive via API v2. The *build_query* function was again combined with the *get_all_tweets* function. *is_quote* was set to TRUE while most other query parameter were set to NULL to collect any quote tweet responding to the 151 Musk tweet sample. *remove_promoted* was set to TRUE to exclude all advertisement quote tweets. Language (*lang*) was set to only include English written quote tweets. To obtain the quote tweets related to a specific Musk tweet, the URL of that tweet needed to be provided. The time period for the query search was kept the same as for the collection of Musk's tweets. However, it must be mentioned that Twitter initially launched the quote tweet feature in 2015 (Shu, 2015). The introduction of the quote tweet feature had an impact on the number of quote tweets available for Musk's tweets posted before its introduction. Fewer quote tweets per Musk tweet have been retrieved for the period prior to 2015. Furthermore, the number of quote tweets per tweet will also be influenced by the absolute number of users on the platform. n specifies again the number of tweets to collect. It was set to 1,000,000 to ensure that all tweets mentioning words from the query were collected. The data was saved to JSON files which were combined in R to an all quote-tweet comprising data frame. In total 145,127 quote tweets were collected using this method.

3.3 Data analysis of Musk's tweets

A qualitative, inductive coding analysis approach has been used for the manual analysis of Musk's tweets. Coding means the process of classifying textual data by identifying meaningful segments and assigning them a concise label that represents the content of the labelled data (Skjott Linneberg & Korsgaard, 2019). The 410 queried tweets were investigated and inductively coded by the researcher using the software NVivo 20. Each tweet has been read and the content has been coded related to its relevance in explaining Musk STI. A bottom-up, inductive 'textbook' coding approach was employed to analyze the tweets (Adu, 2019; Skjott Linneberg & Korsgaard, 2019). The coding has been performed iteratively until data saturation was reached.

The first step involved open coding of the data. Tweets that contained statements expressing Musk imaginary of the future and how the public should think about the present and the future were coded. Codes were framed as specific, narrow explanations of the tweet's content. Tweets that were not coded due to containing non-relevant technical information about the space and electric vehicle industry were subsequently excluded from further analytical phases. This reduced the Musk dataset from 410 to 151 tweets. In a second cycle of coding, the initial, specific codes were compared with each other and with the data to create higher-level categories from the initial, more specific codes (see Appendix 1 for Musk tweets and codes). In the final cycle of coding, only the categories that possessed the greatest significance for achieving the research objective were selected and merged into guiding themes for constructing Musk's STI narrative. The themes were: Life on Earth is not safe forever; A commercial interplanetary transport system must be constructed; Colonizing Mars will enable the multiplanetary life; The imaginary of a multiplanetary future must inspire people. Codes and categories were then used to elaborate on the themes while constructing the STI narrative.

3.4 Data analysis of Quote Tweets

The data analysis of quote tweets followed a mixed-methods approach. Due to the large volume of textual data present in the 145,127 collected quote tweets, first, quantitative computational text analysis methods needed to be employed to prepare and categorize the data. This involved the techniques of Sentiment Analysis (SA), and Topic Modelling. Both were conducted using R and the R studio environment. Following these steps, the research project progressed with a qualitative in-depth Argumentative Discourse Analysis (ADA) of the most influential quote

tweets. This was achieved by using again the NVivo 20. Lastly, a Network Analysis has been conducted using the Ucinet software visualising the structure and patterns of the results derived from the ADA.

Sentiment Analysis of quote tweets

SA was employed as the initial tool for data categorization, as it allows to classify the quote tweets based on the sentiment expressed regarding Musk's STI. The research compared two common approaches to SA of social media text: a rule-based dictionary approach and Supervised Machine Learning (SML). This was done to ensure that the option with the highest validity would be used. Prior to conducting the SA, the quote tweets dataset was pre-processed by transforming the raw text into a corpus and a document-term-matrix. This transformation of textual data into a quantitative representation is an obligatory step in Natural Language Processing allowing the computational analysis of human text. The research project used the quanteda package (Benoit et al., 2018) and corpustool packgage (Welbers & Van Atteveldt, 2019) to accomplish this.

As a rule-based SA model, the parsimonious VADER (Valence Aware Dictionary for sEntiment Reasoning) has been selected as the optimal choice among the available alternatives. Data scientists Hutto and Gilbert (2014) have designed this model specifically to infer the sentiment of tweets. VADER has been found to perform reliably and effectively in classifying short pre-processed text for sentiment analysis (Al-Shabi, 2020; Hutto & Gilbert, 2014) . VADER uses a dictionary of 7540 common words, phrases, and emoticons frequently found in social media text. Each expression is assigned a sentiment score based on its positivity, negativity, and neutrality. Additionally, the model includes rules to handle modifiers, punctuation, and capitalization to better capture the intensity and context of the expressed sentiment (Hutto & Gilbert, 2014).

Applying the default VADER model, allowed to assign each tweet either a positive, neutral, and negative sentiment However, it resulted in an overfitting of quote tweets to the 'neutral' sentiment, when compared to 100 random sampled quote tweets that were manually annotated as 'positive', 'neutral', 'negative' by the researcher it achieved only an accuracy of 0.4 or 40% correct, which was substantially lower as the performance reported by Hutto & Gilbert (2014). The reason for the low performance was due to the algorithm of the compound scoring variable which resulted in an over fitting of 'neutral' sentiments. As a result, the researcher decided to customize the default VADER model for this research project. This has been achieved by adjusting the compound scoring algorithm by respecting the following condition: positive >= 0, negative < 0. As a consequence, the neutral scale ranging from -0.5 to 0.5 got integrated into

the positive and negative scale. This adjusted VADER model (aVader) performed significantly better in predicting the sentiment of quote tweets when compared to a newly randomized and humanly annotated sample. Using common machine learning evaluation metrics, the model obtained an accuracy of (0.72) and an F1-score (0.54) which equals a good but not exceptional performance level.

Research suggested that SML models can generally achieve better performances than rule-based dictionary models (Van Atteveldt et al., 2021). This hypothesis was examined by training and testing three SML models on a publicly available binary (positive, negative) annotated 1.6 million tweets dataset. The three developed models, which were a Naïve Bayes model, a support vector machine model, and a Logistic Regression model have been subsequently applied to the quote tweets and validated against the same randomized sample. The Logistic Regression model performed best (accuracy: 0.71, F1: 0.53) but achieved slightly worse prediction results compared to the aVader model. Consequently, the aVader model's prediction of quote tweets' sentiment has been used during the following analysis steps.

The aVADER algorithm infers the vast majority of quote tweets expressed as positive sentiment. This has also been observed by the researcher. More than three quarters of quote tweets (76.6%; 111,217 tweets; 100,041 distinct users) exhibit a positive attitude towards Musk's tweets. In contrast, 76 perceive his tweets as negative according to the aVader. Overall, the aVADER algorithm was not able to capture the sentiment of 12 quote tweets. This is likely due to internal bugs that struggled to calculate sentiment wordscores for particular misspelled phrases. These 12 NA observations have subsequently been removed from the data set and excluded from further analysis. This resulted in a final data set of 145,115 quote tweets annotated with either positive or negative sentiment. Subsequently, a positive sentiment was conceived as being pro Musk. Vice versa, a negative sentiment was conceived as being contra Musk.

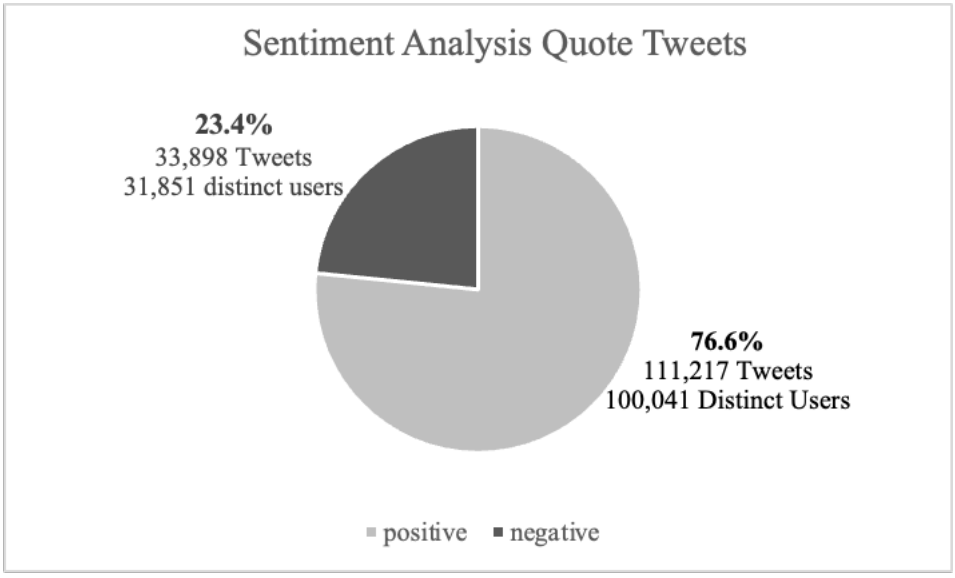

Figure 3: Visualising the distribution of quote tweets according to the SA.

Topic modelling of quote tweets

Determining the underlying topics that are present in the quote tweets corpus consisted of a computational topic modelling and a subsequent manual inductive interpretation of the retrieved models.

Topic models are predictive, probabilistic, unsupervised analysis tools to present the underlying topics of a text corpus (Chang et al., 2009). Using the stm package (Roberts et al., 2019) in R studio, correlated topic modelling was conducted to reveal the latent topics that are raised by users within the sentiment annotated quote tweets dataset. Correlated topic modelling builds on the Latent Dirichlet Allocation and is a probabilistic algorithm to determine frequently, co-occurring terms (correlations) of a text corpus via logistic normal distribution (Blei & Lafferty, 2007). Correlated topic modelling was needed in this study to systematically and objectively retrieve underlying themes and patterns that are discussed in the quote tweets dataset.

After applying again pre-processing of the tweets using corpustools and quanteda, which included this time also stopwords removal as well as removal of frequently occurring slang and swearwords from the tweet corpus, a new document-term-matrix containing the annotated sentiment has been created.

LDA based topic modelling algorithms require the researcher to specify the number of topics to be received beforehand. This can impose challenges as the researcher needs to have a rough outlook on how many topics he expects to find in the corpus. As an educated conjecture and for the purpose of this project, the researcher assumed that the number of topics would be on a range with a minimum of 2 and a maximum of 10 distinct topics. Therefore, 9 iterations

of calling the stm function on the quote tweets were carried out. As method of initialization the default deterministic spectral initialization has been chosen. The number of expectation-maximization interactions was set to 100 which allowed the algorithm to reach convergence for each model run. Validity and reliability of the results were ensured during the following approach: The 9 model-runs and their correlated terms were manually examined by the researcher (see Appendix 4). Terms that occurred only once in all 9 topic model runs were excluded because they were evaluated to be insignificant for the analysis. Subsequently the terms derived from the correlated topic modelling were combined based on the researcher's interpretation and manually aggregated into 5 topics.

Furthermore, the inclusion of "Multiplanetary" as a sixth topic was deemed crucial for answering subquestion-2. The decision to add these key terms, alongside the terms generated by topic modelling, was driven by their significance in shaping Musk's STI. Its incorporation allowed the research to derive valuable new insights, thereby enhancing the comprehensive analysis of sub-question 2.

Final topics	**Filter string**
Population	"birth" OR "care" OR "kids' OR "money" OR "population" OR "white"
Climate	"change" OR "climate" OR "earth"
Future of civilization	"civilization" OR "future OR "human(s)" OR "humanity" OR "life" OR "live"
Space	"mars" OR "moon" OR "planet" OR "space" OR "start"
Elon Musk	"car(s)" OR "day" OR "doge" OR "hope" OR "love" OR "musk" OR "people" OR "real" OR "tesla" OR "tweet"
Multiplanetary	"multi(-)planetary" OR "inter(-)planetary"

Table 2: Displaying the 6 topics and filter strings generated through topic modelling and manual analysis.

These terms of the final 6 topics functioned as filter strings for dividing the positive and the negative sentiment quote tweet corpus into 12 smaller sub-corpora, 6 for positive and 6 for negative sentiment. To obtain the discursive content that was most discussed by the tweeters, the researcher ranked each of the 12 corpora based on the number of likes as a measure of the level of influence and support that a particular argument received. Thereafter, the top 100 liked quote tweets for pro and contra were manually investigated, which resulted in 1200 manually sighted quote tweets. The quote tweets relevant for the research objective were collected, stored,

and subsequently analysed using the ADA framework and the NVivo 20 software. In cases where the sentiment analysis (SA) prediction was considered false based on the researcher's subjective judgment, the tweet was placed in the appropriate category.

Argumentative Discourse Analysis

The ADA is a method of scientific inquiry developed by Maarten Hajer (1997, 2006), that has been used for the qualitative analysis of the argumentative structure of the selected quote tweets. In ADA, discourses are comprised of storylines, which can be thought of as the linguistic medium through which actors try to impose their view of reality on others. In simple terms, storylines are the condensed statements summarizing more complex narratives (Hajer, 2006). In this research project, storylines will be the aggregated themes that emerge from the investigated corpora of quote tweets. The storylines of the quote tweets emerged trough the iterative, inductive coding in NVivo 20. The same process of coding, categorisation, and theme development has been employed as for the analysis of the Musk tweets. The coding of the data has been conducted under consideration of the thematic sustainability framework and its three distinct dimensions.

The actors uttering these storylines were the Twitter users quoting Musk. In Nvivo 20, their usernames have been extracted together with the tweets they posted. Through expressing particular arguments and views, the actors' possessed affinity with certain storylines. According to Hajer's ADA framework, actors that are flocking around particular storylines can be conceived as forming coalitions (Hajer, 1993). These groups of allied and opposing actors based on endorsing particular storylines are referred to as *discourse coalitions*. Usually discourse coalitions are not static but compete with each other for becoming the dominant way of giving meaning to reality (Hajer, 2006). Based on the position towards Musk's STI, the quote tweets and the respective Twitter users were allocated to a pro or contra discourse coalition.

Overall, 236 quote tweets were found for the pro-Musk coalition (see Appendix 2), while 261 were found for the contra-Musk coalition (see Appendix 3).

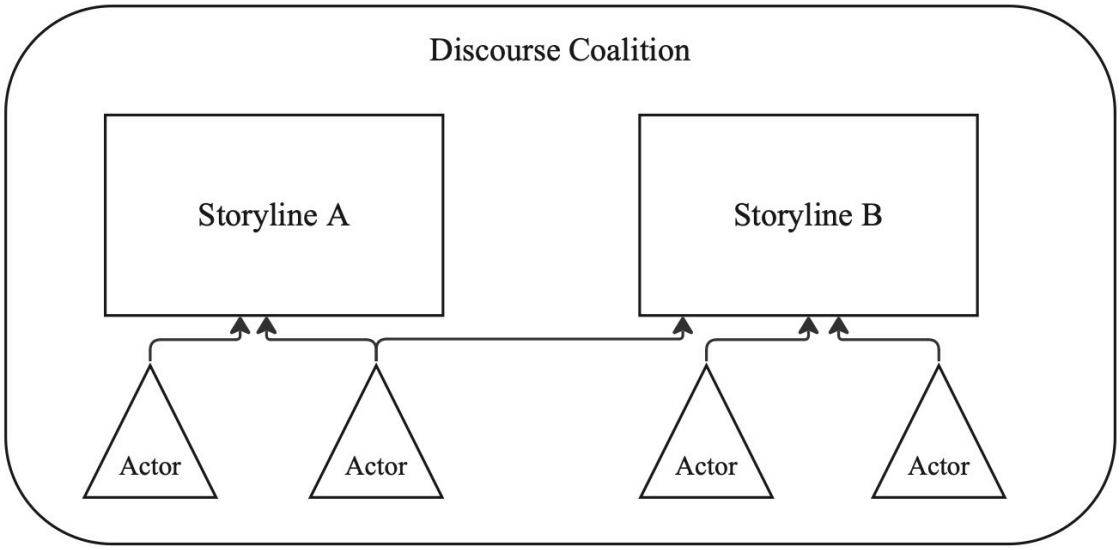

Figure 4: Schematic visualization of the elements of ADA.

Network Analysis

To visualise the actors, their affiliation with storylines and the emerging coalitions, two mode affiliation networks were constructed using the software Ucinet and netdraw (Borgatti et al., 2014). Except of density calculations of the networks, the softwares were only employed as a means for visualisation.

The usernames and the coded storylines from the NVivo 20 analysis have been used as basic input for the DL editor to construct the matrix for the two-mode affiliation network. A tie connects the user node and the storyline node if the user made reference to that storyline in his quote tweet. When an actors mentioned more than one storyline in the tweet, a tie to all of the referred storylines have been drawn. Moreover, two metrics were added as attributes to the networks. Firstly, the size of the node was based on the number of followers, to visualise the impact of this user on Twitter. The size of the node increases by orders of magnitude with the smallest nodes having smaller or equal to 1,000 followers, and the largest nodes more than 1,000,000 followers. Secondly, the socio-professional background of the user has been taken into account by categorizing every user into one of 7 groups. This processed has been accomplished by processing the information that the account profile provided in its bio.

Social actor group	Definition
1 = Academics	all people and organizations who identify as pursuing research or teaching
2 = Social activists	all people and organizations who identify as contributing to social rights
3 = Entrepreneurs	all people and organizations who identify as working in the industry sector or managing a business
4 = Creatives	all people and organizations who identify as creating art, digital content, or media of some type
5 = Governance actors	all people and organizations who identify as having a role in governing society
6 = Laypeople	all people who identify as non-experts or the general public
7 = undefined	all people and organizations who cannot be identified

Table 3: Definitions of the social actor groups used to categorise the Twitter users.

4. Results

Chapter 4 presents the results of the analyses to answer the research sub-questions:

1) What is the socio-technical imaginary that Musk seeks to advance?
2) What impact does his socio-technical imaginary have on Twitter users' discourse of sustainability?

Chapter 4.1 identifies Elon Musk's STI by analysing his tweets. The selected tweets are presented in a narrative-form to delineate his STI. Chapter 4.2 uses ADA and NA to examine how his STI impacted Twitter users' discourse regarding sustainability. The previously developed thematic framework of sustainability serves as a reference for structuring this sub-chapter.

4.1 Musk's socio-technical imaginary

This section uncovers Musk's STI by summarizing the 151-tweets data set in a single narrative. The narrative's structure mirrors the underlying argumentation of Musk. It starts by exposing the driving force, continues with the approach to achieve the envisioned goal, and concludes with his strategy to win others for his plans.

Life on Earth is not safe forever.

"*This will happen again – just a matter of time*" (Musk, tweet 149).

Musk's future imaginary is rooted in a deep fear: to become extinct as a human species. Pointing to the impact of past extinction events, Musk is concerned about long-term safety of life on Earth. He imagines that the occurrence of a mass extinction event in the future will be inevitable (Musk, tweet 149). Therefore, he argues that humanity must find ways to be prepared for such catastrophic incidents. The threat posed by extraterrestrial bodies such as asteroids and their potential large-scale impacts are perceived by him as the greatest risks for the extinction of species (Musk, tweet 16; Musk, tweet 91).

The sampled tweets reveal that climate change used to be also a concern for him, but only between 2013 and 2018, and to a much lesser extent. However, its significance for Musk has noticeably diminished over time, being overshadowed by a growing emphasis on population

collapse due to declining birth rates (Musk, tweet 122). Warning that everyone "should be much more worried about population collapse" (Musk, tweet 128), Musk is now strongly believing that "[p]opulation collapse due to low birth rates is a much bigger risk to civilization than global warming" (Musk, tweet 147). Consequently, Musk considers impact events as the greatest extraterrestrial threat for all life on Earth, while he perceives a declining human population as the greatest terrestrial risk affecting mostly the human civilization.

Musk worries that consciousness, which he regards as the shared and most valuable attribute of all higher developed living beings on Earth is at risk of being lost when these threats materialize. Therefore, he aspires to "preserve the light of consciousness" forever (Musk, tweet 76). Humanity is conceived by him as the central agent that should act as a steward for all life on Earth ensuring the long-term survival for its species. However, he does not propose to address socio-ecological problems on Earth as the means to achieve this. Instead, Musk firmly believes that the preservation of life will be achieved through becoming a spacefaring civilization and the extension of life to other planets (Musk, tweet 137). Imagining the successful implementation of this 'back-up' plan, he thinks that there might come a day when species on earth have become extinct but continue to thrive elsewhere in the universe (Musk, tweet 116). Alluding to the biblical story of Noah's Ark, he beliefs that an enormous interplanetary rocket fleet could function as the Ark of the future - transporting human and non-human beings to outer space to ensure their survival (Musk, tweet 151). To render this imaginary more tangible for his audience, Musk shared also a 'Space Ark' illustration by a Japanese artist along with his tweet (see image 1).

In essence, Musk understanding of sustainability is driven by the imperative to preserve life and consciousness by extending it beyond Earth. Through persistently sharing doomsday scenarios and warnings via his tweets, Musk attempts to shape the public perception to recognize this concern as the most important issue for humankind.

Image 1: Illustration shared by Musk along with tweet “Starship takes beings of Earth to Mars”. Created by Shigeru Komatsuzaki, 1968. (Musk, tweet 151).

A commercial interplanetary transport system must be constructed.

“*Making large scale rocket propulsion landing work well is a critical step towards a fully reusable Mars transport system*” (Musk, tweet 7).

To fulfil the objective of migrating living beings to outer space for their long-term survival, Musk has demonstrated working on an interplanetary transport system (Musk, tweet 42; 44; 45; 61). Establishing the spacecraft manufacturing company ‘SpaceX’ in 2002, he embarked on the mission to create a transportation infrastructure capable of accomplishing this feat. According to Musk, the path to success lies in making space travel as accessible and common as modern air travel (Musk, tweet 107). Driven by the cost-efficiency rather than environmental considerations, Musk's central objective with SpaceX evolves around the realization of reusable rocket transportation (Musk, tweet 75). Like other vehicles that humans are using, it should become also widespread practice to reuse rockets as well (Musk, tweet 59). In his view, this will enable prompt re-flights, drastically reduce costs for production, and maintenance enabling

more frequent space missions, both within Earth's orbit and beyond. A notion he encapsulates with the slogan “Rapidly Reusable Rockets” (Musk, tweet 119).

Musk is not afraid to push the pace for innovation and is known to have an ambitious approach with testing SpaceX products (Musk, tweet 49). This gives the company critical advantage over competitors in the space industry. According to Musk, “Making large scale rocket propulsion landing work” is the first critical step toward reusability (Musk, tweet 6). SpaceX has achieved landings of rocket propulsions for his Falcon-9 model already numerous times and is pushing to decrease the time until a rocket can be re-launched to sub 24 hours (Musk, tweet 49). State agencies such as NASA (Musk, tweet 27; 35; 57; 83; 97; 108) and the US Airforce (Musk, tweet 32) have consistently recognized the progress made by SpaceX and are awarding the private firm regularly with prestigious astronautical or national security contracts.

In recent years, Musk directed SpaceX’s focus on the Starship model which should be fully reusable and allow humanity to colonize space and “inhabit other worlds” (Musk, tweet 95). The ultimate objective of SpaceX's future interplanetary transport system, as highlighted by Musk, is to facilitate making life multiplanetary (Musk, tweet 6; 7). To accomplish this, Musk emphasizes that frequent and large payload missions transporting “megatons per year to orbit” will be required (Musk, tweet 100). However, Musk disregards considering the potential environmental implications of this approach.

Musk tweets reveal that he is attributing paramount importance to the existence of a robust, reusable space travel infrastructure. He envisions his rockets as the interplanetary mobility vehicles capable of ensuring the continuity of consciousness by making life multiplanetary.

Colonizing Mars will enable the multiplanetary life.

“Make life multiplanetary! #Mars” (Musk, tweet 115).

Musk intends to make life multiplanetary by inhabiting Mars as the first destination (Musk, tweet 12). Making life multi-planetary was repeatedly mentioned as a solution to avoiding the potential impacts of a mass extinction event in the future (Musk, tweet 3; 16; 26; 91). In an interview with one of the world’s leading scientific journals ‘Nature’, Musk outlines why Mars is the most favourable place to start human habitation (Musk, tweet 4). In May 2012, Musk summarizes the necessary steps for achieving a multiplanetary future: First, achieving re-launch of spacecrafts which he considers to be a critical breakthrough to develop a “fully reusable Mars

transport system" Musk, tweet 6; 7). And secondly, transporting at least 80,000 humans per year to Mars to build a "Mars colony" for which eventually "millions of people are needed" (Musk, tweet 11). Four years later in 2016, he boldly assures that this will be accomplished by the 2060s (Musk, tweet 12).

In his tweets, Musk often draws parallels between the landscapes of Mars and Earth, for example by comparing it to the Californian desert (Musk, tweet 10), tweeting about the presence of water ice in Martian soil (Musk, tweet 25), and the colours to be observed during sun rise and sun set (Musk, tweet 63). However, the boundaries between real observation and simulation become blurred when he deliberately suggests that the computer-animated image of Mars to be an authentic representation of how the planet looked like in ancient times (see image 2, Musk, tweet 39). This behaviour reflects his effort to make people believe that both planets are in fact equally liveable and that accomplishing thriving life on Mars is primarily a matter of will and technology. To make Mars habitable, Musk envisions to transform Mars through drastic terraforming methods to make it suitable for human needs (Musk, tweet 13). The two main options he proposes are either to "Nuke Mars" (Musk, tweet 34; 90 by detonating nuclear explosives in the Mars orbit to create artificial suns or employing "thousands of solar reflector satellites" (Musk, tweet 92) to warm the Martian atmosphere. (Musk, tweet 105).

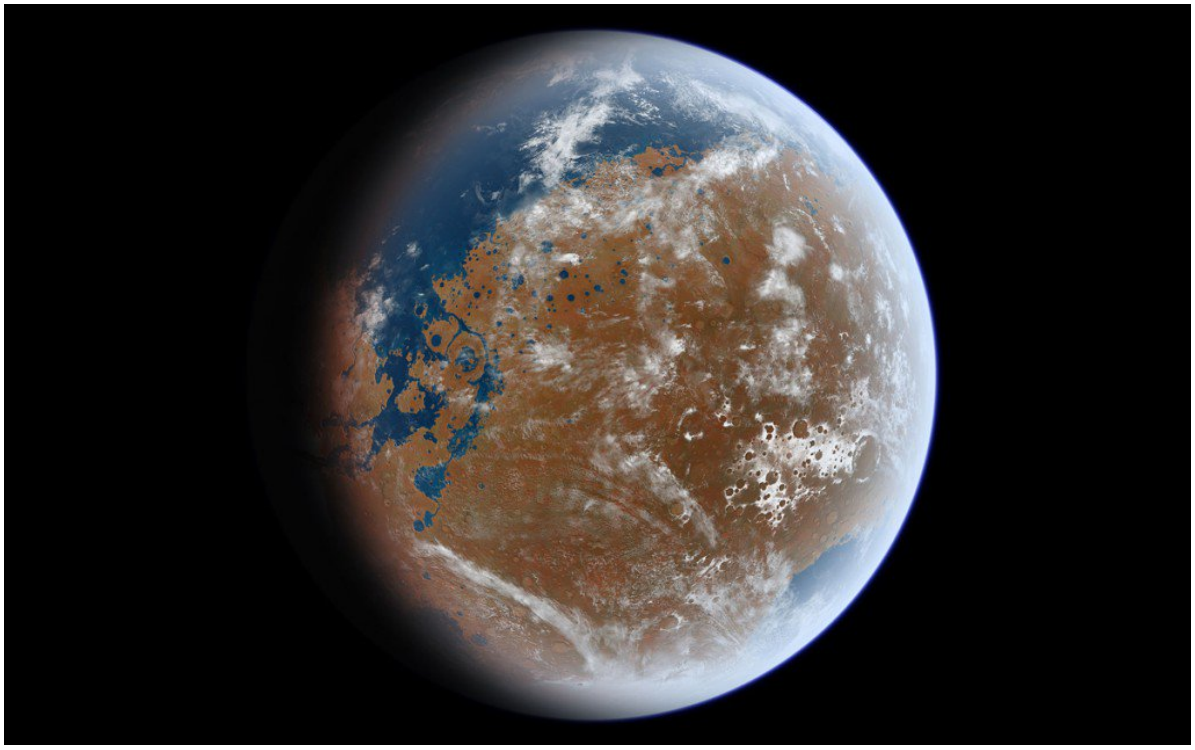

Image 2: Musk attempts to portray Mars as Earth-like by posting digitally altered images (Musk, tweet 39.)

Musk is pleased to see that the concept of multiplanetary life is receiving more attention by American politics. In 2017, he celebrated that the US Senate started acknowledging more concretely the relevance of Mars exploration and settlement of space (Musk, tweet 56). In his opinion, this was long overdue considering the perceived stalemate of progress since the end of the Apollo program (Musk, tweet 65; 105). Furthermore, Musk actively encourages citizen engagement in various ways for a multiplanetary future; for example, asking individuals to exert political influence by commenting on environmental impact assessments in favor for SpaceX's *Starbase* construction plans (Musk, tweet 123). Ultimately, Musk wants the public to associate and perceive him as the leading person who is utterly dedicated to make life multiplanetary and colonize Mars (Musk, tweet 75).

Musk's stance regarding the prospective governance system on Mars, has evolved over time. In 2013, he initially tweeted that he cannot "mandate anything about a Mars colony" (Musk, tweet 15) and is only working "on the tech[nology] to get people there" (Musk, tweet 15). However, since 2019, his position has shifted, and he is now actively advocating for a Mars technocracy (Musk, tweet 85). Additionally, Musk indulges in personal fantasies, symbolically connecting himself to Mars by referring to it as his "souldog" (Musk, tweet 106) or "home planet" (Musk, tweet 31). Making these associations serves to further strengthen the public image of him as the prominent figure in the quest to extend life beyond Earth.

In sum, Musk wants to make life multiplanetary by colonizing Mars. To realize this, his tweets emphasize Mars' potential liveability, encourage the public's space discourse, and reinforce his role as a technocratic leader of the potential future Mars civilization.

The imaginary of a multiplanetary future must inspire people.

"*It is high time that humanity went beyond Earth. Should have a moon base by now and sent astronauts to Mars. The future needs to inspire*." (Musk, tweet 65).

Elon Musk believes that any vision of the future should make people feel excited. Therefore, he shares a very optimistic view that the contemporary challenges and problems can be resolved. Asserting that the present is already "fantastic" and will continue to be so as long as "future downside risks" are covered (Musk, tweet 8), Musk aims to foster a sense of confidence that humankind is capable of overcoming any obstacles it encounters.

For Musk personally, it cannot get more exciting "as creating a base on Mars" (Musk, tweet 5). This vision is not only evident in his words but also reflected in the symbols associated with his companies, for example in the presence of the Mars and Earth orbit on the Starlink cover (Musk, tweet 120). To turn his STI into reality, he recognizes the need for widespread

public support (Musk, tweet 72). To acquire such support, he employs attention-grabbing campaigns, including launching a Tesla equipped with a mannequin into space (Musk, tweet 64; 68; 69; 70) and offering Tesla customers the opportunity to send laser-etched glass images of themselves "to deep space for millions of years" (Musk, tweet 79). Furthermore, Musk leverages the power of visual media by sharing high-quality images and video clips of rocket launches, landings, and human made objects in space (Musk, tweet 86; 87; 112; 131; 146). For the ongoing Starship-project, Musk also uses animations to fuel people's imagination about how a journey to Mars with SpaceX could look like (see image 3; Musk, tweet 131).

Musk employs various persuasive techniques to engage people's imagination of a future on Mars by using stimulating questions such as "[…]What will 2032 will [sic.] be like? (…) Will we be on Mars?" (Musk, tweet 124, "Lie back and think of Mars" (Musk, tweet 130). Other statements like "#OccupyMars" (Musk, tweet 77), "Population of Mars is still zero people!" (Musk, tweet 141), "Mars, here we come!" (Musk, tweet 110) are utilized to cultivate anticipation and excitement among his followers. Furthermore, he reinforces this anticipation by proclaiming that "Humanity will reach Mars in your lifetime" (Musk, tweet 139) while accompanying such tweets with science fiction-inspired images depicting a prospective Mars base. In addition, Musk reasons that a new philosophy is needed, one that embraces curiosity and seeks to explore the unknowns of the universe by extending humanity's presence beyond Earth (Musk, tweet 144).

Musk employs attention-grabbing tweets for two purposes: Firstly, to foster a sense of optimism, aspiration, and trust in the remarkable capabilities that human ingenuity can achieve (Musk, tweet 72). And secondly, to indirectly divert attention away from sustainability challenges on Earth, to make everyone feel glad to be part of humanity, and hopeful about the future (Musk, tweet 129).

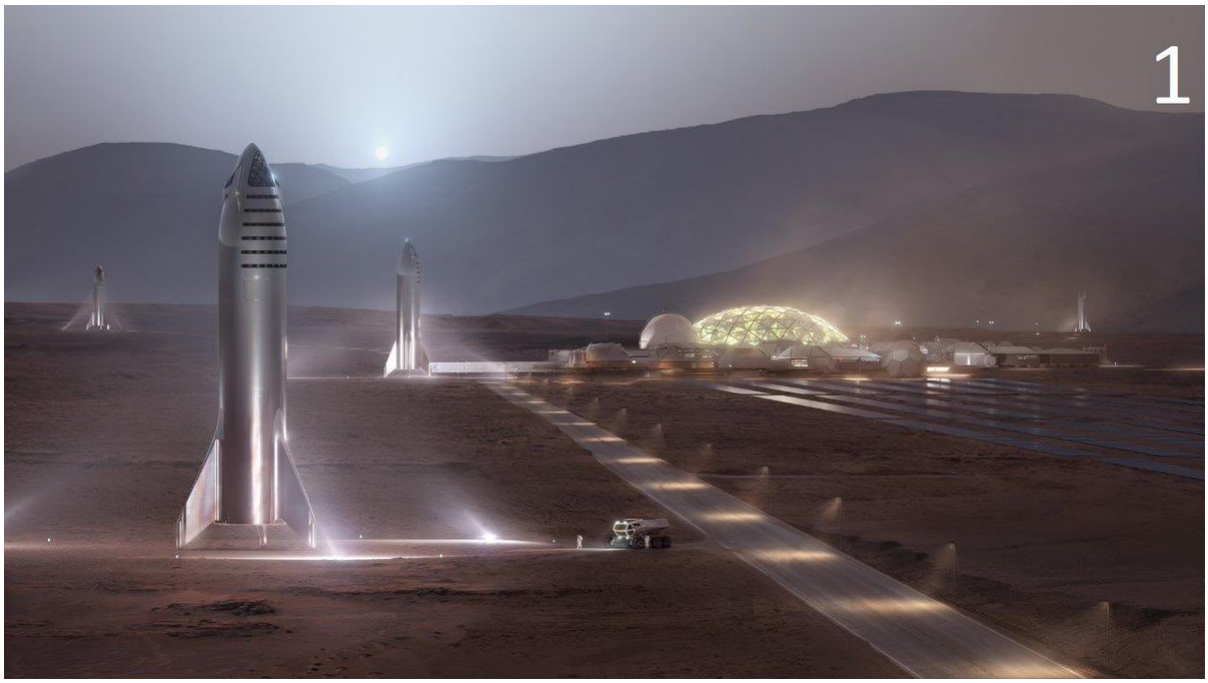

Image 3: Computer-animated picture of how Musk envisions the SpaceX base on Mars (Musk, tweet 87).

4.2 Elon Musk's impact on the discourse of sustainability

The following chapter uses ADA, NA, and the thematic framework of sustainability to answer sub-question 2. It is divided into two parts: firstly, a quantitative descriptive overview to contextualize the coalitions; and secondly, the ADA of quote tweets visually supported by two-mode affiliation networks. Each subsection starts by highlighting the configuration of the sub-coalitions per sustainability dimension derived from the constructed networks. The following ADA delves into discourses and storylines, which are given as headlines to each respective subsection.

4.2.1 Statistical overview of quote tweets results

As can be seen in table 4, In total 297 quote tweets have been selected for ADA. The contra-coalitions tweet and user count was approximately 10% higher than the pro-coalition's counts. The contra-coalition tweets received significantly more likes in absolute numbers. On average a contra tweet received almost 4-times as many likes as a pro-coalition tweet. This suggests that the arguments of contra-users receive on average more social validation and approval. In terms of followers, however, the pro-coalition has an impressive advantage over the opposing coalition. Their followership is roughly double of that of the contra-coalition, despite having

21 fewer users. This means that pro-users tend to have a greater popularity on Twitter and can influence a larger audience.

	PRO-coalition	CONTRA-coalition
Total quote tweets	236	261
Total quote tweeters	229	250
Total likes of quote tweets	**30,300**	**131,735**
Average like per quote tweet	128.39	504.71
Total followership	**31,956,483**	**16,982,159**
Average followership per quote tweeter	139,547.96	67,928.64

Table 4: Absolute and on average descriptive statistics of tweets and users of both coalitions.

Figure 5 depicts the distribution of social actor groups within the pro- and contra-coalition. The pro-coalition (n=229) comprises slightly fewer actors compared to the contra-coalition (n=250). People with an entrepreneurial background (n=69) are by far the most dominant social group among the pro-users. They are followed by undefined accounts (n=58) and laypeople (n=45). No social activists have been identified as supporting Musk STI. On the contra-side the strongest group are creatives (n=65) shortly followed by laypeople (n=63) and undefined users (n=49). Social activists are present among the contra-actors (n=16) in equal numbers with entrepreneurs. Furthermore, academics are more strongly represented in the contra-coalitions than in the pro-coalition. Taking also the density of the pro- (0.156) and the contra-coalition (0.198) into account, it can be hypothesized that the pro-coalition is more loosely connected and is dominated by more entrepreneurial argumentation patterns. On the other side, the contra-coalition is slightly more densely connected and is likely possessing a larger spectrum of ideas with enabling a more critically debate of Musk's STI.

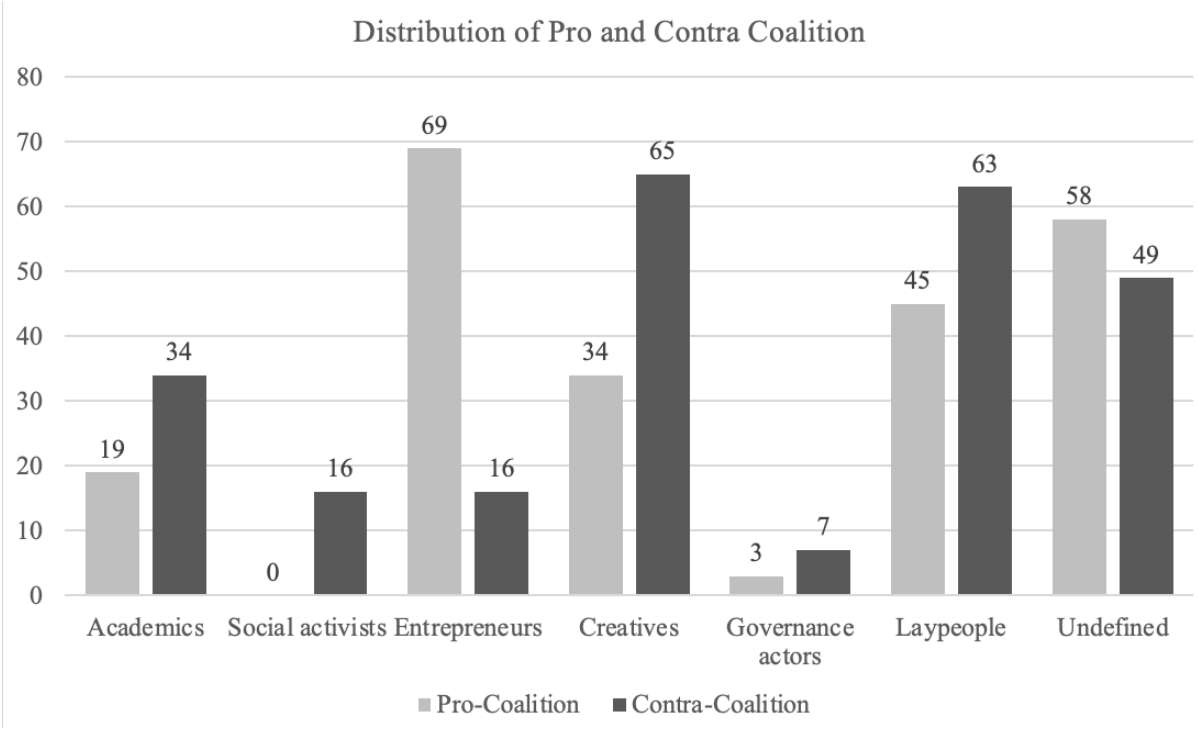

Figure 5: Social actor groups descriptive statistics for pro- and contra coalition.

4.2.2 Musk's impact on the environmental dimension of sustainability

This sub-chapter delineates the pro-storylines (Pro-S) and contra-storylines (Contra-S) related to the environmental dimension of sustainability. It analyses their views along the environmental stewardship spectrum that has been described in the chapter 2.2.

Pro-S1 contains a variety of small-scale and large-scale follower accounts of which most are undefined (n=17). Entrepreneurs (n=10) are the second largest group. Pro-S1 and Pro-S2 are sparsely linked through austinbarnard45, a SpaceX engineer, and TirthaChakraba2, an Indian space enthusiast. Pro-S2 is primarily composed of entrepreneurial actors (n=11), with 9 of them are having more than 100,000 followers each. Contra-S1 is connected to the most nodes (n=76) of all pro and contra storylines. The environmental contra-network involves a large number of academics (Contra-S1=13, Contra-S2=8) is overall more densely linked (d=0.24) than the environmental pro-network (d=0.19).

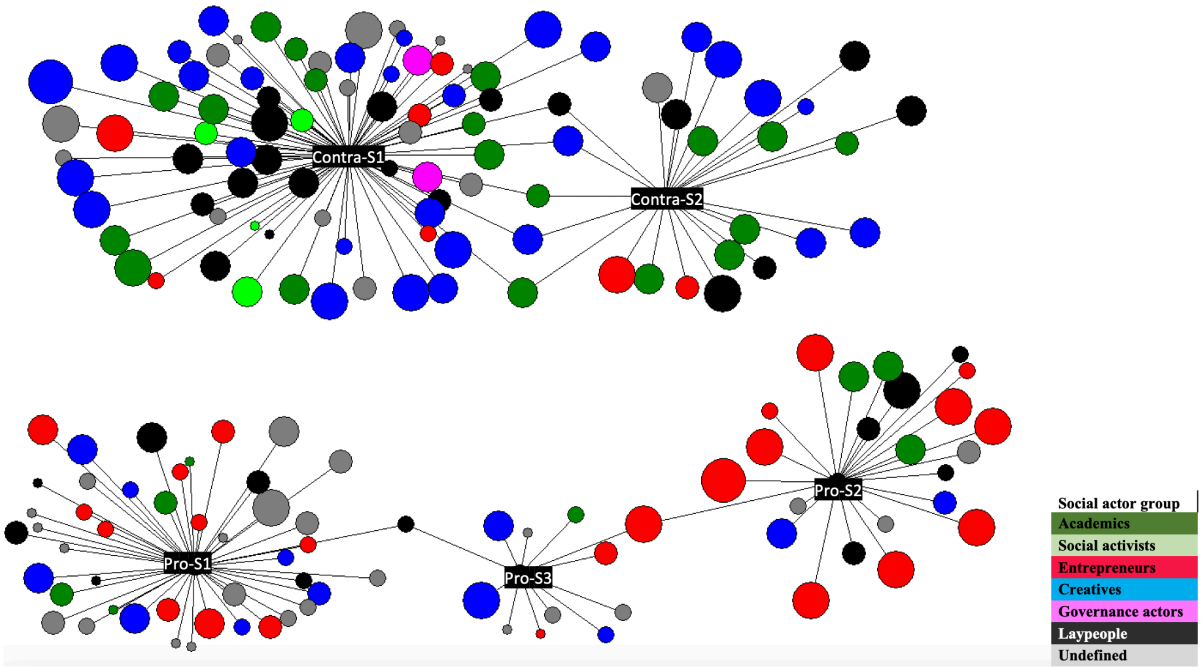

Figure 6: Two-mode affiliation network for the environmental dimension.

PRO-S1: To ensure the long-term survival, we must follow Musk's vision of making life multiplanetary.

Pro-coalition actors view Elon Musk as a "good steward" of the environment (RichardGarriott, 2021). They believe that Musk and his companies bring numerous benefits to the local environment where they operate in (Space_Centric, 2021). However, the principal benefit that pro-users think Elon Musk will help accomplish is to ensure the long-term survival of the human species by making life multiplanetary.

Pro-actors are convinced that there is already sufficient support to alleviate the environmental crises on Earth (itheuwa, 2021); and that environmental issues do not qualify as valid reasons to avoid pursuing a multiplanetary existence (dnahinga, 2021). The perception is that environmental sustainability efforts are not targeted towards guaranteeing the survival of the human species, which proponents consider to be of utmost importance. Only Musk is perceived as working on an alternative for the worst-case scenario that Earth cannot be saved anymore (itheuwa, 2021). Earth is framed as being unpredictable and incapable of ensuring the continuance of human and non-human life in the future (Timbonacci702, 2021). Instead, a geo-technocratic engineering approach, as suggested by Musk, is trusted to offer a more reliable solution to guarantee the human existence indefinitely.

Pro-users share Musk's concern that a "global apocalypse" (TirthaChakraba2, 2021), annihilating all terrestrial life, is only a matter of time and consider astrophysical threats like

asteroids or the expansion and collapse of the sun as the most severe existential risks. Immediate environmental problems like the ongoing climate crisis, are perceived as not having a significant impact on the proliferation of humanity. This suggests that the level of concern among pro-users tends to increase as the threats become more distant and unknowable. Pro-actors seem to have a strong sense of risk aversion and a need for long-lasting security. Clearly rejecting the notion that humanity presence is bound to Earth, they perceive transitioning to a multi-planet species as the "only hope to survive in the long, long-term" (DavidSantoro1, 2021). Therefore, becoming multiplanetary is understood not just an option but a necessity.

Pro-users conceive the human race as superior and believe that their exceptional ability to manage the environment sets them apart from other species. This perspective is interpreted through both secular and religious lenses. Some proponents view this ability as the result of an evolutionary process, while others believe that humankind was chosen by a supernatural power, such as the Christian God, "to steward over every living thing on Earth" (realbobbyd_, 2022). However, both camps agree that humans as a highly developed species would have ethical responsibility to safeguard non-human life by backing it up in outer space (TirthaChakraba2, 2021). Therefore, ensuring the continuity of life by making it multiplanetary is perceived partly as the extension of a God-given right, partly as the result of an evolutionary process that positioned the human species on top of the biosphere.

The analysis reveals that pro-user of all social backgrounds comprehend Musk's multiplanetary vision as a means to ensure the long-term survival of the human species. Due to feelings of moral collective responsibility, non-human species should considered to be 'saved' as well.

PRO-S2: Transforming and inhabiting Mars will be the start of multiplanetary life.

Musk identified Mars as the initial destination for his multiplanetary expansion plans. His announcement to transport humans to Mars and establish a colony on the red planet generates great excitement among pro-actors. Each step in the design, manufacture, and launch of rockets and cargo is celebrated as a crucial step towards inhabiting Mars (MarcusHouse, 2020). For example, achieving rocket reusability of the Falcon 9 model is regarded as a ground-breaking milestone in spacecraft engineering (arichie_rich, 2021). The frequently used hashtag #OccupyMars indicates pro-actors' desire to establish a permanent presence and start to transform Mars into a habitable planet (DirghShah, 2018). Pro-actors are essentially echoing his narrative, evoking a rhetoric of imperialism. By drawing parallels to the colonization of the

Americas by Europeans, proponents argue that Mars colonizers would also be entitled to exploit and utilize the land according to their own will (surmountoby, 2021).

Proponents ascribe only extrinsic value to Mars. According to Robert Zubrin, founder of the 'Mars Society' NGO, humanity is going to Mars to explore, learn, grow,and expand its powers, protect itself, and "to improve the universe" (robert_zubrin, 2022). The notion of improving the universe suggests that pro-users perceive the current state of the universe as inferior and incomplete. Once humanity reaches Mars, they can start terraforming it and other planets to maximize their utility for human use. Humans are seen as "Mother Earth's children", tasked with extending the anthropogenic impact to "as many other worlds […] as can [be] reach[ed]" (austinbarnard45, 2021). Consequently, an 'improved' universe would mean that humans are spreading unrestrained from Earth to Mars to any other planet they like.

In summary, pro-actors see Mars as a valuable alternative to Earth, having the opportunity to alter it to humanity's own discretion, with little consideration for Mars' existing environment and its intrinsic value. The network visualization reveals that this storyline is dominated by highly followed tech-entrepreneurs. This further complements the finding that pro-users approach sustainability from a multiplanetary-engineering perspective.

PRO-S3: Becoming multiplanetary will be an evolutionary leap.

Becoming a multiplanetary species is envisioned by proponents as having profound implications for the development of humans and other species. Pro-users imagine transitioning from a single planet to multiplanetary species as the next great leap in the evolution of human and non-human life (waitbutwhy, 2022). Thus, post-Earth human interplanetary migration is perceived as significant for human evolution as the 'Out of Africa' phase (iamhotak, 2021). Proponents predict it as an inevitable step that will unlock humanity's true potential as the most intelligent and adaptable species (iamstevensewell, 2021).

Moreover, many pro-users speculate that living in space could lead to long-term evolutionary changes in human and non-human biology. They contemplate the possibility that life may evolve on distinct trajectories, invoking the concept of speciation, which fuels their imagination and stimulates their interest (swapp19902, 2021). Additionally, proponents consider the prospect of deliberately modifying the genomes of human and non-human species selected for multiplanetary colonization to enhance their adaptation to the challenging environmental conditions of space (ReMeCloning, 2017).

In sum, creatives and people interested in life optimization posit that humanity's migration to outer space will be an inevitable part of its evolutionary trajectory. Humans are

imagined becoming the stewards of this outer space evolutionary adaptation process, as they possess the agency to select, guide, and manage these transformations in accordance to their preferences.

CONTRA-S1: Making life multiplanetary endanger Earth's environmental integrity.

The contra-coalition is drawing attention to the ongoing environmental and ecological crises on Earth. In their opinion, preserving Earth should be of utmost importance, as no other planet would offer similar conditions for complex life to flourish. They concur that humanity exerts a significant role in shaping the trajectory of the Earth's processes. Given humankind's abilities, it ought to be also humankind's responsibility to protect Earth for all human and non-human life (whereisdaz, 2021; AidaGreenbury, 2021). This view of responsible environmental stewardship aligns, to some extent, with the pro-coalition's viewpoint. Nevertheless, the opposing group emphasizes that preserving the environmental integrity of Earth takes precedence over pursuing strategies for replicating the biosphere in outer space (westmm4028, 2022).

The viability of a multiplanetary future is perceived as improbable and distant, whereas the immediate and direct ecological consequences of humanity's destructive environmental impact are acutely felt in the daily lives of all living beings on Earth (TileTony, 2022). Musk and the pro-coalition should realize that allocating resources and efforts towards a multiplanetary future is deemed irresponsible and despotic, as it will erode support for keeping Earth's environment intact (TDS_Chris, 2020).

Preserving Earth's biodiversity is paramount for contra-actors. Carolyn Porco, a distinguished American Astrophysicist, criticizes Musk's multiplanetary imaginary and accuses him of jeopardizing terrestrial conservation efforts by making the idea of creating ecological backups in space seem feasible (carolynporco, 2022). Given the lack of support for biodiversity conservation on Earth, others question if the human tendency to exploit the environment would change for the better in a multiplanetary future, (jagmavi, 2022). Furthermore, opponents argue that if environmental degradation persists, Earth's biodiversity will further decline, reducing the number of species to make multiplanetary (Tiagojdf, 2021). Instead of space representing hope, as Musk would like to see it, contra-actors want to "make Earth represent hope" (pramsey342, 2021).

This could be achieved by directing efforts towards addressing climate change, which is regarded by many users as the greatest environmental challenge. They argue that tackling climate change would likely be more feasible than creating habitable ecosystems in outer space

(j_n_foster, 2021). Furthermore, the carbon footprint and subsequent environmental damage that are associated with the operations of interplanetary transport system will likely be so devastating that they will exacerbate atmospheric disruptions and accelerate the "dying out of life on Earth" (hermit_hwarang, 2021). Falling short of limiting global warming and seeing Musk commencing on his vision of turning Mars into an alternative ecosystem, instils in contra-actors a strong sense of pessimism and frustration (trEVmaximizer, 2021; mushm0on, 2021). Thus, the contra actors voice their frustration and perceive his vision as a misdirected priority that will cause undesirable ecological costs and consequences (AlAmin18237781, 2022). Therefore, contra-actors suggest that Musk should disembark from his STI and instead embrace a realistic approach, using his enormous wealth to, for instance, support climate change mitigation efforts (AlAmin18237781, 2022; bern_identity, 2021). This is deemed very urgent, as many are convinced that the chances of avoiding a 'climate apocalypse' are becoming increasingly smaller. While financial investments would be appreciated by contra-users, it would already mean significant change if Musk and other rich private actors would reduce their personal consumption and actively advocate for the preservation of the biosphere (gothspiderbitch, 2021).

This contra-storyline specifically highlights that conservationists, academics, authors, and writers want to preserve Earth and its biodiversity, acknowledging the role of humanity in shaping the planet's trajectory. Moreover, opponents argue that addressing environmental problems such as climate change should take precedence over pursuing a multiplanetary future, urging Musk and other influential actors to redirect their focus towards environmental preservation.

CONTRA-S2: Backing-up life on Mars by becoming multiplanetary will not work because ecosystems are interdependent and adapted to Earth.

Among Musk's opponents, especially within the community of conservation scientists, the imaginary of using space as a backup location for life is heavily criticized and considered an impossible feat (BugQuestions, 2021). The argument put forth is that the Earth's biosphere, which has evolved over billions of years, is perfectly adapted to the terrestrial environment. Contra-actors see life as an interdependent system which is thriving on complex closed-loop cycles that cannot be easily re-created, especially in space (notimportant80, 2021).

Consequently, they are opposing the storyline that Mars could serve as a 'Planet B'. The absence of liquid water, a thin atmosphere, average temperatures of minus 60 degrees Celsius, no geomagnetic field, and reduced gravitation should be compelling reasons to conclude that it

is impossible for life to survive on Mars (edgarrmcgregor, 2022). The detrimental impact on the health and psychological well-being of astronauts who spend only a limited time in space should be already make it evident that terrestrial life is not adapted to space environments (OutRagingBull, 2021). These are considered fundamental and widely acknowledged biophysical facts, which Musk and his supporters appear to intentionally disregard (mustapipa, 2021). The contra-side further condemns the option to terraform Mars because they firmly believe that such attempts exceed the human capabilities and would ultimately fail. Moreover, Musk's suggestion of using nuclear weapons on Mars is ethically alarming and could be anticipated to increase the risk of conflicts on Earth (canitti, 2019).

Contra-users speculate that proponents of space colonization are merely captivated by the idea of inhabiting another planet without fully considering the underlying reasons and consequences of such a proposal (parasociality, 2022). Therefore, they argue that preserving Earth's biosphere by becoming multiplanetary is a foolish and irresponsible strategy (CharlieJGardner, 2022).

Sharing several ties with the previous storyline, the scientifically well-informed contra-coalition counters the pro-actor's narrative of a backup plan for long-term survival by emphasizing the intricate socio-ecological interdependencies and feedback loops that exist within Earth's biosphere. Conditions on Mars, on the other hand, are assessed as too extreme to enable replicating terrestrial ecosystems.

4.2.3 Musk's impact on the social dimension of sustainability

This section analyses the storylines of both coalitions related to the social dimension of sustainability, guided by the concepts of social equity and justice.

The pro-network features only 13 (Pro-S4) and 9 actors (Pro-S5) and has no linking nodes between storylines. Apart from undefined users (n=9) this sub-coalition includes the accounts of the CEO of the world's largest cryptocurrency exchange (cz_binance) and a right-wing member of the US congress (laurenboebert) with more than 1 million followers respectively. The social contra-network is linked at least with one connecting node between storylines. A large concentration of creatives is present in Contra-S3 (n=22) and S4 (n=5). Moreover, Contra-S3 contains the greatest number of social activists (n=7) and governance actors (n=3) per storyline. As contra-storylines become more abstract the ratio of laypeople (Contra-S4) and undefined actors (Contra-S5) increases.

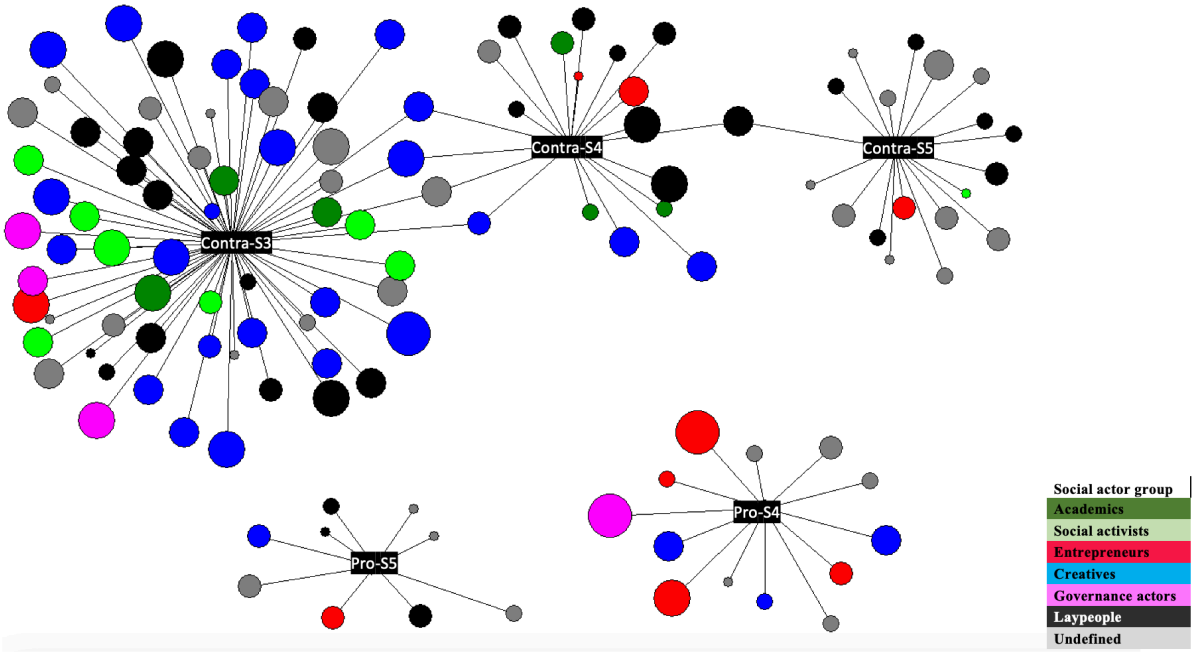

Figure 7: Two-mode affiliation network for the social dimension.

PRO-S4: The multiplanetary societal context is still to be determined.

Regarding the social dimension, pro-coalition users' focus is directed towards the prospective societal setting in outer space. They develop their own conceptualization of a multiplanetary society, influenced by their present respective worldview. Although these conceptualizations all have in common that they endorse Musk's ambition to become multiplanetary, they all share slightly different outlooks on how society will develop.

Optimists envision a multiplanetary life on Mars as a new chance "to begin again in a golden land of opportunity and adventure" (radicalbytes, 2021). Vast lands with unlimited opportunities are believed to await the first colonizers (surmountoby, 2021). On the other hand, realists predict the multiplanetary life to be feasible but challenging and dangerous. (tashfene, 2022). Some sci-fi inspired people picture it to resemble the journey depicted in movies and literature, where they themselves take on the role of captaining their own spaceship through the universe (shotbyfinnegan, 2016).

More practical considerations revolve around the question of recognitional equity and justice in relation to interplanetary travel: Will every individual be granted the freedom to choose their preferred planet of residence, or will the multiplanetary dream be accessible only to a select few with significant financial resources? While some SpaceX investors believe that access will be determined by capital, they maintain that Musk will strive to make it affordable for a broad segment of society (vincent13031925, 2020). Moreover, the analysis of quote tweets

revealed there is a strong notion of right-wing political perspectives present among pro-actors. Notably, Congresswoman and gun rights activist Lauren Boebert exemplifies this stance. She urges Musk to deliberately exclude 'American liberals' as she thinks they will impede progress towards becoming multiplanetary, similarly to how they were allegedly misgoverning the United States (laurenboebert, 2020). The view of pro-users associating a negative societal outcome with liberal political ideology indicates that this would likely also entail dividing implications for space colonizing.

In addition, questions arise concerning the interplanetary governance system and land allocation for colonizers. Will they be dictated by whoever sets foot first on Mars? Could Martian land become privately owned property that can be commercially traded? If Musk would succeed with the colonization of Mars, pro-users think that this could make him the richest and most powerful individual in the whole universe (cz_binance, 2022).

In Conclusion, pro-coalition actors hold varying views on the social aspects of Musk's STI. The future context of multiplanetary life is remains imaginative at this point. However, it is notable that social equity and justice implications are hardly discussed.

Pro-S5: The human population must continue growing to make life multiplanetary.

Musk's claim that a declining population growth rate could induce a global 'population collapse', is another theme taken up by the pro-coalition. They are concerned that a decrease in population growth will have significant implications for the demographic stability and the prospects of humanity as a multiplanetary species (Joydeb87778387, 2022; subhaBhowmik15, 2022). Meanwhile, people advocating for socio-ecological problems, often referred to as "what about the environment" people (alariclabrie, 2022), "globalists" (Elen_Beliy, 2022), or those described as woke-minded (SvegotMagnus, 2022), are seen as adversaries of the multiplanetary idea because they are perceived as accepting or even promoting population decline. It is worth noting that some extreme actors within the pro-discourse coalitions demonstrate once more cognitive ties to far-right conspiracy theories, linking the decline of white ethnicity and the fear of a great replacement to the agendas of environmentally focused globalists (SvegotMagnus, 2022).

It shows that proponents of Musk's population theory perceive a decreasing birth rate as a threat to the impetus for extending life to space.

Contra-S3: Achieving social equity and justice should be prioritized over multiplanetary endeavours.

From contra-coalition perspective, actors argue that advancing social equity and justice will have a more significant impact on the quality of life than pursuing a multiplanetary civilization. The analysis of contra-users' tweets revealed that many actors have a background in socialism or activism or are more generally inclined to align with the political left.

These users emphasize the importance of addressing intragenerational distributive equity and justice issues, asserting that resolving these matters is crucial for ensuring a sustainable future. They contend that privileged and wealthy individuals like Musk have a moral obligation to support the socio-economically disadvantaged members of society with a portion of their resources. Prominent areas requiring immediate attention include basic physiological needs, such as poverty (peterdaou, 2021; ahmedusa2005, 2022), food insecurity (ElaineWelteroth, 2021), and access to clean drinking water (mysticklemom, 2021). Additionally, addressing safety needs, such as eradicating homelessness (danadonnelly, 2020; cliffordmyers, 2022), ensuring affordable health and medical care (jameelajamil, 2021), and improving wages (mshannabrooks, 2021), is deemed crucial. Furthermore, contra-actors demand from Musk and other billionaires to support addressing structural security concerns, including the prevention of armed conflict (Nel_iss, 2021), dismantling of oppressive regimes (jameelajamil, 2021), and investment in infrastructure development in less developed regions (asifintoronto, 2021).

A recurring argument among contra-actors is that extremely wealthy actors like Musk should contribute a higher share of their wealth through increased taxes. This egalitarian notion is expressed with the hashtag #TaxTheRich (taradublinrocks, 2021). They maintain that the concentration of immense wealth in the hands of a select few deprives others of the opportunity to live a pleasant and sustainable life. Therefore, redistributing the fortunes of extremely rich people like Musk is perceived to be crucial for achieving intragenerational distributive equity and justice, which is argued to be an important step towards a sustainable society on Earth (leonmwalter, 2021). According to the contra-actors, the state should play a critical role in enabling this redistribution. Instead of channelling taxpayer money from average citizens into multi-billion-dollar contracts for billionaire space endeavours, the state should act as a balancing force, redistributing wealth for the greater benefit of social equity and justice (CommunistsEgirl, 2021). However, the state is perceived as a weak agent, acting mainly subservient to the interests of the wealthy, which reinforces their belief that the privatization of space exploration will exacerbate the inaccessibility of space for the broader population (fluidcreativiy, 2021).

Consequently, contra-actors also raise the fundamental question of recognitional equity and justice: Will Musk's interplanetary vision be accessible to everyone, or will it become an exclusive privilege limited to wealthy elites? Speculating that the latter case will happen, they start to envision a dystopian future where space would become the exclusive domain of the white mega-wealthy, while the rest of humanity would be left behind on an exploited and degraded planet (jameelajamil, 2021; mollyroooo, 2018). Meanwhile, the rich and fortunate would indulge in space tourism for amusement while also leveraging it as a means to amass more power and control (TitusNation, 2021).

Contra-actors observe Musk's aspiration to present multiplanetary endeavours as a symbol of hope for sustainability, yet they argue that this imaginary falls short. They firmly believe that basic human needs, which are not considered in Musk's STI, should be prioritized and achieved through higher taxes for the wealthy.

Contra-S4: The vision of a multiplanetary civilization is continued western colonialism.

The contra-actors critique Musk imaginary of a multiplanetary civilization as a colonial practice. Extending humanity to outer space is perceived as expanding and incorporating new territory for economic and strategic benefits, reflecting a recurring pattern of western colonial and imperial ideologies. Elon Musk is seen as a contemporary embodiment of this mindset, using the rhetoric about ensuring the survival of humankind and consciousness to mask his colonial ambitions (Trollacoaster, 2019). The contra-actors firmly believe that a blueprint behind his sociotechnical imaginary is evident: the intention is to "destroy Earth, stop caring about it, move on [and destroy] a new planet" (joshfoxfilm, 2021) in order to consolidate more power and resources.

Furthermore, they believe that Musk uses his population collapse theory intentionally to push his multiplanetary colonization agenda. Contra-users contend that it is logically unsound to believe that a growing population and its corresponding environmental impact will offer a safer future compared to a declining world population (Kalzsom, 2022). Therefore, they presume that Musk is intentionally misleading people with his "underpopulation crisis narrative" (fega_rk, 2022) to influence public perception and promote pro-natal policies and behaviours.

In sum, contra-actors argue that ensuring intra- and intergenerational equity and justice for all humans would become increasingly difficult in an overpopulated world. This, in turn, could serve as a justification for future governance regimes to welcome the vision of space colonialization (IntuitMachine, 2022).

Contra-S5: Multiplanetary colonization will lead to interplanetary conflicts.

As contra-actors express antipathy towards multiplanetary colonization, they also contemplate about the potential societal consequences of 'human decentralization' which is anticipated to arise if Musk's STI would become reality.

Opponents think that Musk and the pro-coalition have a naive perspective on the prospects of a multiplanetary future, underestimating the potential for interplanetary challenges and conflicts (lonewanderer25, 2022).

First, there are difficulties imagined integrating the new multiplanetary outposts effectively into the existing planetary governance system. Contra-users estimate that new interplanetary institutions would need to be created such as, for example, "United Planets, Galaxy Health Organisation, [or an] Interplanetary Monetary fund" (BirdLawyer4, 2021). However, opponents argue that such an approach may result in growing fragmentation and pose challenges in effectively coordinating between terrestrial and space entities. Furthermore, in a colonization scenario it is anticipated that levies or obligations would be imposed between the mainland and its settlers (KushyTheClown, 2022). However, compliance and monitoring with these obligations would turn out to be difficult due to the vast separating distances. Disagreements over these levies and obligations are expected to arise, potentially leading to colonial revolts and a drive for independence in the space colonies (Johns10S, 2021). This could result in a shift from alliances to rivalries vying for extraterrestrial assets, ultimately escalating into interplanetary warfare (nowly101_devi, 2021).

Contra-actors are acknowledging the potential implications of multiplanetary colonization and their ramifications on the prospective societal dimension of sustainability. They are underscoring that Musk is underrepresenting the obstacles that society would face in a multiplanetary setting.

4.2.4 Musk's impact on the techno-economic discourse of sustainability

This section highlights the storylines related to the techno-economic dimension of sustainability. The analysis is guided by the perspectives of ecomodernism and degrowth which have been described in the chapter 2.2.

Pro-S6 lists the most entrepreneurs (n=20) per storyline, with 6 accounts having above 100,000 followers. User JohnnaCrider1connects Pro-S6 and Pro-S7, with the latter storyline having a more balanced distribution of actor groups. Contra-S6, contains the mostly creatives (n=13) and laypeople (n=13) as well as the second largest accumulation of social activists (n=5)

subscribing to a storyline. According to their self-description and usernames, actors can be viewed as residing on the political left spectrum.

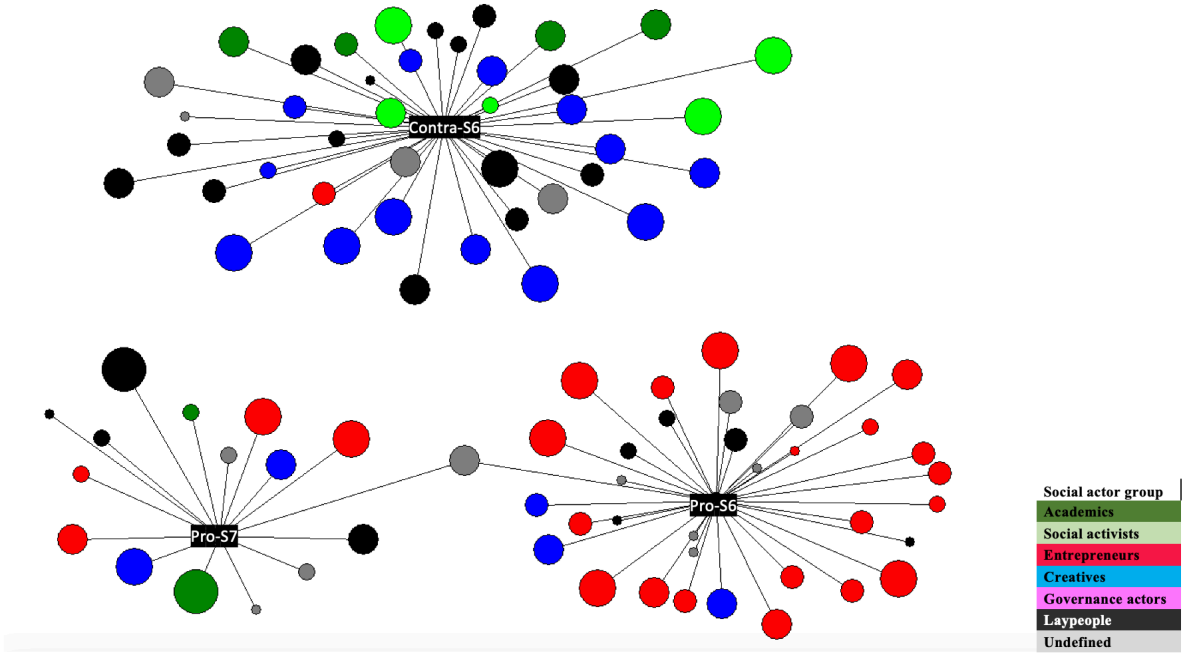

Figure 8: Two-mode affiliation network for the techno-economic dimension.

Pro-S6: Supporting Musk STI will stimulate techno-economic development crucial for a more sustainable future.

The pro-coalition approaches Musk's STI with an optimistic view on the techno-economic dimension. They embrace the innovative ingenuity represented in his business ventures and believe that Tesla and SpaceX will contribute to achieving a sustainable multiplanetary future. Entrepreneurs especially from the digital financial service industry represent the majority of the actors uttering this storyline.

Private and public investments are framed as crucial for facilitating the realization of Musk's STI. Pro-actors argue that people can take tangible steps to privately help accelerate the process towards a sustainable multiplanetary future, for example, by purchasing products from Musk's companies (JC_finance, 2021, MilMileBattery, 2021). Furthermore, pro-actors advocate for an increase of government funding for SpaceX, as they perceive making life multiplanetary to be a global security concern. Therefore, every national government should spend "at least 5%" of its GDP on "multiplanetary civilization expansion" (johnsavage_eth, 2022).

Inspired by Musk's vision, pro-actors engaged in the commercialization of the multiplanetary idea, utilize Musk's tweets as a platform to advertise and announce various start-up businesses (LughStablecoin, 2022; OVRtheReality, 2021; sandeepssrin, 2018; shinobi_frost, 2021; xrplebroccoli, 2021). While diverse, these products and services all contribute to familiarizing people with the concept of a multiplanetary civilization and serve as bridges between the conceptual imaginary and existing socio-economic practices. Especially cryptocurrencies, which Musk has already used as payment in SpaceX's missions, are envisioned to enable the future interplanetary commerce (PLANETART053, 2021).

Since pro-actors see space as vast and limitless, they advocate for expanding the terrestrial business model to commercialize also extraterrestrial resources and territory. The space industry should progress towards celestial object mining and establish interplanetary mining hubs with global delivery standards (JDBtracker, 2021). Megatons per year to and from orbit are framed necessary "to take the next step for life to become interplanetary" (MarkNew, 2020). The acquired space resources are expected to end the scarcity economics problem on Earth and help decouple economic growth from environmental degradation (MoosedPoet, 2021). To reap these benefits, proponents are advocating for a greater societal acceptance for increased missions and payloads to space (MarkNew, 2020).

To summarize, pro-actors seem to adopt an ecomodernism perspective on the relationship between economic growth and environmental impact. They are optimistic that multiplanetary colonization will boost innovation and present new business opportunities.

Pro-S7: The interplanetary transport system inspires proponents to choose techno-economic development over environmental matters.

Pro-actors of various social groups celebrate Elon Musk for building an interplanetary transport system aimed at enabling humans to become a multiplanetary species in the future. Specifically, the Starship program, designed to transport humans to Mars, receives immense support (TheWordCoin, 2022).

Musk understands the importance of inspiring people to gain public approval for his STI. In the case of SpaceX, pro-users are captivated by the imagery and attention-grabbing marketing strategies such as launching a Tesla car with an astronaut mannequin into space (GerberKawasaki, 2018). Musk tweets stimulate in the proponents the belief that space settlement is feasible (pdouglasweather, 2018). Ultimately, these actions can be interpreted as strengthening pro-users' trust in a technology driven future (AhraniLogan, 2016; AlbertEinstein, 2016).

Moreover, proponents advocate that making life multiplanetary should not be hindered by government regulations or environmental concerns. This is illustrated, for instance, by pro-actors' efforts to exert pressure on the Federal Aviation Administration (FAA) to permit the construction of the Starship launch site in proximity to a nature reserve (Space_Centric, 2021). Their utilitarian argument is grounded in the belief that Earth's biosphere is abundant and sacrificing a small portion of it for the greater benefits of interplanetary space travel would be justifiable (SpaceY_UK, 2021). In that sense it can be argued that techno-economic development takes precedence for them over environmental matters.

In sum, Musk's technological inventiveness plays a central role in shaping the belief of pro-users that sustainability should be approached through eco-modernization.

Contra-S6: The techno-economic implications of Musk's STI foster the emergence of destructive interplanetary capitalism.

The contra-coalition led by social activists and creatives expresses severe concerns about the potential techno-economic development that Musk's STI would imply. They criticize capitalism as the primary driving force that could also threaten space as a global commons and fosters exploitation on earth and in space in the future.

Contra-actors perceive the profit motive as the underlying cause and incentive behind Musk's involvement in space (AdrianXpression, 2021; MauriceWFP, 2022). Billionaires like Elon Musk are considered representative figures of an emerging type of interplanetary capitalism (JgrantGlover, 2022). Due to their enormous wealth, they are believed to possess considerable power and influence to shape the trajectory of this evolving economic system (AlexandriaV2005, 2021).

Opponents believe that Musk and others, in their relentless pursuit of maximizing profits, will also simply disregard space as a global commons (AgnesCPoirier, 2018). While space has been traditionally regarded as a shared, non-excludable good, the recent technological progress enabled by private entrepreneurs, induces a shift in control, favouring now these wealthy private actors. This development could provide private actors like Musk with pivotal leverage to gain government approval for privatizing space for example through commercializing extraterrestrial resources or appropriating land (thestuffofmemes, 2019; adamliaw, 2021).

Moreover, opponents fear that the power-driven ambition, economic greed, and exploitative behaviour inherent to humans would persist and potentially worsen in space due to a lack of regulatory bodies (BrotherAugusti2, 2022; jagmavi, 2022). They express concerns that

the quest for making life multiplanetary would only achieve interplanetary “slave labour markets” (ClintonAlden, 2022; parismarx, 2022). Furthermore, they firmly believe that space colonies could never operate self-sufficiently, which would aggravate the extraction and subsequent depletion of Earth’s natural resources (Edaphosaurus, 2021; LeftySquirrel, 2021). With interplanetary shipping believed to be highly expensive as well, contra-actors conclude that Musk’s multiplanetary vision will not be economically feasible (jeffyguy, 2022; parasociality, 2022).

To conclude, opponents, particularly from the political left argue that Musk's endeavours will not achieve his objective of establishing a multiplanetary civilization but rather extend capitalist exploitation to outer space. This would result in the consolidation of monopolistic power structures, which are perceived as a critical socio-economic barriers impeding progress toward sustainability.

4.3 Summarizing key findings

The purpose of this sub-chapter is to present a concise summary of the main findings, focusing on the broader picture that arose from the results. Furthermore, the combined two-mode affiliation network is presented in figure 9.

The primary concern of Musk’s STI is the survival of life by preparing for potential existential threats. Employing an extreme long-term perspective, Musk frames making life multiplanetary as the only viable solution. His STI presents Mars as the ideal destination for human space colonization. To enable human proliferation between Earth and other celestial bodies, the need for an interplanetary transport system is stressed. Additionally, Musk uses imagery strategically to persuade the public of the necessity to realize his STI.

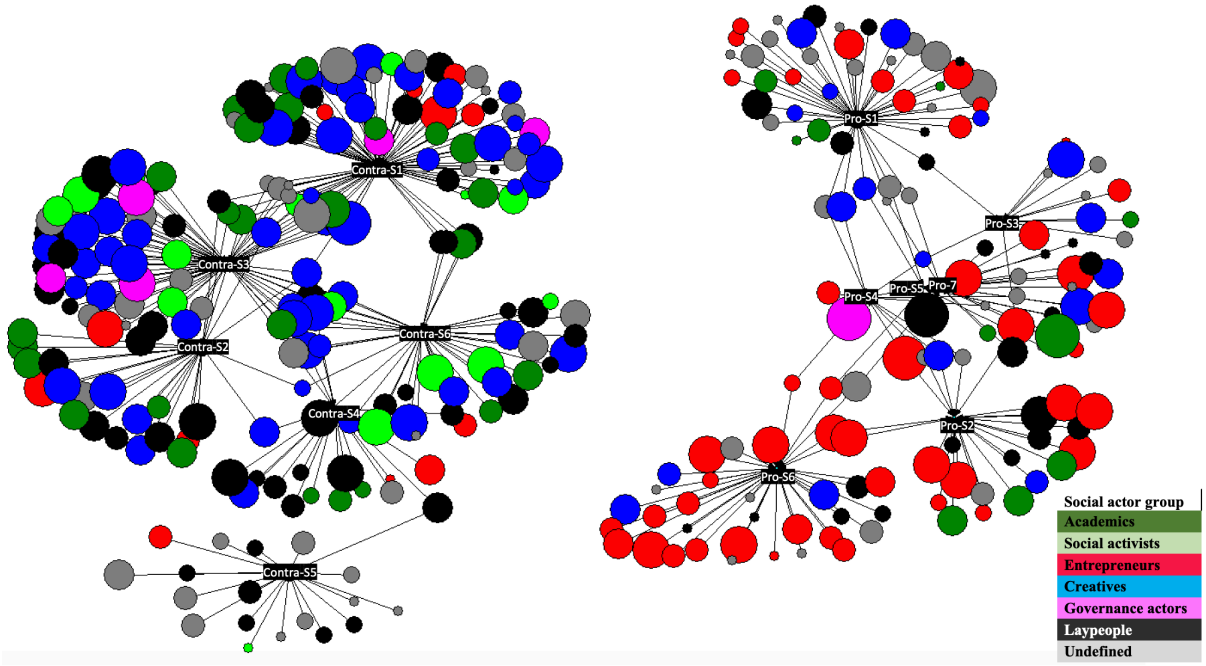

Figure 9: Combined two-mode affiliation network for both discourse coalitions.

Musk STI had a dividing effect on its audience on Twitter. A pro and a contra discourse coalition with opposing storylines emerged.

The pro-coalition agrees that the survival of the human and non-human species should be viewed as the highest priority of sustainability. It ought to be the moral collective responsibility of humankind to act as a steward for other living beings. Proponents view humankind as separate from nature, using engineering methods to maximizing the utility of space and dictate the evolutionary trajectory of species according to their preferences.

The contra-coalition firmly acknowledges humanity's negative impact on the environment. Contrary to Musk, they argue that humanity should use its abilities to preserve, conserve, and repair the environmental damage they have caused. Diverting efforts and resources to the seemingly impossible and unethically pursuit of making life multiplanetary will not help but further aggregate environmental problems. They maintain that the complex social-ecological interdependencies of terrestrial life, will demonstrate the impracticality of transferring life to the Mars environment. Consequently, any attempt to create a 'back-up' of Earth's biosphere in space would fail.

The analysis of the social dimension showed that the pro-coalition barely acknowledged social equity and justice issues in their discourse. Their views are to a large extent shaped by right wing populism. In general, proponents embrace the freedom that a life in outer space would entail; despite the obvious hardships and struggles they believe in a functioning space

civilization. To further the need for space colonization, pro-actors support Musk's theory of population collapse and believe that population growth must continue.

Users opposing Musk's STI, argue that addressing issues of social equity and justice, are far more important. As a solution for improving basic human needs, they advocate for distributing the wealth of extremely rich actors like Musk through stricter tax regulations. Furthermore, they criticize Musk's vision as enduring notions of colonialism and hegemonic thinking, consolidating existing western power structures in space. This would inevitably lead to unanticipated (inter-) planetary challenges for social equity and justice.

Pro-users' sustainability discourse of techno-economic matters, is optimistic toward using engineering methods to achieve sustainability. Building an interplanetary transport system is perceived as desirable and achievable. The pro-coalition envisions that the economic utility gained from venturing to space will justify environmental ramifications because space resources could contribute to a sustainable development.

In contrast, social activists and creatives from the political left challenge this ecomodernist view of achieving sustainability. They perceive Musk's ambitions in space as an opportunistic encroachment to commercialize space as a global commons, while simultaneously depleting and polluting Earth's natural resources.

Zooming in on the coalition networks, it becomes apparent that the contra-coalition's storylines are much more linked compared to the pro-coalition storylines. Especially, the contra-storylines of preserving environmental integrity (S1), achieving social equity and justice (S3), and criticizing capitalism (S6) demonstrate a hight degree of density (n = 28 shared nodes). This indicates that the contra-users' discourse applies a more encompassing, systems thinking perspective on sustainability, while the pro-coalition discourse of sustainability seems to be fragmented and narrowly focused on single topics.

Overall, the findings provide strong evidence that Twitter users react with two distinct discourses of sustainability to Musk's STI. On one hand, a discourse of sustainability in the conventional 'planetary' sense as articulated by the contra-coalition, and on the other hand, a rivalrous discourse of sustainability in the 'multiplanetary' sense as uttered by the pro-coalition. While the planetary discourse can be referred to as focusing on actions that stay within planetary boundaries, the multiplanetary discourse, in contrast, advocates for actions that exceed planetary boundaries.

5. Discussion

This chapter reflects on the main results and their meaning. The findings are interpreted in the light of the thematic sustainability framework. Moreover, potential limitations of the research approach and methods are critically assessed while suggesting improvements. The broader significance of the study is demonstrated by examining the implications and the contribution to theory and future societal practice as well as presenting new avenues for future research.

Reflection

The analysis provided empirical evidence that Musk and the pro-coalition impetus to care for the future of life on Earth resembles an anthropocentric attempt of environmental stewardism. Their favouring of techno-engineering approaches to environmental problems indicates a manifestation of earlier philosophical perspectives linked to anthropocosmism (Burleson, 2002; Finney, 1988; Sagan, 1994b). The findings offer several insights: Making life multiplanetary as displayed in Musk's vision, would be a highly resource-intensive endeavour. On one hand, components needed to construct and equip a fleet of 120m large and 5000t heavy Starships would require enormous quantities of finite terrestrial resources subtracting them effectively from sustainability efforts on Earth. On top of that, a far greater amount of resources would be needed to make Mars habitable. Given the lack of serious scientific evidence suggesting that space colonies could operate self-sufficiently, one would have to consider the contra-coalitions scenario of continuous depletion from a terrestrial-extractivist space colonization supply chain.

At the same time, pollution on the ground, in the lower atmosphere, and Earth's orbit would continuously rise as Musk's vision of an interplanetary transport system with 'rapidly, reusable rockets' and 42,000 Starlink satellites becomes reality (Gammon, 2021; Reuters, 2023). The increasing congestion of the Earth's orbits coupled with growing density of space debris will likely cause a cascading effect of collisions known as the Kessler Syndrome (Kessler & Cour-Palais, 1978). This would have permanent consequences on the services and scientific pursuits of communication, observation, and navigation. From an environmental perspective, the dystopian idea of 'multiplanetary sustainability' that is sought by Musk and the pro-coalition could be summarized in the words of Temmen (2022) as Earth becoming Mars-like, and Mars becoming Earth-like.

Examining Musk's STI and the ADA of quote tweets led to three foundational questions regarding social equity and justice. First and foremost, it is essential for society to address the

ethical implications of becoming a multiplanetary species. Should we attempt to become god-like creators of new worlds and control the evolutionary path of life and consciousness as suggested by Musk? Or would that not reflect an obvious moral defect of our human character? Following Musk and pro-actors' vision ultimately means believing that our long-term safety justifies the right to dictate, transform, and transgress what have been partly agreed societal norms, partly physically set boundaries. However, the insights derived from the contra-coalition seem to point toward the yet underexplored field of space environmental ethics, which would contextualize Musk's STI as a hubristic approach demonstrating human's insensitivity towards the living and non-living environment (Sparrow, 1999; Stoner, 2017).

Secondly, it should be questioned who is truly considered to become multiplanetary. Who is included? Who can have access? For whom will the trip to Mars be affordable? Or bluntly summarized in the quote tweet of stephanevw (2021) "Is the space for everyone or just for rich people?". Despite pro-user belief that interplanetary travel will be accessible and affordable for everyone, Musk's (2017) indication of a ticket prize between $100,000 and $200,000 under ideal circumstances effectively renders the possibility to go to Mars only attainable for wealthy elites. Furthermore, the evident inclination for right-wing ideology among pro-users further strengthens the prospective image of interplanetary travel as an exclusive, anti-democratic practice that prioritizes predominantly white, pre-existing power structures.

The third question deals with the hypothetical scenario in which space colonies have been established. In this multiplanetary context, how would the civilizations on Earth and in space coexist? The ADA findings suggest that the multiplanetary co-existence would not be without conflicts. Disputes over resource allocation, economic and territorial interests, and decision-making would undoubtedly occur, likely exacerbated due to the lack of connectivity. The present governance and legal system are extremely ill-prepared to address these dangers (Herron, 2019). Given the absence of effective mechanisms, unresolved contestation would evoke likely armed (interplanetary) conflicts expanding the scale of suffering to outer space (Torres, 2018). The awareness of contra-actors regarding this matter indicates its relevance beyond academic, interdisciplinary studies on anticipation and foresight.

Applying the techno-economic lens allowed this research project to provide insights in the yet barely discussed connection between capitalism and efforts to make life multiplanetary. It has become evident that almost a third of Musk's STI proponents possess an entrepreneurial background. Furthermore, the discourse analysis was able to demonstrate that these actors have

a large interest in growing their financial assets in the emerging industry sectors related to the commercialization of space. Becoming a multiplanetary species is seen as a strategy to expand market opportunities and, above all, to maintain the economic growth model. While many global actors support the narrative of space as a way to "promote sustained socio-economic growth" (OECD, 2019) and achieve a decoupling from adverse socio-ecological impacts on Earth, this thesis project presented arguments challenging the validity of this assumption.

In essence, subscribing to this framing presents another opportunity for ecomodernist and capitalists to perpetuate their economic growth-business-as-usual approach. It is a cause for concern that the continuation of capitalism, which is responsible for many environmental crises and social inequalities on Earth, is not only tolerated but also used as a justification to venture to space (Gunderson et al., 2021). Therefore, this thesis project contends that the fixation on making profits by exploiting other celestial bodies as well as likely also the human labour of the mining astronauts should not be mistaken for a sustainable practice as some might like to refer to it. Instead, it openly highlights the strong interlinkages between capital, resources, and colonial or hegemonic ambitions.

Implications for future research and governance

Several implications for future research and global policymaking can be delineated from this research. This section intends to highlight three major propositions and examines their implications for future governance research and practice. Firstly, the speculation about decision-making in space that has become evident in the discourse analysis empirically confirmed the *lack of effective regulations* and *fragmentation* of the present space governance system (Tepper, 2019; Weeden & Chow, 2012). This space governance regime complex is comprised of an increasing number of international laws, agreements and policies, national laws and policies, and stakeholder interrelations and standards (Wiser & Aganaba, 2023). This growing diversity of governing institutions can impose challenges for the effectiveness of governance (Kim 2019, Biermann & Kim 2020). Several, policy responses to improve the performance of regime complexes exist already (Biermann & Kim, 2020). Therefore, future research should consider mapping the system dynamics of the space governance regime complex, including the actions between institutions to understand what policy responses should be implemented to improve the performance of the regime complex to reach sustainable outcomes. In this context, the novel earth-space governance framework proposed by Yap and Kim (2023) which advocates for recognizing the interlinkages between earth system governance and space governance, can serve as way to avoid further fragmentation and

contribute to effective policymaking through integration across domains. Therefore, future research and practice should consider treating earth and space governance not as separate spheres but as one interconnected system.

Secondly, and linked to the first proposition, it can be argued that national governments and private actors increasingly engage in *public-private partnerships to pursue common interests* in space. One recent example, is the Artemis programme, which is a NASA-led initiative aimed establishing a long-term presence on the Moon and prepare for future crewed missions to Mars (NASA, n.d.). NASA is striving to emphasize the scientific exploratory motifs of the mission. However, the more compelling driver of the Artemis missions seems to be the exploitation and commercialization of lunar resources and eventual progress towards human Mars expeditions (Creech et al., 2022). This is in line with the Space Policy Directive-1 issued by President Trump in 2017, which seeks to lay the legal foundations "to enable human expansion across the solar system" (Wang, 2017). While Artemis and the Trump directive, both, attempt to label themselves as 'innovative and sustainable' they actually seem to follow the multiplanetary sustainability discourse. This masked attempt to legalize and legitimize the exploitation and colonization of space is deeply concerning, as it effectively provides the ground to violate the status of space as a global commons agreed upon in the Outer Space Treaty (Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, 1967). In fact, the US already officially departed from the global commons notion in 2020[1].Considering the seemingly universal consensus and interests in commercializing space resources, it is unlikely that global governance could develop effective institutions that protect space as a global commons in time before technology allows neo-liberalism its privatisation. Irrespective of this outlook, policymakers could advocate for accountability mechanisms that minimize the inequitable distributions of benefits when space resources are subjected to market forces and privatization. Another recent idea that might be worth exploring is the establishment of space preservation parks in future land-use policies to conserve unaltered extraterrestrial surfaces (Profitiliotis & Haqq-Misra, 2023).

Thirdly, this thesis project wants to invite other researcher to analyse the presence and effects of Elon Musk and other 'longtermist' thinkers on the sustainability discourse. Longtermism is an emerging family of ideological views that aim essentially at minimizing future existential risks and maximizing the long-term well-being of future human generations

[1] According to the Presidential Executive Order 13914 of April 06, 2020, the US asserts: "Americans should have the right to engage in commercial exploration, recovery, and use of resources in outer space […] the United States does not view it as a global commons."

(Moorhouse, 2021). The results derived from answering the first research question, suggest that Musk's STI can be considered as longtermism. The predicament of longtermism perspectives is that they dismiss immediate and serious, but (currently) non-existential threats to humanity, such as climate change, while overemphasizing action for hypothetical future risks. This research project proposes that the direction of attention and effort for sustainability can be affected when pro-longtermism STIs of influential actors such as Musk's infiltrate and spread within discourses. Therefore, as an educated guess, this research project proposes that if left unnoticed or neglected, that this could induce a shift from the currently dominant planetary sustainability discourse to a multiplanetary sustainability discourse. This shift may further institutionalize into policy arrangements favouring the latter, creating a reinforcing feedback loop. Over time, this could, for instance, mean that the majority of people starts to perceive space colonization as most promising avenue for achieving sustainability. Figure 10, attempts to visualize this process. Academics are invited to comment and further examine this conceptual relationship to contribute better to its understanding.

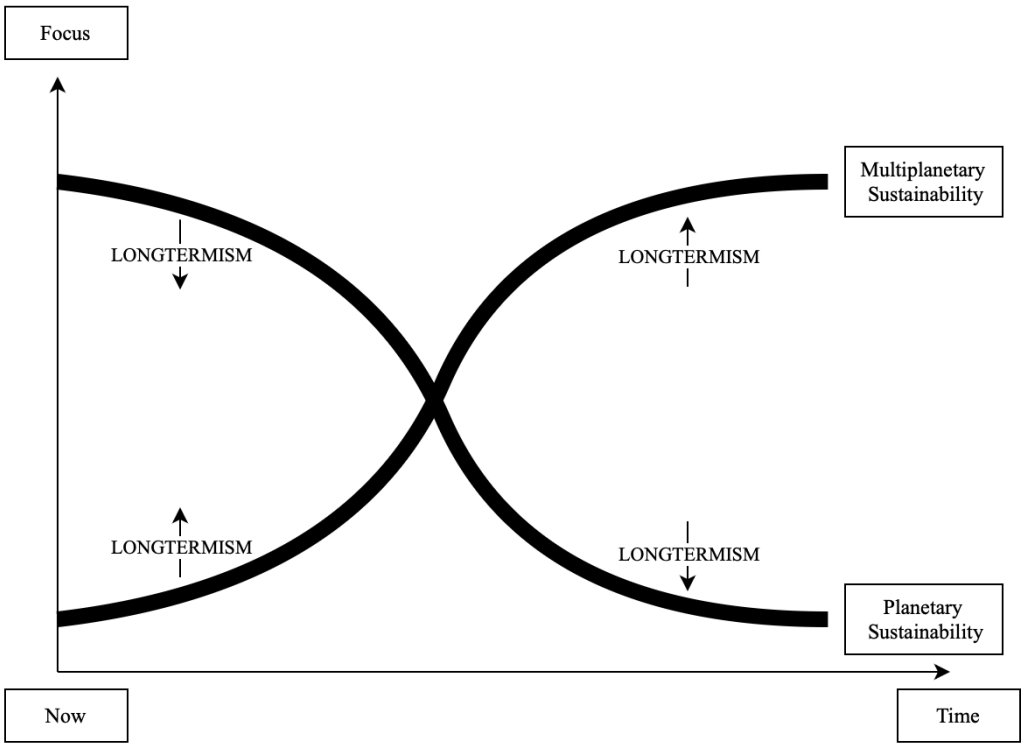

Figure 10: Ideological perspectives of longtermism such as Musk's STI could shift the focus from Planetary to Multiplanetary sustainability over time.

Limitations

While this thesis project was conducted with utmost attention to scientific scrutiny and rigor, certain limitations could not have been avoided. This section will critically discuss the limitations and either substantiate why this approach has been optimal or, where necessary, suggest opportunities for improvement.

First and foremost, this study assumed that Twitter data allows the researcher to infer the narratives and discourses of actors. It must be acknowledged that Twitter conversations are not a perfect representation of the public debate or views because the expression is limited to whoever uses Twitter and what they are willing to share on the platform. It is likely that the anonymity of the digital social network causes some users to reveal more and some users to reveal less of what they are really thinking. Therefore, certain views could be over- or underrepresented. Moreover, taking into account the takeover of Twitter by Musk in October 2022 could have caused many of its critics to abandon or reduce their engagement with the platform. This could potentially also explain to some degree the considerably lower number of negative tweets as derived from the Sentiment Analysis. However, this would only account for a fraction of the tweets posted in the last quarter of 2022. Therefore, it is more likely that the adjusted Vader algorithm leaned towards an overfitting of positive sentiment.

It is hypothesized that incorporating other posts or comments from various social media platforms and additional data sources such as newspaper articles or interviews could enhance the validity and reliability of the findings through data triangulation. However, it must be noted that this research project conducted a large-scale longitudinal analysis of more than 140,000 tweets over a 14-year time period to determine the underlying views of users. This makes the findings already highly reliable and valid. It is likely that data triangulation would have only a minor impact on the outcomes of this study.

Secondly, the interpretation of data has been based on the researchers subjective inductive reasoning. This is due to the thesis requirements which asks the researcher to deliver an authentically individual product. It could be argued that conducting parts of the research in a team, would have advantages for the coding and interpretation of the data. To some extent a subjective note cannot be avoided, yet, the author of this study worked with great diligence and used also quantitative computational approaches to text analysis to remove unintended bias. Furthermore, the researcher disclosed the approaches of data analysis in detail in the methods section to ensure that others would arrive at the same results.

Related to this point, is the difficulty of inferring people's position on sustainability as a multilevel concept based on tweets. This is mainly due to two reasons. The first limitation is

the ‘shortness’ of Tweets at maximum length of 280 characters which leads user to condense their views into concise and sometimes cryptic messages. It becomes the task of the researcher to decipher and read-between-the-lines. The potential impact of outliers has been reduced by presenting the results at the aggregated coalition-level. Additionally, looking only at responses to Musk, disregards other users’ positions that have not used his tweets to disseminate their discourse of sustainability. However, since the objective was to specifically look at Musk’s impact on the sustainability discourse the approach taken is still valid.

Lastly, two more practical limitations remain. An alternative approach would have been to use important keywords from Musk’s STI narrative to filter the quote tweets for discourse topics. The advantage of this approach would have been that it would have made the need for topic modelling and the thematic framework redundant. However, this would have effectively also excluded some relevant findings and limited the breadth of discourses present in quote tweets. Not using topic modelling would make the selection of quote tweets seem arbitrary. Furthermore, without the thematic framework there would have been no common standard to compare the arguments present in the quote tweets against. Therefore, the inclusion of both has been critical to present a wide array of views for inductive coding using the ADA method. A further minor but nonetheless valid limitations is the allocation of quote tweets that mention pro- and contra storylines to either coalition. This has been done to simplify the approach and to allow a clear distinction between both coalitions. Upon reflection on the conducted study, the researcher recognized that it would have been beneficial, to investigate also the potential ‘in-between’ coalition discourse. However, it was found that only approximately 1% of quote tweets would have fallen into this in-between category. Therefore, it can be argued that the derived insights would have been minimal, and that the prevailing method is more favourable due to its succinct way of presenting the findings.

6. Conclusion

This thesis project asked two questions: First, what is the STI of Elon Musk, and secondly, how does his imaginary impact the discourse of sustainability. To answer the research questions, a Twitter archive query have been conducted sampling 151 tweets of Elon Musk and 145,115 responding quote tweets of other Twitter users between 2009 until 2023. The tweets have been analysed using state-of-the-art quantitative and qualitative methods.

The first sub-question used the analytical concept of STI to construct a narrative of Musk tweets. The analysis showed that Musk's develops a vision of the future in which he argues that the long-term survival of species should be the most important concern. According to Musk, the key to ensure the continuity of life and consciousness lies in making life multiplanetary. His STI envisions terraforming and colonizing Mars using an interplanetary transport system. Via means of communication and imagery he tries to gather public approval for his vision.

The aim of the second sub-question of this thesis project was to reveal what kind of impact Musk STI had on the sustainability discourse of Twitter users. Employing a thematic sustainability framework, the project was able to demarcate two opposing discourse coalitions and delineate their argumentations.

Overall, the analysis of the second sub-question led to three key findings: Firstly, the pro-coalition's discourse is articulated from an anthropocentric perspective and characterized by the strong influence of tech-entrepreneurs and their preference for multiplanetary-engineering solutions to sustainability. Secondly, the contra-coalition's discourse is reflecting critically on Musk's STI and the resulting anthropocentric impact. These actors advocate for thinking systematically about the interlinkages of sustainability dimensions. To them making progress towards environmental integrity, an equitable and just society, and a non-capitalistic economy means realizing sustainability.

Thirdly, as a result, it is essential to recognize that both coalitions pursue distinct visions of sustainability discourse. Musk and his proponents envision sustainability as ensuring the continuity of life and consciousness through growth and multiplanetary expansion. In contrast, contra-actors conceive sustainability as a single planet endeavour which aims at making the deliberate choice to stay within Earth's boundaries.

Ultimately, this research project demonstrated the profound impact of Musk's STI on discourses pertaining to the future of sustainability at the earth-space interface. In doing so, this study aimed to contribute to the fundamental question of sustainability: What do we want to be sustained? Instead of perpetuating the harmful human activities that caused us to

become concerned about sustainability, the future of sustainability should embrace the necessity to change behaviours for a more resilient and harmonious coexistence with, both, our terrestrial and extraterrestrial environment.

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Appendix

Appendix 1: Musk's 151 tweet dataset chronologically ordered.

Tweet number	**created_at**	**Text**	**NVivo Codes**
1	2011-12-29T22:31:09.000Z	Interesting Economist article about how humanity's collective actions have created a fundamentally new geological age -- the Anthropocene.	Anthropocene
2	2011-12-30T15:35:47.000Z	Not that this really matters. All current rocket tech, including ours, sucks. Only when it becomes fully reusable, will it not suck.	Reusable Rockets
3	2012-03-15T09:37:28.000Z	Lovely poster about wishes that explains one of the many reasons to make life multiplanetary http://t.co/e1ZM8a2b	Make life multiplanetary
4	2012-04-09T02:01:15.000Z	Interview in Nature describing why we should extend life to Mars http://t.co/6Ux0q4OX	Make life multiplanetary
5	2012-04-09T02:04:53.000Z	Besides ensuring the continuance of life, creating a base on Mars would be the most exciting adventure ever!	Space inspiration
6	2012-05-11T00:55:26.000Z	Making large scale rocket propulsion landing work well is a critical step towards a fully reusable Mars transport system	(Reusable) interplanetary transport system

7	2012-05-11T00:58:31.000Z	... which is the critical breakthrough needed for life to become multiplanetary.	Make life multiplanetary
8	2012-07-27T02:26:31.000Z	Compared to past, today's world is fantastic & likely will be for many decades. Just need to cover future downside risk.	The present is better than the past
9	2012-07-31T21:57:37.000Z	Goal for Model S is to show that electric is way way better than gas. Combine w solar power & the future looks bright.	Solar power is the future
10	2012-11-21T03:01:08.000Z	Love this picture of the Curiousity rover on Mars. Landscape looks just like the California desert. http://t.co/02GDasae	Mars landscape
11	2012-11-27T17:48:23.000Z	Millions of people needed for Mars colony, so 80k+ would just be the number moving to Mars per year http://t.co/rwMuzVEK	Make life multiplanetary / Colonizing Mars
12	2012-11-27T18:00:03.000Z	But if humanity wishes to become a multi-planet species, then we must figure out how to move millions of people to Mars.	Make life multiplanetary / Colonizing Mars
13	2013-01-04T03:09:39.000Z	This gives a sense of what Mars would look like after changing the climate to sustain life http://t.co/DT1P5EUp	Geoengineer Mars to sustain life

14	2013-01-10T08:05:03.000Z	Also, I am not the kale eating overlord of Mars (altho kale has its moments) http://t.co/nCjMgEjC	No mandate over Mars colony
15	2013-01-10T17:27:35.000Z	To be super clear, I don't wish to (nor could I) mandate anything about a Mars Colony. Am just working on the tech to get people there.	No mandate over Mars colony
16	2013-03-23T00:26:25.000Z	When Shoemaker-Levy comet hit Jupiter in 94, it made an Earth size hole. We wd be super dead if it actually hit Earth http://t.co/b6IyuLoHIo	Life on Earth is not safe (forever)
17	2013-03-26T07:08:08.000Z	Future will indeed be rooftop solar + battery pack, w utility company just providing backup power http://t.co/1PlB3xn0Cz	Solar power is the future
18	2013-05-24T04:38:23.000Z	Those who would deny climate change should ask themselves what happens if they are wrong http://t.co/S7fOIrly6B	Climate change is a real threat / Life on Earth is not safe (forever)
19	2013-05-25T18:08:54.000Z	Climate change deniers claim "scientists disagree", same rebuttal used by tobacco industry about lung cancer for decades	Climate change is a real threat
20	2013-05-25T18:15:55.000Z	In reality, 97% of scientists agree that we face serious human generated climate change http://t.co/soQCnJB61B	Climate change is a real threat

21	2013-05-25T18:28:03.000Z	Sorry for all the heavy stuff abt climate change, but I really thought world wd take action sooner. No time for subtlety	Climate change is a real threat
22	2013-05-25T20:25:29.000Z	Am not suggesting shutting down CO2 production, but rather to price in environmental cost & shift to sustainable energy	Shift to sustainable energy
23	2013-05-25T20:39:58.000Z	Yeah, climate change should really be considered a centrist issue, as it affects everyone.	Climate change is a real threat
24	2013-05-25T21:01:04.000Z	Worth reading Merchants of Doubt. Same who tried to deny smoking deaths r denying climate change http://t.co/C6H8HrzS8X	Climate change is a real threat
25	2013-09-27T02:32:44.000Z	Water ice on Mars http://t.co/fPz1OF7EXI	Water on Mars
26	2014-06-04T15:35:20.000Z	Ok, but the sloths kinda had it coming "Humans Blamed for Extinction of Mammoths & Giant Sloths" http://t.co/pIPW8rjjl2	Life on Earth is not safe (forever)
27	2014-09-16T21:13:38.000Z	Deeply honored and appreciative of the trust that @NASA has placed in @SpaceX for the future of human spaceflight	Entrusted by NASA
28	2014-12-26T00:06:08.000Z	Reading The Culture series by Banks. Compelling picture of a grand, semi-utopian galactic future. Hopefully not too optimistic about AI.	Sci-Fi influence

29	2015-01-10T17:20:28.000Z	Am super proud of my crew for making huge strides towards reusability on this mission. You guys rock!	(Reusable) interplanetary transport system / Reusable rockets
30	2015-02-11T22:22:38.000Z	Can't delay any longer. Must proceed with primary mission to launch the Deep Space Climate Observatory spacecraft.	Climate change is a real threat
31	2015-03-12T22:00:35.000Z	The rumor that I'm building a spaceship to get back to my home planet Mars is totally untrue	Make life multiplanetary
32	2015-05-27T03:57:09.000Z	Air Force certifies @SpaceX to compete for launching national security satellites http://t.co/tLYcEDJFPV	Entrusted by Airforce
33	2015-08-17T19:56:52.000Z	Article on @SpaceX and colonizing Mars by @waitbutwhy http://t.co/HhBJ48QSMW	Colonizing Mars
34	2015-09-12T19:07:49.000Z	Btw, not saying we *should* nuke Mars -- just layin' out a few options …	Geoengineer Mars to sustain life
35	2015-09-14T21:24:22.000Z	Researchers at @NASA propose using @SpaceX Falcon/Dragon for Mars sample return mission http://t.co/U6LNKyF4Jr	Entrusted by NASA
36	2015-10-09T05:29:18.000Z	Peak temp increases due to climate change http://t.co/dThGhXd6MT	Climate change is a real threat

37	2016-03-30T16:54:40.000Z	You can now buy cruise ship tickets for the Arctic passage. Seeing is believing. https://t.co/LhKupkNMFC	Climate change is a real threat
38	2016-04-27T16:43:15.000Z	Dragon 2 is designed to be able to land anywhere in the solar system. Red Dragon Mars mission is the first test flight.	(Reusable) interplanetary transport system
39	2016-05-19T18:22:44.000Z	Great image of ancient Mars https://t.co/iy3AngxKlq	Mars landscape
40	2016-06-04T08:08:58.000Z	Creating a neural lace is the thing that really matters for humanity to achieve symbiosis with machines	AI
41	2016-09-13T16:26:31.000Z	Scientists: Earth Endangered by New Strain of Fact-Resistant Humans https://t.co/ihmrY43rHa via @BorowitzReport	Climate change is a real threat
42	2016-09-18T01:57:07.000Z	Preview of the @SpaceX interplanetary transport system at @IAC2016 https://t.co/Rz4XmeAoRw	(Reusable) interplanetary transport system
43	2016-09-26T05:18:07.000Z	SpaceX propulsion just achieved first firing of the Raptor interplanetary transport engine https://t.co/vRleyJvBkx	(Reusable) interplanetary transport system
44	2016-09-27T17:55:27.000Z	Full Interplanetary Tranport System presentation in ~30 mins. Simulation preview: https://t.co/lKAxabzfKX	(Reusable) interplanetary transport system
45	2016-09-27T21:52:39.000Z	Good article on the interplanetary transport system	(Reusable) interplanetary transport system

		on Gizmodo https://t.co/nysjRDQWFz	
46	2016-09-27T22:44:36.000Z	A Million Humans Could Live on Mars By the 2060s https://t.co/d0nlk1xfOl via @NatGeo	Make life multiplanetary / Colonizing Mars
47	2017-01-25T00:43:16.000Z	Tillerson also said that “the risk of climate change does exist” and he believed “action should be taken"	Climate change is a real threat
48	2017-03-28T10:18:37.000Z	Here is the latest SpaceX travel ad for the flight around the moon & into deep space. Maybe needs a few edits ... https://t.co/mA8ZgutrbE	(Reusable) interplanetary transport system
49	2017-03-30T23:39:41.000Z	Incredibly proud of the SpaceX team for achieving this milestone in space! Next goal is reflight within 24 hours.	(Reusable) interplanetary transport system
50	2017-03-31T18:44:25.000Z	Considering trying to bring upper stage back on Falcon Heavy demo flight for full reusability. Odds of success low, but maybe worth a shot.	(Reusable) interplanetary transport system
51	2017-06-01T20:02:13.000Z	Am departing presidential councils. Climate change is real. Leaving Paris is not good for America or the world.	Climate change is a real threat
52	2017-06-04T04:49:56.000Z	It's starting to feel kinda normal to reuse rockets. Good. That's how it is for cars & airplanes and how it should be for rockets.	(Reusable) interplanetary transport system

53	2017-06-16T17:40:27.000Z	Mars V2 plan coming soon, which I think addresses the most fundamental flaw in V1: how to pay for development & operation of giant rockets https://t.co/yaITdVdpEc	Make life multiplanetary / Colonizing Mars
54	2017-06-17T03:10:27.000Z	Colonizing Mars (thanks Prof Hubbard for creating this from my talk). Major changes to the plan coming soon. https://t.co/s59qMHUj5O	Colonizing Mars
55	2017-07-13T23:02:52.000Z	Other orgs shd also develop reusable orbital rockets. If an airplane co had reusable airplanes, buying single use airplanes wd seem crazy. https://t.co/OJotlGmPHt	Reusable Rockets
56	2017-07-14T00:45:59.000Z	US Senate hearing on advancing the exploration and settlement of space https://t.co/z2lkDUdXKU	Make life multiplanetary
57	2017-08-03T18:27:26.000Z	Looking forward to launching @NASA astronauts to the International Space Station next year! https://t.co/qoLtTEP4L8	Entrusted by NASA
58	2017-08-29T08:45:36.000Z	Worth reading Life 3.0 by @Tegmark. AI will be the best or worst thing ever for humanity, so let’s get it right. https://t.co/lT0uMH3ujZ	AI

59	2017-09-14T09:00:21.000Z	Long road to reusabity of Falcon 9 primary boost stage…When upper stage & fairing also reusable, costs will drop by a factor >100. https://t.co/WyTAQ3T9EP	Reusable Rockets
60	2017-09-25T10:12:44.000Z	Presentation of @SpaceX Interplanetary Spaceship & Rocket design from 2016 https://t.co/3b1YWWmmxg	(Reusable) interplanetary transport system
61	2017-09-26T00:11:58.000Z	Simulation of how the SpaceX Interplanetary Spaceship and Rocket design would work. Will be… https://t.co/yWYDxtAKQP	(Reusable) interplanetary transport system
62	2017-09-29T03:03:32.000Z	Mars City Opposite of Earth. Dawn and dusk sky are blue on Mars and day sky is red. https://t.co/XHcZIdgqnb	Colonizing Mars / Mars landscape
63	2017-11-28T01:10:46.000Z	Mars sky is the opposite of Earth Blue sunrise and sunset Red during the day https://t.co/RjmSZ98bCz	Mars landscape
64	2017-12-02T02:22:01.000Z	Payload will be my midnight cherry Tesla Roadster playing Space Oddity. Destination is Mars orbit. Will be in deep space for a billion years or so if it doesn't blow up on ascent.	Space inspiration

65	2017-12-13T20:29:02.000Z	It is high time that humanity went beyond Earth. Should have a moon base by now and sent astronauts to Mars. The future needs to inspire. https://t.co/6HjDQnRSA5	Space inspiration / Make life multiplanetary / Colonizing Mars
66	2018-02-04T19:26:10.000Z	Pale blue dot https://t.co/KZj3I55EY1	Space inspiration
67	2018-02-05T18:24:10.000Z	Falcon Heavy sends a car to Mars https://t.co/Y7uBtU6Mt2	Space inspiration
68	2018-02-06T21:44:52.000Z	View from SpaceX Launch Control. Apparently, there is a car in orbit around Earth. https://t.co/QljN2VnL1O	Space inspiration
69	2018-02-06T22:40:38.000Z	Printed on the circuit board of a car in deep space https://t.co/8ZMJVUs4W1	Space inspiration
70	2018-02-07T22:01:02.000Z	Last pic of Starman in Roadster on its journey to Mars orbit and then the Asteroid Belt https://t.co/IWSjRyTr8V	Space inspiration
71	2018-02-22T15:56:32.000Z	First two Starlink demo satellites, called Tintin A & B, deployed and communicating to Earth stations https://t.co/TfI53wHEtz	Commercial satellite infrastructure

72	2018-03-11T00:19:50.000Z	Why Falcon Heavy & Starman? Life cannot just be about solving one sad problem after another. There need to be things that inspire you, that make you glad to wake up in the morning and be part of humanity. That is why we did it. We did for you. https://t.co/5STO7q4wro	Space inspiration
73	2018-04-06T04:55:21.000Z	Nothing will affect the future of humanity more than digital super-intelligence. Watch Chris Paine's new AI movie for free until Sunday night at https://t.co/WehHcZX7Qe	AI
74	2018-04-09T04:58:52.000Z	SpaceX main body tool for the BFR interplanetary spaceship https://t.co/WbTITI6WSu	(Reusable) interplanetary transport system
75	2018-06-15T15:35:54.000Z	My "pay" is in options, which only matter if stock goes up & I sell. Will use that to make life multiplanetary, help education & environment on Earth w my foundation. Just don't want us to be sad about the future. https://t.co/l3YEvjvyuz	Being excited about the future / Make life multiplanetary

76	2018-06-25T03:08:17.000Z	This is why we must preserve the light of consciousness by becoming a spacefaring civilization & extending life to other planets https://t.co/UDDP8I1zsS	Life on Earth is not safe (forever) / Make life multiplanetary / (Reusable) interplanetary transport system
77	2018-09-17T05:11:53.000Z	#OccupyMars	Colonizing Mars
78	2018-09-21T21:28:06.000Z	Mars Base Alpha https://t.co/O1llQp8rFY	Colonizing Mars
79	2018-10-05T07:35:59.000Z	Tesla owners can refer someone to buy a Tesla & get any image they want laser etched in glass & sent to deep space for millions of years https://t.co/GIkezD5GDA	Space inspiration
80	2018-10-12T18:03:45.000Z	Tesla exists to help reduce risk of catastrophic climate change, which affects all species on Earth. Even if your faith in humanity is faltering, this is worth caring about. Support makes a difference. Thank you.	Climate change is a real threat
81	2018-11-10T21:19:43.000Z	We know we'll run out of dead dinosaurs to mine for fuel & have to use sustainable energy eventually, so why not go renewable now & avoid increasing risk of climate catastrophe? Betting that science is wrong & oil companies are right is the	Climate change is a real threat / Shift to sustainable energy

		dumbest experiment in history by far … https://t.co/TvyuDBf3lR	
82	2018-12-11T13:47:41.000Z	Love that people are buying a Tesla for the product itself, even if they don't believe in climate change. Not everyone can be convinced about global warming, but if an electric car is simply the best product, they don't need to be. https://t.co/DGjMcbYGBj	Climate change is a real threat
83	2019-01-25T05:36:21.000Z	If test flight of 🐊 goes well next month, @NASA 👨‍🚀👩‍🚀 will 🚀 to @Space_Station this summer!	Entrusted by NASA
84	2019-01-31T20:56:47.000Z	Exciting to see all the new electric vehicles coming to market! We created Tesla to accelerate a sustainable future & it's happening! https://t.co/IqREiDqIyL	Tesla is accelerating sustainability
85	2019-02-27T20:43:51.000Z	Make the Mars Technocracy real	Colonizing Mars / No mandate over Mars colony
86	2019-04-29T11:26:17.000Z	Starship on the moon https://t.co/UGjDG8ofID	Space inspiration

87	2019-04-29T11:45:48.000Z	Starships on Mars https://t.co/AyKEO6ATiZ	Space inspiration
88	2019-05-16T01:26:39.000Z	Starlink mission will be heaviest @SpaceX payload ever at 18.5 tons. If all goes well, each launch of 60 satellites will generate more power than Space Station & deliver 1 terabit of bandwidth to Earth.	Commercial satellite infrastructure
89	2019-06-23T20:20:47.000Z	Accelerating Starship development to build the Martian Technocracy	Colonizing Mars / No mandate over Mars colony
90	2019-08-16T04:23:22.000Z	Nuke Mars!	Geoengineer Mars to sustain life
91	2019-08-18T21:26:26.000Z	Great name! Wouldn't worry about this particular one, but a big rock will hit Earth eventually & we currently have no defense. https://t.co/XhY8uoNNax	Life on Earth is not safe (forever)
92	2019-08-20T18:05:49.000Z	Might make sense to have thousands of solar reflector satellites 🛰 to warm Mars vs artificial suns (tbd)	Geoengineer Mars to sustain life
93	2019-08-24T21:15:05.000Z	If you're a utility or public utilities commission, please consider using the Tesla Megapack. Better for the environment & usually lower cost than fossil fuel	Tesla is accelerating sustainability

		peaker plants! https://t.co/Ls4IfB0d6a	
94	2019-09-22T15:59:44.000Z	Either way, sustainable energy wins!! https://t.co/13hB5hd2Hc	Shift to sustainable energy
95	2019-09-27T19:25:10.000Z	Starship will allow us to inhabit other worlds	Make life multiplanetary / (Reusable) interplanetary transport system / Reusable rockets
96	2019-10-22T06:03:33.000Z	Sending this tweet through space via Starlink satellite 	Commercial satellite infrastructure
97	2019-10-30T02:05:30.000Z	Soon, SpaceX will launch @NASA astronauts to @Space_Station! https://t.co/wAy5MNqnEI	Entrusted by NASA
98	2019-10-30T17:59:49.000Z	Thank for helping grow sustainable energy through solar! https://t.co/zH08AMhVMj	Shift to sustainable energy
99	2019-11-21T21:26:45.000Z	Tesla Cybertruck (pressurized edition) will be official truck of Mars	Colonizing Mars
100	2020-01-17T01:46:26.000Z	Megatons per year to orbit are needed for life to become multiplanetary	Make life multiplanetary / (Reusable) interplanetary transport system

101	2020-02-04T00:13:15.000Z	Going max hardcore on design/production Starship here in Boca. It’s awesome! Feels a bit like a Mars simulator.	Space inspiration
102	2020-02-05T06:10:51.000Z	Starship Concerto in Zero G https://t.co/gkn05I1bvZ	Space inspiration
103	2020-02-10T02:12:52.000Z	Mars is to Earth, as Terminus was to Trantor	Sci-Fi influence
104	2020-03-11T18:41:24.000Z	We should be excited about the future & striving to go beyond the horizon!	Being excited about the future
105	2020-04-17T17:54:52.000Z	Good progress, but 18 years to launch our first humans is a long time. Technology must advance faster or there will be no city on the red planet in our lifetime. https://t.co/IsICexqxtV https://t.co/uzSpZFFemI	Colonizing Mars
106	2020-06-21T07:03:08.000Z	Mars is my souldog	Self-description
107	2020-08-02T22:45:07.000Z	When space travel becomes as common as air travel, the future of civilization will be assured	Life on Earth is not safe (forever) / Make life multiplanetary
108	2020-11-12T15:34:36.000Z	4 Astronauts fly to @Space_Station on Sat night from Cape. First operational flight of Crew Dragon. https://t.co/uZCGiKciKb	Entrusted by NASA

109	2020-11-13T16:28:32.000Z	What is the general population (no knowledge of symptoms) accuracy of a sars-cov2 PCR test & is it possible to generate a false positive if you simply run enough cycles?	Covid-19
110	2020-12-09T23:08:53.000Z	Mars, here we come!!	Space inspiration / Colonizing Mars
111	2021-01-18T05:52:28.000Z	Battery cell production is the fundamental rate-limiter slowing down a sustainable energy future. Very important problem. https://t.co/MYOUSAC2AK	Shift to sustainable energy
112	2021-02-25T06:35:22.000Z	Starship to the moon https://t.co/tVMJbBk3BU	Space inspiration
113	2021-03-05T10:32:09.000Z	Cybervikings of Mars	Space inspiration
114	2021-03-25T07:48:53.000Z	Mars rover looking back https://t.co/oaFOCezRuU	Space inspiration / Mars landscape
115	2021-04-16T00:50:37.000Z	Make life multiplanetary! #Mars	Make life multiplanetary / Colonizing Mars
116	2021-04-17T04:46:34.000Z	If we make life multiplanetary, there may come a day when some plants & animals die out on Earth, but are still alive on Mars	Life on Earth is not safe (forever) / Make life multiplanetary / Colonizing Mars /

			Geoengineer Mars to sustain life
117	2021-05-06T19:26:09.000Z	Public support for life on Mars is critical to making it happen	Colonizing Mars / Public support for Mars
118	2021-05-09T22:41:43.000Z	SpaceX launching satellite Doge-1 to the moon next year – Mission paid for in Doge – 1st crypto in space – 1st meme in space To the moooooonnn!! https://t.co/xXfjGZVeUW	Space inspiration / Cryptocurrency and space
119	2021-06-30T20:11:10.000Z	Rapidly Reusable Rockets, R R R 🏴‍☠️	Reusable Rockets
120	2021-07-03T21:23:23.000Z	New SpaceX Starlink cover shows transfer orbit from Earth to Mars https://t.co/vwWeuhWCoP	Space inspiration
121	2021-07-13T03:05:20.000Z	those who attack space maybe don't realize that space represents hope for so many people	Space inspiration
122	2021-07-27T01:02:58.000Z	Population collapse is potentially the greatest risk to the future of civilization https://t.co/VVN8kElTlS	Population collapse is a real threat

123	2021-09-17T18:12:05.000Z	Please add your voice to the public comments. Support is greatly appreciated! Humanity’s future on the moon, Mars & beyond depends upon it. Thanks, Elon https://t.co/5K6Wda57EP	Public support for Mars
124	2021-12-10T17:29:40.000Z	Wow, only three weeks to 2022! What will 2032 will be like? Seems so futuristic! Will we be on Mars?	Space inspiration
125	2021-12-10T17:52:37.000Z	Mars & Cars	Space inspiration
126	2021-12-20T01:24:29.000Z	Given the almost unimaginable nature of the present, what will the future be? https://t.co/b2Yw0AXGVA	Being excited about the future
127	2021-12-24T21:32:25.000Z	Interesting https://t.co/548FHpnnxU	Population collapse is a real threat
128	2022-01-18T17:02:24.000Z	We should be much more worried about population collapse	Population collapse is a real threat
129	2022-01-19T02:51:53.000Z	Believe in the future!	Being excited about the future
130	2022-01-29T11:21:38.000Z	Lie back and think of Mars	Space inspiration
131	2022-02-15T02:27:54.000Z	Starship to Mars simulation https://t.co/fkpYvv5pMR	Space inspiration /

			Public support for Mars
132	2022-03-30T01:43:14.000Z	Sustainable energy generation from sun & wind is making great progress! https://t.co/hL6gp6SVQX	Shift to sustainable energy / Solar power is the future
133	2022-04-03T04:50:49.000Z	Humanity did not evolve to mourn the unborn	Population collapse is a real threat
134	2022-05-20T03:28:32.000Z	The attacks against me should be viewed through a political lens – this is their standard (despicable) playbook – but nothing will deter me from fighting for a good future and your right to free speech	Being excited about the future / Self-description
135	2022-05-24T13:51:07.000Z	USA birth rate has been below min sustainable levels for ~50 years https://t.co/v5PSLbvEAE	Population collapse is a real threat
136	2022-05-24T20:13:10.000Z	Population collapse is the biggest threat to civilization https://t.co/ZrHN5DsrVB	Population collapse is a real threat
137	2022-06-05T11:29:45.000Z	Making life multiplanetary expands the scope & scale of consciousness. It also enables us to backup the biosphere, protecting all life as we know it from a calamity on Earth. Humanity is life's steward, as	Make life multiplanetary / Colonizing Mars / Geoengineer Mars to sustain life / Public support for Mars

		no other species can transport life to Mars. We can't let them down.	
138	2022-06-05T11:39:30.000Z	Some hate humanity, but I love humanity so much	Philantrophist
139	2022-07-06T10:58:50.000Z	Humanity will reach Mars in your lifetime	Space inspiration / Colonizing Mars
140	2022-07-07T14:04:41.000Z	Doing my best to help the underpopulation crisis. A collapsing birth rate is the biggest danger civilization faces by far.	Population collapse is a real threat
141	2022-07-07T14:17:45.000Z	Population of Mars is still zero people!	Colonizing Mars / Public support for Mars
142	2022-07-15T12:21:05.000Z	Mars may be a fixer upper of a planet, but it has great potential!	Public support for Mars
143	2022-07-15T12:55:42.000Z	Tesla is to protect life on Earth, SpaceX to extend life beyond.	Make life multiplanetary
144	2022-07-27T15:38:48.000Z	A new philosophy of the future is needed. I believe it should be curiosity about the Universe – expand humanity to become a	Space inspiration / Make life multiplanetary

		multiplanet, then interstellar, species to see what's out there.	
145	2022-07-29T14:46:31.000Z	I can't say for sure that Starship will reach escape velocity, but my hubris certainly has	Self-description
146	2022-08-12T05:08:20.000Z	This will be Mars one day https://t.co/nf4hML8dKx	Space inspiration / Colonizing Mars
147	2022-08-26T04:27:02.000Z	Population collapse due to low birth rates is a much bigger risk to civilization than global warming	Population collapse is a real threat
148	2022-08-26T22:27:59.000Z	Countries should be increasing nuclear power generation! It is insane from a national security standpoint & bad for the environment to shut them down.	Increasing nuclear power generation
149	2022-08-28T23:51:49.000Z	This will happen again – just a matter of time https://t.co/HeyZhZbAih	Life on Earth is not safe (forever)
150	2022-11-29T23:31:45.000Z	A little more progress to Mars https://t.co/TUjECUHaQ3	Colonizing Mars
151	2022-12-05T07:48:11.000Z	Starship takes beings of Earth to Mars https://t.co/6qaIc3p4yA	Colonizing Mars

Appendix 2: Pro-coalition quote tweets.

Username	**Quote tweet text**	**Follower count**	**Like count**
Int_Machines	We knew @ElonMusk was taking #Dogecoin to the Moon, but had no idea it would be on our flight. - First Commercial Lander to the Moon	7866	457
OVRtheReality	🌎 Projections show that humans will be interacting seamlessly with a spatial layer over planet earth and; reality as we know it today will be truly augmented, just how Hollywood movies have shown us. This will take place on the #OVRmetaverse. We can do that on Mars, too! #AR #OVR	54276	61
CryptoGodJohn	Wtf Elon $DOGE is really going to the moon	445490	410
berner415	If that's the case , I have collected the best cannabis and industrial hemp genetics 🧬 and would love to provide those to you and the team . We are gonna need good hemp on mars and humans need cannabis .	325978	532
MarsEcosystem	So, in these three weeks, we will launch a #GameFi platform and an innovative #YieldAggregator. The IHOs of both projects will be held on #Mars, and $XMS will be accepted. 🔥🔥🔥All XMS raised from these IHOs will be BURNT.	158534	344

	See you guys on Mars. #Bsctomars #MarsEcosystem		
kingspeed_io	Is Elon Musk talking about CARS? Because Kingspeed is having several futuristic NFTs cars with numerous extreme weathers, just like Mars. KSC - TO THE MARS. Join now at:	107982	79
sandeepssrin	Reading Elon's tweets clarifies your purpose in the universe. Why am I taking a fucking vacation when instead I can help a billion people *afford* interplanetary travel. #InterplanetaryCredit @RedCarpetUp Back to work.	5593	3
HoffaJay	Next we need some satellites for @YourSpacePage so we can send the first stellar social media site to space, connecting the people on Mars and; the moon with the people on earth... #AnInterstellarNetwork #LetsMakeLifeMultiPlanetary	923	1
paulwoods	Earth's first interplanetary integrated marketing campaign?	1890	0

Investor4Space	Agreed 100% and hopefully we achieve this milestone of being a multiplanetary species in our lifetime 🚀	65	0
trylolli	Bitcoiners will be the biggest funders and supporters of life on Mars thus bitcoin will inevitably be the interplanetary currency of the future	61909	97
BigImpactHumans	Let's keep in mind how incredible this is and remember to discuss it with family, friends and coworkers/colleagues! This mission will demonstrate the application of cryptocurrency beyond Earth orbit and set the foundation for interplanetary commerce! #Dogecoin	55492	43
LughStablecoin	Will the multi-planetary civilization use #stablecoins on Mars for cross-border payments with Earth? 🌎	1245	11
AmyDashTV	Plus digital currency will easily transfer to the multi-planetary economy.	48640	8
Mendiballs	Make life multiplanetary! #doge	135	3
xrplebroccoli	If life is multiplanetary, you'd probably need an intergalactic currency right? (Cough, cough #XRP)😏 @elonmusk @digitalassetbuy	4830	1
NotChrisPool	Whoever builds the first off-planet base, gets to decide the inter-planetary currency.	2711	3
PLANETART053	The first crypto in space, the first meme in space, and it's paid for in DogeCoin! "This mission will demonstrate the application of cryptocurrency beyond Earth orbit and set the foundation for interplanetary	1795	0

	commerce," said SpaceX Vice President of Commercial Sales Tom Ochinero		
yasik	$DOGE - the first interstellar/multi-planetary currency	855	0
EskimoTrader	#Doge and; #Safemoon will be multi-planetary currencies. Who else??	78	0
Hninoo13428936	#DOGE multiplanetary currency.. 🚀🚀🚀 Every body must own it.	37	0
dmitrij86	Let's make DOGE an interplanetary currency? Nobody believed in TESLA either, and where is Tesla now? DOGE next? Why not?	2	0
Baosy858	Make #doge the multiplanetary currency @elonmusk	16	0
laurenboebert	Just keep the lunatic liberals out of space or they'll turn it into a massive dump like they've done with inner cities in America.	2303234	277
ArnoldPoernomo	Moon time!	2220507	206
Rainmaker1973	A recap of Starship's mission to Mars [read more:	1037769	493
AlbertEinstein	The future of space exploration is here. Just...wow. #SpaceX	650490	45
heydave7	Congrats @spacex and @elonmusk on successful high-altitude test of Starship!	310809	260
PeterDiamandis	The probability of Elon putting Humans on Mars by 2024? Just went up A LOT!	200923	263
LeilaniMunter	So cool. I'm in! RT if you'd join me on first @SpaceX rocket ship to Mars! The only thing I'd sell my Tesla for is a ticket to Mars.	53861	29

ThePradeepRawat	Dear @elonmusk Bhai🙏 Waiting for your Space X Rockets from Mars! Upper fix, Lower Fix,. please send them for Our #NEETUG2022 #NEETUG Aspirants🌱 They will treat your indecisiveness of buying/not buying @Twitter for free for life as Docs! Apka 👽 Bhai From surface of Mars👽🤖	15942	170
MarsEcosystem	Lie back and think of @MarsEcosystem. Let's travel to Mars together! @elonmusk! #marsecosystem #DeFi	158534	213
Safemartians	Lie back and think of SafeMars #safemars #BSC	145363	452
kinganiii	bro elon’s gonna play astroneer but irl. who’s the real gamer now	138372	1607
MarcusHouse	Mars here we come indeed. What an incredible day! Congrats @SpaceX / @elonmusk! VICTORY! 😍	109025	584
iamparis007	I love reading stuff like this! Now, this is innovative and something no one has ever thought of besides Elon Musk. I believe in you.	107421	0
Teslaconomics	Wow.. can’t stop thinking about SpaceX and going to mars one day.. 👀	100121	130

Teslaconomics	Wow, the image of Starship taking beings of Earth to Mars is profound. #SpaceX	100088	67
MrNobre	This is a real thing that exists. There's a billionaire making *interplanetary* spaceships out there Yeah I know that fawning over Musk is normie-tier shit by now. Still. Spaceships.	21822	8
zebulgar	No we should be getting the megatons from asteroids, not from Earth. Rockets should only be transporting humans as soon as possible, way before we start thinking about being multiplanetary. Focus on the root cause. Gravity wells are tough to get out of.	124043	45
austinbarnard45	When we go to Mars, it won't be just humans who go there but life itself. We'll be bringing along side us a fragile piece of the planets bio-sphere, we are mother Earth's children and we will fertilize as many other worlds with the light of life as far as we can reach.🚀🌱	469833	312
TirthaChakraba2	Becoming multi-planet is the preparation for an eventual global apocalypse that we may not be able to stop. All the species who share this planet with us deserve a chance and we need to help them. With great power (intelligence) comes great responsibility.	918	3

realbobbyd_	Mankind - uniquely made in the image and likeness of God - was commissioned to steward over every living thing of the Earth. Making life multiplanetary is an extension and obligation of that birthright. Ad Astra 🚀✨	24	0
JaneidyEve	Agree. If more people saw life from a cosmic perspective they would come to the realization that Earth is a treasure in the Universe because life is rare. We all have the responsibility to respect eachotherand;preserve the long-term survival of all species by becoming multiplanetary	24116	25
DavidSantoro1	We must go multiplanetary:	7747	4
TristanLaurent	Must read to understand why transitioning from single-planet species to multiplanet species is vital to our survival	383	1
ilariacapua	In the meantime, let 's take care of what we have on #PlanetEarth #CircularHealth #CircularEconomy	123634	102
cognazor	Maybe start with regenerating the earth, you know, training wheels?	20353	97
RobInTheBlack	How about this, fix earth first, then move on!	61075	65
Aryan_warlord	#truestory The future of #Humanity as a species needs to be multi-planetary to secure us from cataclysmic threats	18431	14
DavidSantoro1	Becoming a multiplanetary spieces is our *only* hope to survive in the long, long term.	7747	13

TheDogeBird	If we do not make life multiplanetary, everything we have ever done as the human race will eventually be erased, and everything will have been for nothing.	2491	2
PPathole	Mankind was born on Earth. It was never meant to die here.	199119	142
bearmace	The sun is guaranteed by the laws of thermodynamics to eventually burn out- interplanetary and; interstellar transplantation of all life on earth is the only way forward. This would've excited ppl decades ago but now QTs replies are mostly snark and; ridicule.	1913	1
DannyAllenUK	No truer words. We need to become multi-planetary, Multi Galactic to ensure the human race endures. That is if we want it to. Human race is probably one of the worst life forms to have evolved.	18414	1
Ayers111	We need to become the Multiplanetary Generation.	1645	0
mechack_kainda	We will have a sustainable civilization on Mars, Europa and Titan by 2050 if we keep progressing at the same speed we've been on for the past few years. Multi-planetary civilizations is the only way for humanity to survive	752	0
AsguardiansX	Then it will be tagged as how humans got wiped out by an asteroid except if we become multiplanetery in this decade	421	0

CommanderRising	If we we're to make humans multi-planetary, it virtually guarantees our existence. If you were to bring along the rest of the animal kingdom, along with plant life, their fate would be secured like ours. Dogs, cats, rabbits, deer, running around on Mars... 👍🏻🚀	377	0
Timbonacci702	Let's do this @elonmusk, our window for becoming an interplanetary and interstellar species is SMALL. We must do this to survive. Nothing will EVER be better than Earth, but it's time.	261	0
GFXGarage	There isn't an economist on the planet that would agree with putting all of our eggs in one basket. Multiplanetary existence would increase our chances of survival... if we do it well. Singular points of failure are very risky.	173	0
Lebowski309	Earth is the cradle, of humanity. IF, we are to survive an extinction event, we must become an interplanetary species. Elon Musk.	172	0
DasLalit	We need to differentiate between making life interplanetary and making man interplanetary.	90	0
sirhankus	I fully concur with Elon Musk in that we as a civilization should become multiplanet species. It's something I've always thought as a kid. I mean why put all our eggs in one basket ?	15	0
Anuj1_618	Until we find life outside let's understand the importance of this impossible lightning spark that took place on earth and; why we need to	8	0

	be a space civilisation. #MultiPlanetaryLifeForm		
Khoi_HLM	Space exploration opens a new chapter for human kind to aim for further tech-advancements and preserve the existance of human by making us multiplanetary species	0	0
cz_binance	Who owns the land on Mars? Can Elon sell them? using blockchain? Would really make him the richest guy in the universe, for a long time to come. 😆	8194190	2579
mymangenghis	A #SAFEMARS is our future. Let's talk about how we can make it happen @elonmusk, we @Safemartians see your vision! WHAT NOW IMPERATOR? (GET THAT #TESLA BOYS)	1431	20
PeterMcCormack	Yep, in the next two decades you might get 3 people to Mars and it would be an amazing technical achievement. Right now #bitcoin can help 8 billion people, half living under authoritarianism… it represents hope to them yet you attack it.	511900	3788
FRONZ1LLA	I can't wait to watch this, you're my hero. One of the only people on earth that isn't afraid to think BIG 👌🏽	175687	78
robert_zubrin	Making life Multiplanetary expands humanity's power; both to better itself and to protect the Earth. Together to Mars, then together with Mars, we will improve the universe.	18368	117
Erdayastronaut	Well, if there hasn't been a good reason to use me as a referral for your @Tesla	1509885	110

	purchase... here's a the reason!!! Looks like I can send a picture of me vacuuming a vacuum into the vacuum of space!		
vijayshekhar	Growth hacker. For selling cars.	590814	117
manukumarjain	That's what I love about @elonmusk. Whoever thought of sending a Tesla up in space? Epic! 🙏 Massive #Respect	523558	240
GerberKawasaki	This could be the coolest thing I've seen, ever. #TeslaRoadster in space. #FalconHeavy #LaunchDay Just amazing Elon Musk. Blowing my mind today. #Tesla $tsla	313092	27
Laurie_Garrett	Son of a gun, @elonmusk did it -- SpaceX launched a #Tesla into space with a car dummy on board. Now orbiting.	245654	8
pdouglasweather	Why I'm optimistic for the future - there is now a Tesla orbiting the Earth	28245	50
md21_racing	This is pretty cool @elonmusk !! I'm busy racing planes at @Redbullairrace , otherwise I would come and fly Teslas through space for you 😊😜 #respect	4492	31
Kristennetten	If you landed a Tesla referral, October 5 – December 10, 2018, your picture might have made it to space if you submitted one ☝	105150	33
humeirabadsha	"It's kind of silly and fun, but silly and fun things are important "Elon Musk on putting a mannequin called Starman seated in a Tesla into the Mars orbit. #FalconHeavy #humansonmars	1279	21
ajabdullah_	Tesla cars are out of this world	3907	17
Cornubot	World's fastest car is a Tesla Roadster.	68703	17

JesperParnevik	Some politicians in Sweden hate cars and air travel. Their blood pressure most have SKYROCKETED...(pun intended...🤓) #spacexlaunch #carinspace #Tesla	33746	33
RubinaKharel	Not in my wildest dreams had I imagined a car orbiting Earth, but here it is. Waiting for Elon to take off his mask and; announce he's an alien from Mars trapped on Earth doing all this to get back home. What a ride! #TeslaRoadster #FalconHeavy	4037	9
manukumarjain	That's what I love about @elonmusk. Whoever thought of sending a Tesla up in space? Epic! 🙏 Massive #Respect	523558	240
hblodget	In case there was any doubt, it is now official. Elon is now the most amazing human on Earth.	144923	50
AlbertEinstein	Nice work, @elonmusk! #ToInfinityAndBeyond	650525	127
vsikka	Here's to an amazing engineering achievement, an extraordinary achievement of imagination and conviction and entrepreneurship, but most of all an achievement that lifts us all, moves us all forward, and makes all our spirits soar. Thank you and congratulations @elonmusk	239047	148
FutureJurvetson	Cybertruck unveil live webcast starts at 8pm PST, details to come at @Tesla. P.S. only electric vehicles have driven on other worlds, and most likely, they only will. It's time to ice the ICE.	54802	105

MetaCarsNFT	$CARS TO MARS🚀	24956	100
TimSweeneyEpic	Stay healthy and we'll live to see it, as our grandfathers lived to see Moon landings.	209004	296
vincent13031925	SpaceX will make it affordable.	199488	238
elarryjay	How much is rent over there, am tired of this earth 🌑	4374	29
DirghShah	#OccupyMars Motivation: It came to my mind that if I go to Mars and procreate, my son/daughter would be a Martian. How cool would that be!!! (will he/she have a martian interplanetary passport) @elonmusk @SpaceX	103	7
arichie_rich	With today's successful landing, SpaceX, rightfully took humanity's first step towards being interplanetary. "That's one small step for man, one gaint hop for mankind." We're going to Mars! To explore. To learn. To grow. Most importantly to stay.	190	1
American4sure	Yes, I support a multi-planetary human civilization.	9513	4
Jennerator211	Fix that landing and I'm in! 😄 Congrats @elonmusk and @SpaceX That was one of the coolest things I've ever watched! You are well on your way to interplanetary travel!	2053	15
letiziadavoli	#Starship. Can't wait. 🚀 #makinglifemultiplanetary	7118	3
blaw737	Make life multiplanetary!	285	2
MarcusHouse	You do have a knack for turning dreams into reality @elonmusk. We are behind any idea	109017	2

	that will make us a multi-planet species. Good Luck!		
BeastGamerMan	I don’t know why but the logistics of humanity going interplanetary gets me excited.	1825	1
karenbuch	Are we, as a Universe, ready for Interplanetary Transport? @SpaceX and; @elonmusk think so. Watch this amazing simulation; peek into the future	3190	1
roberth2309	Interplanetary civilization. I can't wait.	62	1
synergyscott	Glad to see and participate in the sustainable energy and environment advancements... looking forward to the multiplanetary part! Hopefully within my lifetime.	135	1
0stevenrobb0	I got goosebumps watching this! I can't wait for the next generation of interplanetary dreamers inspired by this to reach further out into the stars. Thank you @elonmusk and @SpaceX	394	0
shashankjaitely	I love this guy. He had me at multiplanetary life...	1181	0
meesumzafar	Can’t wait to see human on Mars and a working interplanetary transport network	1105	0
JavierInchausti	I fully support life on Mars and making humans multiplanetary!	298	0
Cipher2K	The launch gave me chills. What a time to be alive! Thank you to @elonmusk and; @SpaceX for what they are accomplishing.. Making great strides in hopes of making Humans, an interplanetary species. Keep up the great work! #Proud #SpaceX #Science #MuskForEarthPresident	250	0

imnotintegrated	"Why do you want to live? What's the point? What inspires you? What do you love about the future? If the future does not include being out there among the stars and being a multi-planet species, I find that incredibly depressing."	155	0
HuhWhoWuzThat	I'm obsessed with space at the moment. It's amazing how little we truly are and how focused on retarded shit we are. Imagine humanity would all work together the achievements we could accomplish. It's so hopeful seeing shit about going multiplanetary.	86	0
nickytokyo2021	Given what is happening on Earth now, I believe your space exploration projects, including the migration of Mars and; a multiplanetary species, will be of great help to mankind. :) Elon, keep up the good work ! 💪♡🚀	46	0
iamhotak	Humanity has always wished to see #evolution in action rather than theory. Post earth human multiplanetary migration will be one phenomenon in the evolution of man that will give us a chance to experience evolution in action far more significantly than 'Out of Africa' period.	207	5

waitbutwhy	The five greatest leaps for Earth life might be: 1. First life 2. Simple cell > complex cell 3. Single cell > multicellular organisms 4. Ocean > land 5. One planet > multiplanetary Only a few great leaps in 3.7 billion years and we get to witness it.	751855	2264
RaveenaKarn	Multi-planetary life is vision. Life is all about diversity.	44	1
thebbq100	It amazes me how the human race is advancing and quickly becoming a multi-planet species. The future is near!	141	0
kunal_rajan	The only person on Earth working relentlessly to make like multiplanetary! Can't wait for the day humans land on #Mars 🚀	4148	7
AbbasGuennoun	Maybe the dream will come true : Making humans a multi-planetary species. Nothing is impossible with #ElonMusk, thank you...	33	1
RealMiamiEstate	Though I dont share the urgency of this goal, I do think its exciting to know that thanks to you, we may actually become interplanetary species Hope u r one day able to dream up and; build d same propulsion system UFOs or The Enterprise display and; name that 1st manned vessel after it	5628	0
omuthes	The entire world is proud of you! Step towards realizing multiplanetary humans	286	0

TheWordCoin	#Starship is the key to making life multiplanetary and; protecting the light of consciousness to the $STARS. @elonmusk	778	4
AhraniLogan	Wow. This is the kind of workplace that we have only ever seen before in movies. Until Now..#SpaceX #InterplanetaryTravel #Future @elonmusk	14411	10
CarterKoWang	The fundamental goal of @Tesla is to accelerate the advent of sustainable energy on Earth. The fundamental goal of @SpaceX is to enable humanity to become a multi-planetary species. These are two of the most ambitious companies on Earth. We should be rooting for them!	364	3
iamdeepaklenka	We support and appreciate all your hard work @SpaceX @elonmusk . The starship is designed to carry passengers and cargo to destinations including low earth orbit,the moon,mars and beyond. STARSHIP IS HPOE.Making Humans a multiplanetary species. #Starship #starshipishope	12	1
RichardGarriott	I know @elonmusk I know many of the staff @SpaceXBocaChica I know the care and hard work they are putting in to be good stewards of the local area. The environment and the local citizens have and will continue to greatly benefit from this inspiring and caring neighbor.	49747	1469

kimbal	Welcome to the future everyone! @spacex rocks. Go bro 🤠🚀	320643	1317
ProfBrianCox	This is great. The payload on the first test flight of the Falcon Heavy will be a Tesla playing Space Oddity :-)	3068508	896
JohnnaCrider1	I sent an email. SpaceX deserves the support of the American government.	79617	841
Sci_Phile	One of the coolest sentences I've ever read.	145104	120
Robertsmania	Starting now! SpaceX - Making Humans a Multiplanetary Species. Yes please.	1485	2
adammharvey	I genuinely never thought I'd see the words 'interplanetary' and; 'engine' in the same sentence during my lifetime... #toboldlygo	680	0
SpaceY_UK	Every creature, every ecosystem and every beach is unique and precious. But there are thousands of beaches, millions of ecosystems and billions of creatures. There's only one Starbase. We must support @elonmusk and @SpaceX as they lead humanity to becoming a multi-planet species.	576	0
goldflakes_	Honestly as a space camp attending, sci fi loving, stargazing human. I agree… and no cap I think @SpaceX will be the one to take us to our next planet and; beyond #interplanetaryspecies#anotherlife#intergalactic	341	0
Space_Centric	Let them fly! #Starship has inspired many during it's testing campaign. I understand the environmental issues but SpaceX will work with the locals to help keep it safe while also keeping the multi-planetary dream alive.	19	0

biodunawosusi	Yes! From conquering our global village to a visionary march to facilitate a multiplanet human species. Space technology could be one of the pillars of a 21st century Noah's Boat to preserve human civilization.	2375	0
BadMaryBand	I'm in favor of anything called the Raptor interplanetary transport engine!	92609	7
robertoblake	To advance innovation and ultimately save the human race by becoming an interplanetary species we need to elevate the baseline and monetize everyone's talents and contributions. Thus requires massive reforms in education and ideas like #UBI to advance civilization.	77800	7
ElysseKlaus	I couldn't agree more with Elon. #ElonMusk #Universe #ExpandHumanity #Humans #MultiPlanets #InterstellarSpecies #Explore #CuriousityAndRisk #SeeWhatIsOutThere #SpeedTheProcess #ItIsPossible	3069	0
sallyear	"A new philosophy of the future is needed," he insisted. "I believe it should be curiosity about the Universe – expand humanity to become a multiplanet, then interstellar, species to see what's out there." @elonmusk #FuturePerfect	1074	0
lichrist	This will prove to be one of the best photos of the year if not decade. Thank you Elon! I shared your interplanetary flight video with my elementary students today. I was	82	0

	reminded of my own experience watching the Apollo missions in the same room as they were sitting in.		
DrSallyL	We must do this ASAP. The longer we go as a single-planetary species, the closer we are to the end of the only known way the universe can understand itself. Make life multiplanetary! #Mars	502	6
RogaSocial	Let's not get lazy and take our eyes off the fact that we've likely only got about 5 billions years left on the sun, as well. Multiplanetary is great...multisolar would be even better.	78	0
JohnnaCrider1	Love what Elon Musk is doing with his money. Make life multi-planetary Help education Help the Earth and the environment. His foundation has helped a lot.	79613	149
martinvars	I want @elonmusk to succeed at what made him the best entrepreneur in the world: Tesla and Space X. This is why I am against him taking huge personal loans and overpaying for hard to manage Twitter. No politics, just business sense.	131949	37
MonicaCrowley	Never give in, @ElonMusk. Never.	869244	5312
KurtSchlichter	I respect @elonmusk's potency most of all.	465664	254

ZacharyMoses	We need a Space Port in Utah. We have a booming population full of kids fascinated by space. I am still that kid, when it comes to space. Thank you @elonmusk for kicking off an interplanetary space race. #PioneersOfTheFuture #ZacharyMoses2020	373	0
ceo_kowood	Amazing Elon Musk @elonmusk Just amazing. Working on a concept for an interplanetary orbiting launch and; land system between Earth and; Mars.	154	0
Imfromldotadot_	At a loss for words. 😨 Interplanetary travel brought to you by Mr. Musk is a reality.	136	0
YoungCosmonaut	Homie is just trying to have the world run on clean energy and make humans a multiplanetary species and he gets so much shit?? People are dumb	47	0
SuvigyaPandey	TRUE and I really don't understand why people are opposing the advancement that @elonmusk is working towards to make humans a multiplanetary species. If likes of Elon and Jeff etc. remove poverty from earth then what will the elected representatives of the countries do???	3	0
Kristennetten	My heart ❤️ is to leave the earth better than we found it — Elon, Tesla etc trying to do just this. Looking forward to the XPrize projects making a difference with carbon sequestration 🌎	105147	77
Goldfiinger77	This is why the Tesla family will always have Elon’s back.	1114	31

MikeSWarner	Straight up say what you want about Elon, but he's making a difference more than 99.99% of the population. Solar Energy, Underground Transportation, automated and sustainable energy cars, and the potential to leave Earth/become interstellar. Foh with the hate	369	18
WarriorGiraffe	Real life super hero. Go Elon!	1191	130
MayurBichewar	And because of the peoples like you I feel great to be the part of humanity. Being curious out because we are soon becoming a multiplanetory species. Let's together increase the scope and scale of consciousness.	90	2
joshgad	Thank you for taking us into the future. You have taken over where the greats have left off from Edison to Jobs to Tesla.	662194	38
teslaownersSV	A true visionary who was focused on the end goal and not distracted by the noise of doubt. Proud of @elonmusk and the @Tesla team for defining excellence in pursuing a sustainable future.	667814	38
RyanTedder	Dude u are a modern Edison/Ford. Keep inventing the future it's fun to watch	69591	485
daelmor	After investing half the $ from PayPal into Tesla and; SpaceX, nearly losing it all, investing the rest, getting divorced, coming close to a nervous breakdown, and; dealing w critics, I wonder if @elonmusk would do it all again had he known how hard it would be. My guess is hell yeah😊	11769	14
WestworldHBO	Live without limits, @SpaceX. #KilterFilms @ElonMusk	285282	149

PadhyeAnish	Making life multi-planetary is ubiquitous to @SpaceX As @elonmusk said it, multi-planetary existence is unfathomable to common man. But if mankind trusts the ingenuity of visionaries like Mr. Musk then it can comprehend the possibility of catastrophes Earth poses to its dwellers	72	1
joaoar	Elon Musk presents a visionary interplanetary transport system. Always pushing the barriers... Worth watching!! #ElonMusk #spacex	774	0
BrandonKelleyFL	With a name like @elonmusk, you're almost obligated to discover a way to send humans interplanetary. With great anthroponymics comes great responsibility.	159	0
AxisMundi2022	I can see us as multiplanetary beings it makes sense and would be awesome if we could explore the stars nu in our lifetime. Exciting stuff Elon!	319	3
hardmaru	Making Humans a Multi-Planetary Species. 🚀	190780	18
bwelks_	We will be an interplanetary species in our lifetime.	536	3
iamthedevilsec	Gives me chills when Elon says "Earth", referring to it as another place that some of us may not be in the near future. The multiplanetary dream is so exciting.	2043	2
johnhering	Another step closer to humanity becoming an interplanetary species.	40357	2
VanellixLuck	Just love to be an interplanetary humanity! @elonmusk #Mars #metaverse #cryptocurrency	55	1

8heartsandroses	And that will be AWESOME. 😎 #MultiPlanetaryCivilization	251	0
dorait	Making Humans a Multi-Planetary Species - love that vision.	10862	0
AllenSaakyan	Make Consciousness Multi-Planetary #MCMP @elonmusk	4161	0
JoaoPacheco91	Humanity on route to becoming a multi-planetary species! Thank you @elonmusk and everyone at @SpaceX! #SpaceX #SN8	992	0
Positive_wal	Let's make it. Oh I'm so excited to witness humans being interplanetary species. Hope I'll be alive when this happens	307	0
tylertzero	I cannot wait to be an interplanetary species.	282	0
alexsiletsky	This man is single-handedly making humans a multi-planetary species; we're observing history in the making - what a time to be alive!	389	0
ItsVenusBlake	Multi-Planetary Human Species here we come! Go Elon! 🛸 #AliensUnite #ElonMusk #Mars	2577	13
JC_finance	Buying starlink is funding the advancement in making life multiplanetary @elonmusk #SpaceX	2649	3
MilMileBattery	By supporting Starlink, you are supporting making life multi-planetary 👍🏽	6863	12
johnsavage_eth	Total spending on multi-planetary civilisation expansion should be at least 5% for every country.	16390	3

	#elonmusk @elonmusk #mars #planet @SpaceX		
PstafarianPrice	I'm becoming increasingly convinced that there are only two truly worthwhile pursuits in life: 1. Contributing to humanity becoming interplanetary 2. Having children, who have the potential to contribute to making humanity interplanetary	6651	3
medray529	Personally, I plan to make this one of my life's main objectives. We must become multiplanetary in order to improve the likelihood of our species surviving in the long run.	1031	0
SvegotMagnus	A collapse of white civilization due to low birthrates will end the dream of humanity as a multiplanetary species. An honest look at history will show this beyond a doubt. Get woke = stay earthbound and regress.	5295	3
Elen_Beliy	We need to rush this process before our globalists decrease our planet’s population size drastically along with destroying our nature😑 #population #humans #planetmars #multiplanetary #earth #operationmars	102	1
Joydeb87778387	The world’s population is set to decline starting in the next few decades. This is deeply concerning. To make life multiplanetary and to build a self sustaining city on Mars we'll need humans. But if this trend continues, it'll le impact on humanity.	25	1

alariclabrie	If humanity doesn't become a multi-planetary species soon we will face an extinction level event eventually. To become a MP species we need more people not less. Elon, once again, has a point. This thread is filled with "what about the environment" people in the replies.	1545	0
LesegoMooketsi_	More population for multi-planetary 💪🌍🌓🪐	1651	0
ndcrypto256	Mankind will be interplanetary so say NO to birth control methods we need to fill Mars 🤩 GOD feeds more than 8Billion people everyday.	139	0
C0RRECT1ON	It will happen within three lifetimes. Put economics, engineering and science to work to make families more desirable and childbirth safer. Otherwise, kiss interplanetary ambitions goodbye.	76	0
BharatKaravadra	Increasing the level of consciousness of individuals helps increase the momentum to becoming multiplanetry beings. ...the first line of @elonmusk's tweet also works the other way around.	16	0
subhaBhowmik15	The world's population is set to decline starting in the next few decades. This is deeply concerning. To make life multiplanetary and to build a self sustaining city on Mars we'll need humans. But if this trend continues, it'll leave a serious impact on humanity.	12	0

TeslaGoesPlaid	Making life multi-planetary will open up whole new areas of innovation, technology and sustainability. We'll all benefit, no matter which planet we live on! #Mars	4902	3
cjdell	Need more people with this attitude. Humanity must become multiplanetary or face extinction. The technological breakthroughs required to achieve this will also massively improve the quality of life on Earth (and create new industries). So much tech came from the Apollo program.	700	0
TirthaChakraba2	Becoming multi-planet is the preparation for an eventual global apocalypse that we may not be able to stop. All the species who share this planet with us deserve a chance and we need to help them. With great power (intelligence) comes great responsibility.	918	3
DeviationBro	Thank you Elon for making dreams a reality. From Green tech to neural tech, the work you do is truly humanity first. Becoming multiplanetary is more important than all others as the tech achievements made will improve humanity and this planet more than anything else we could do.	491	0
radicalbytes	A new life awaits you in the off-world colonies, a chance to begin again in a golden land of opportunity and adventure.	15602	140

dnahinga	This thread has all the arguments and counter-arguments for going to space. But lemme ask, when do we know we have solved ALL the problems on earth before we attempt a multiplanetary existence? Forever? 10 years? 100 years? Ok. Great! And then what? What about space? 🧐🥷😂	21745	1
EqualOpp4All	Only thing I would add to that is that we already are a multi-planetary species. It's the only explanation that makes sense with regards to how homosapiens developed as they have. We've come from the stars and; therefore, to the stars we must return. ,	2333	1
Mike_Twice	First, humans are already multiplanet and second... how come we aint been back to the moon.....not gonna stop askin Lonny	828	1
thechosen1_777	Space is our future. So many people are waking up to the fact that we have always been a multi-planetary species. It is where we belong. @elonmusk ❤️ #Humanity #consciousness	151	1
91_instinct	It will not be the first time when humans will become multiplanetary , It has already happened in the past	7	0
Suave162	Unbeknownst to most humans on Earth's surface, we're already an interplanetary and interstellar species. However, @elonmusk has a point, it's the lack of curiosity about what's out there in the universe and total indifference	1429	0

	regarding #SecretSpacePrograms that stagnates mankind.		
pragyae	Life is multiplanetary.	675	0
RobertOsfield	I believe there is a good chance life is already multi-planetary. All those billions of stars out there and planets orbiting them. All those nooks and carnies where life might cling on or thrive even in this solar system. Human's need to be multi-planetary to go meet them :-)	615	0
LordSophia666	You're late to the party because life is ALREADY multiplanetary.	465	0
danieloutar	He means this has happened on Mars in the past. We are already multi-planetary	372	0
Pravduh15	The future of our species depends on our successful transition to a multiplanetary species.	1140	1
tarnith	If there's one thing I think we can all agree on, it's that we need a backup Multi-planetary is a way more exciting future anyway, that's how you get space pirates. Who doesn't want space pirates?	219	1
Am_Sipula	Something we really need to consider. Multiplanetary is a good concept. Moving life to Mars or moving big industries to space, any option is good than having no backup plan for the future. #SpaceX #BlueOrigin	4003	0

thetylerhayes	Humans are going to become an interplanetary species. It's inevitable but only because humans make it happen	6355	1
ThisIsFRSH	It’s sad that the idea of becoming a multiplanetary species is an “if” rather than common sense.	27501	0
LesegoMooketsi_	Humanity should not be limited to planet Earth, we should engage multiplanetary to unfold Humanity's potential.	1651	0
MarkNew	#ElonMusk #Megatons #Multiplanetary @elonmusk We need megatons per year in orbit to take the next step for life to become interplanetary	1579	0
tashfene	I feel so sad to see the negativity in the replies. It's only crazy until it's done. Multiplanetary life is hard, not impossible.	1528	0
iamstevensewell	It’s entirely possible to have multiplanetary existence for humans and the worlds could be very very different than one another. Plants, animals, life won’t be the same on other planets but the human adaptability will make it happen.	582	0
Pajtim90	I think we will have permanent bases on the Moon and Mars within maybe 50 years. But to be multi-planetary we need viable populations that could survive and continue without support from Earth. I don't think that	91	0

	is feasible for the moon. Mars?Maybe,but not for hundreds of years.		
KanchanMunish	Making life multiplanetary is super important. Though it will be technically challenging, but is possible. The bigger task is scaling consciousness. We still have no clue on this topic. Bigelow had taken a big step on it.	67	0
sharlahumaira	i wish, so we can choose wanna life in mars or earth🙃 transformation from singleplanetary to multiplanetary. to save human when the apocalypse comes on earth😂 hahahhaha, or imagine when a couple long distance relationship from mars to earth😂	1295	0
sprice	I just experienced countless Sci-fi memories converge into reality while fully realizing humanity is going interplanetary. And it will likely happen in my lifetime.	903	0
surmountoby	I like the idea of multi-planetary. Like in the old-time people can choose to leave British and go to America. Hopefully, space travel can be cheap enough so people won't be forced to like and live with all the other jerks.	803	0
swapp19902	If we make life multiplanetary there might be a planet thousands of years from now which takes its own path to evolution completely	331	0

	detached from earth. That would be interesting.		
aniruddhadas9	Making humans multi-planetary species. I think it will happen in our life time :)	172	0
whos_this_again	This I hope happens, the multiplanetary living, can the addition of plants to the planet start to trigger the development of an atmosphere?	165	0
shinobi_frost	🌎New GOAL to be A Multiplanetary Artist! 🌌 Working on pieces for MARS Art Gallery!👽 #ArtistOnTwitter #Art #ElonMusk #ToTheMoon #spacesgottalent #space #nfts #nft	47	0
ReMeCloning	Would a multiplanetary species need a new #genome?	16	0
networkshitlord	How about instead of sending a bunch of rich people we send fertilized embryos, have AI birth and raise them, and make a better version of us with no knowledge of our evil. We don't need our baggage becoming interplanetary. If you want to play God, why not actually become one?	2	0
shotbyfinnegan	Interplanetary...transport...engine? I hope to god I'm still alive if the day ever comes where I can captain my own spaceship.	14475	33

JDBtracker	The World moves faster, Those asteroids aren't going to mine themselves. The materials available will alter Human Society, The Rockets? Spacecraft? A means to an End. Fast Express Global Delivery Interplanetary Mining Space Exclusive Manufacturing centers	1011	0
MoosedPoet	Multi-planetary species, possibly the end to scarcity economics, decentralized governance, blending lines between technology and the Real	973	0
ThisrtyScholarr	If a galaxy is going to collapse, all planets will die . We need to learn to move out of our universe to preserve human race . Multiplanetary movement won't change much .	738	0
AriNovaStella	Yesssss, now that's exactly the future humanity needs, especially the multiplanetary part..., or at least, I know I need that lmfao👌🌎🛰️🧝	358	0
MartenBenjamin	The next step towards the future! #multiplanetary	317	0
itheuwa	Yes and the thing is, there are already so many humanitarian causes that help mitigate environmental issues here on earth. And if all that fails, what's plan B? MAKE LIFE MULTI-PLANETARY.	40	0

savage_jey	We can simultaneously make Earth better and; healthier while also makin life multiplanetary for all/most Earthly Beings. It's possible, we all just gotta do our part like @elonmusk is doin his.	38	0
angajalii	Truly is amazing how close we are to becoming a multi-planetary human Civilization, the price of success outweighs the price of failure	6	0

Appendix 3: Contra-coalition quote tweets.

Username	**Quote tweet text**	**Follower count**	**Like count**
KenTremendous	The average temperature on Mars is negative 80 degrees. Also there's no water. But I guess we should listen to you, since you invented the "tunnel."	239599	4862
mushm0on	I am once again reminding asshole billionaires that it would be easier to fix the climate crisis than it would be to create a livable ecosystem on mars	17151	218
ramzpaul	I am coming to the realization that Mars is just a cold, dry and dead planet that is not that interesting.	113291	129
mustapipa	Oh dear, no. Fuck no. Even rudimentary understanding of planetary sciences, geochemistry, climatology, and requirements of biological organisms would suffice for anyone to conclude that we are bound by our planet.	11188	332

	From the perspective of Earth's biology, Mars is hell.		
ErrataRob	Note: in the event of nuclear winter, dinosaur killing asteroid, Yellowstone exploding, nearby gamma-burst/supernova, killer flare, or manmade climate-change -- the Earth will still be more habitable than Mars.	57710	83
RARohde	I look forward to visiting Musk's orangutan preserve in the great rainforests of Utopia Planitia. Oh wait... No, that's utter nonsense. Mars is incredibly deadly to life. Eventually a few species may survive there in sealed environments, but it will never be a substitute Earth.	43184	57
Msmariablack	In 250k yrs Humanity hasn't explored the ocean or even bothered to try to populate huge chunks of Earth because it's too "extreme" 🤣 But do go on about a humanity that snapped in 8 weeks of home jail colonizing a rock with no breathable air, no water and 220 below zero winters	30165	53

past_is_future	I'm once again begging the Weird Nerds who follow this guy to understand that Mars on its best day now is basically infinitely less hospitable to complex life than Earth has been during even the worst mass extinctions of the past half a billion years.	5135	47
BugQuestions	So, I've been thinking about how to properly respond to this...and there's really no way to do that because we will never be able to take our ecosystems from Earth to other planets. What Musk proposes here is (as @Myrmecos pointed out) simply impossible.	12319	45
trEVmaximizer	How?? How would we so master geoengineering that we could make animals live on a freezing rusty hellscape but we couldn't keep earth within a few degrees of the status quo?	2181	36
nhuntwalker	Nope. That’s not how astrobiology works. Plants and animals barely survive being transplanted into the wrong environments here *on Earth*. To just blindly assume they’d be fine on a whole entire other planet is just... my god	5178	31
Paleoartologist	Sorry, does he want to turn Mars into Earth? And he never stopped to wonder why Mars was like that in the first place??	10927	112

WallStCynic	And if said rock hit Earth, it would STILL be more habitable than the Moon or Mars. It also would be cheaper to terraform Earth than Mars. And float our gene pool in orbit (or undersea) rather than colonize an irradiated planet.	120874	85
AllisonRFloyd	Uh. Space doesn't have plentiful, breathable, naturally occurring oxygen. What's hopeful about rushing to an environment that can't support human life, especially when we can't even take care of the one we live in? Hard pass on space.	29694	123
edgarrmcgregor	Mars has no magnetic field. It has just 1% of the atmospheric pressure of Earth. It has an average temperature of -81°F. It has no moon large enough to stabilize it's axis. It is only 38% the surface area of Earth. We aren't there yet, kiddo. One day, but not yet. Focus on  .	36163	1732
Bhajan_GV	Friends, I love the idea of interstellar travel and being a multi-planet species too. But if you think those are even remotely realistic or helpful options right now, I would encourage to google "how far is a light year" and "how does radiation affect people in space"	62	0

moraknivgang	Let's say that you lived in a place with birds, cows, mushrooms, wind, streams, lakes, clouds, forests, insects, mountains... Would you leave it for a planet that even lack oxygen?	1300	46
mbeisen	Why would anyone want to live on a cold dry rock with people who quit on Earth?	61265	73
parasociality	I maintain that interplanetary colonization is not economically feasible. Even if it were possible, life on Mars means living in a low-gravity desert where stepping outside is lethal. I haven't heard anyone articulate a reason WHY you'd want to live on Mars beyond "it's cool."	2954	8
QasimRashid	No one’s attacking space. We’re attacking the fact that billionaires are exploiting workers, avoiding taxes, and; getting Govt handouts while 80% of Americans live paycheck to paycheck and; 60M Americans are food insecure. You aren’t the victim here bud.	351120	3737
thatonequeen	Does he think "space" is the thing people are attacking?	640917	6543
DreadedJai	We aren’t mad at space, we just don’t like you.	7903	191

megturney	No one is attacking space we just want billionaires to pay taxes. Oh sorry, I mean billionaires who don't pay taxes maybe don't realize that they're ruining the planet for so many people	490509	3742
ProudSocialist	Nobody is attacking space. We are attacking greedy sociopathic billionaires who are taking joyrides in space while people back on planet earth are hungry, sick, and living paycheck to paycheck.	365082	2456
the_EMA_	I honestly hate this shit. Use your billions to fix the damn planet we have. Start with Flint's water supply	8316	352
EugeneMirman	And if people die on Mars, maybe we could find a way to make life in Florida habitable again?	391012	338
BreeNewsome	No one is attacking space can we please stop propping these people up as ideological leaders simply because they're wealthy	476412	2337
everywhereist	does he actually think people are mad at space	126154	999
nickwestes	You're attacking space with billionaire garbage…	81529	405
carolynporco	No one is attacking space. They're attacking the use of it to present false hopes.	62039	178
nerdjpg	No one is attacking space as a concept you clown	25742	165

fluidcreativiy	No one is attacking space, we're attacking billionaires who are destroying our planet and lives and our government that protects you.	10133	172
shannonwoodward	wait who is attacking space when only y'all have been	221234	399
thestuffofmemes	I'm not joking when I say we need to overthrow every last one of these fucking tech sector ghouls before they privatise space.	10044	116
nikkimwalls	You disrespect Earth, you'll disrespect other planets.	7923	114
SarcasmStardust	Imagine thinking we're attacking space and not the greedy fucks who are using tax payer money to fulfill some childhood fantasy while people suffer. Fuck off, scumbag. Space is cool. You're a cancer on humanity.	53627	114
sesquiotic	Maybe you don't realize that people loved space when they had a hopeful future but now that future has been stolen they don't want to cheer the thieves	4792	114
janellelapointe	Elon Musk wants to exploit our human existential crises to make his weird interplanetary colonization fantasy come true, rather than doing anything substantial to make life on Earth more equitable, just and sustainable. This guy sucks ass.	6829	103

jameelajamil	Guys please don’t ruin this fun and hope for the wealthy! We promise to wave at you from space/tweet you when you’re all burning/freezing/drowning to death on Earth because you didn’t have the money/fucking Bitcoin to travel to space with us. Sad face. #BeKindToBillionaires ❤️	1067103	3452
NebraskaMegan	we love space every person loves space we just want to be able to go to the doctor	38915	2300
mykola	If you're somehow still supporting Elon Musk, can we talk about this? Nobody is "attacking space". People are saying that it's ridiculous how much money is being spent on a dick-measuring contest between three billionaires while so many needs on earth go unaddressed.	21842	265
AlexandriaV2005	I don't have a problem with space, it's the billionaires who could literally write a check to transition major economies to renewable energy that gets me	80420	589
amywestervelt	It’s not space, it’s you	62979	507
SamLMontano	Oh, sweetie. We're not attacking space. We're criticizing billionaires.	23037	507
damocrat	We’re not ‘attacking space’. We’re attacking the billionaires who are having a willy-waving competition trying to get	25922	84

	there, while billions of people back on Earth struggle to put food on their tables.		
AnthonyIrwinLA	No one is attacking space They’re attacking billionaires Prioritizing space Over helping people On earth	21787	76
asifintoronto	Nobody attacked space. They're attacking how billionaires are building bus services to space for the super rich, while infrastructure on earth decays - largely because some of the super rich fund campaigns against the social good. Those who fall for this tweet are marks.	16113	79
swiftiec13	no we hate you and your fellow billionaires because you don’t pay taxes and don’t make any effort to help fix the problems we have on earth.	106458	77
erikaheidewald	we’re actually attacking billionaires because you represent the death of hope you fucking dork. space obviously rules	23141	247
KimCrayton1	Folx don’t have an issue with space…it’s the mediocre, unremarkable white dudes with no ethical compass and money to burn, whose ability to get to space was funded with tax dollars but who pay no taxes that we all HOPE will just go away	16360	153

MauriceWFP	We are not "attacking space." We are critiquing capitalism because it produces a few thous. billionaires globally while locking in the fates of billions of poor people - all while a handful of rich white men spend their immense wealth on vanity space exploration enterprises. 1/4	18834	81
traceyecorder	billionaires travel to space obviously don't care that hoarding their wealth starves so many people	22913	70
leonmwalter	We don't attack space. We attack rich assholes, who could solve the worlds problems with their fortunes, but literally shoot money in the straetosphere instead.	3501	42
CommunistsEgirl	No one is attacking space we're attacking 10 billion dollar contracts given to BILLIONAIRES so we can land on the moon again 😒 While people are unhoused, without healthcare, and school lunch debt is a real thing.	11119	34
TitusNation	Attack Space? We're attacking billionaires who want to turn it into a weak ass $250,000 amusement park ride. You seem to be actually trying to get us to a multi-planet species, but these other douche bags? Weak.	194462	304

XcutdinCntrlPrk	Nobody is attacking space, they're attacking morons like you who won't actually get us to a multiplanetary society, but will instead fill the atmosphere with space garbage and slow our spacefaring progress. Bellend.	598	1
SarcasticRover	My planet isn’t a f—king parking lot for your bullshit stunts, Elon. Next time send science.	879663	3054
upulie	You don’t own Mars	38907	974
JaneOst_	how do people fall for this shit? if we can't keep a planet life evolved on hospitable then there's no way it's gonna work out on fuckin' Mars.	12426	1885
IronStache	How about cleaning up our own yard before we start dumping in our neighbor’s?	196040	228
j_n_foster	what the hell kind of tech do we have to colonize Mars that couldn’t be applied cheaper and quicker to mitigating climate change on Earth? y’all really want to work backwards from hell on another planet just to reinvent serfdom and enrich yourselves instead of fixing things	11228	154
TDS_Chris	It's not high time to go beyond Earth. It's high time for humanity to realize we're slowly destroying our own planet and barely change anything. Climate change and sustainability are the topics that should matter, not the Moon, or the Mars.	36521	149

mustapipa	We cannot even create and maintain a functioning, closed biosphere here on Earth, where temperature, pressure, radiation levels, and other factors are favourable. So no, we cannot create a backup of it on a hellish planet such as Mars.	11188	148
DavidFaragalli	Maybe we're not attacking space. Maybe we are disappointed with someone spending their time and vast resources as though they'd pioneered space travel, automobiles, and flamethrowers instead of tackling immediate and dire global issues. THAT would represent hope.	1477	115
kixes	People aren't attacking space they're saying you're a self-centred billionaire with the wrong priorities	30227	109
slugcharmer	this man could like. end global food insecurity or smth but instead he's out here writing space diaspora poetry	3925	107
DeborahMeaden	OR...we could take care of this planet so that species are protected. Maybe we spend energy and money on that?	681083	5062
RonFunches	People who defend space Maybe don't realize that When space represents hope It's because earth fucking sucks Help earth	268972	1680

gothspiderbitch	We'd still have a chance to save this planet with all its plants and animals if people like you stopped hoarding the resources we need to slow the oncoming climate apocalypse before it's too late while convincing individuals to consume the energy of a small nation to own nyan cat	74260	1178
peterdaou	How about starting with no billionaires and no poverty, hunger, or homelessness on this planet...	271485	796
ninaturner	I think we should protect the planet we have.	598743	770
RachelMComedy	spending billions to go to space while the planet burns is self-care uwu	86907	732
Bowsnonk	it's chill how we've already thrown in the towel on this planet, apparently	6757	539
VeryBadLlama	I have taken the billions that were in my bank account and which you were probably hoping I'd use for good Forgive me space seems neat so hopeful and so cold	40222	454

theserfstv	Before you colonize space you might wanna help fix Earth	145031	212
parismarx	so cool to distract us with martian fantasies despite the fact we'd have to live deep underground to not die of radiation when we have a miracle planet that we're actively making less habitable and need to be doing everything we can to preserve	41315	209
bern_identity	There is a literal climate emergency on this planet at the moment, and the 2nd wealthiest human on Earth, a tech CEO, who has the ability to change the course of this timeline is talking about terraforming other planets when he could start by saving this one in desperate need.	35292	203
laloalcaraz	Instead billionaires should pay their taxes so we can work on fixing earth	50915	148
MarxMidwest	Normal People: maybe billionaires should feed hungry people before launching themselves into space. Elon musk: How can you attack space? Don't you think space is cool? Don't you people wanna move to Mars when capitalism destroys earth?!?	37064	67
mcwm	why not just try to keep the ones here alive	25152	169

ItsBouquet	Hope for what? We have a planet on which to live, on which we have evolved and are perfectly adapted. Why don't you put your $$$ into rehabilitating the parts of it that we've trashed?	33167	101
Nel_iss	Humans still die on Earth because of absurd reasons like wars, starvation and many more. So maybe solving our own problems on Earth is more serious than making life multiplanetary atm @elonmusk	127	0
OrangePaulp	this fantasy of utopian space colonies annoys me so much. Antarctica is infinitely more habitable than like Mars, but you don’t see anyone spending billions to set up a city there. shut the fuck up!! Rupi kaur ass…	40816	381
GrimKim	space is a cold void of sparkling death and our world is aflame	126129	902
joshfoxfilm	This is exactly the colonialism that is so dangerous. Destroy Earth, stop caring about it, move on (and destroy) a new planet. This is reprehensible, irresponsible. Elon’s true colors showing.	59078	109
lawindsor	Men will literally try to colonize Mars instead of going to therapy	170454	945

unrealfehr	Occupy it with people of Earth? This isn’t gonna end well. Mars votes no. #samesame	25289	74
Trollacoaster	white men always thinking about imperialism i swear	4995	37
fawfulfan	Reminder that a Mars colony is an incredibly stupid idea that has a 90% chance of killing everyone there within a year and accomplishes no actual scientific or economic goal.	97572	126
evabeylin	Inter-planetary colonization or human race decentralization?	26886	4
Edaphosaurus	We will never become an interplanetary species. There is literally no point in sending people to Mars if we can't manage our problems on earth. A bunch of dudes in spacesuits on a desolate rock won't guarantee the survival of humanity. Tax billionaires for every last penny.	5685	221
CharlieJGardner	In my 25 year career as a conservation scientist, I have never once heard anyone suggest 'back up the biosphere by transporting it all to Mars' as a strategy to conserve Earth's life forms. Might just be the stupidest thing I've ever heard	42564	1490

Myrmecos	Yeah, that's not how biology works. But it's a convenient fantasy people destroying life on our planet can tell themselves as species disappear by the thousands.	31989	782
ninaturner	Instead of working to conserve the planet we have, Elon wants to create Earth 2 on Mars. Tax the rich.	598740	647
ForamWhisperer	Q: If a species goes extinct on Earth but continues living on Mars, is it really extinct? A: Doesn't matter because COLONIZING MARS IS A WASTE OF RESOURCES FIX THE CLIMATE AND BIODIVERSITY CRISIS HERE ON EARTH!	4174	34
SannaRyynanen	A nice way to say: "I know nothing about the complexity of Earth's ecosystems and don't care. I just need you to think I have a back up plan, so that I can continue to fuck things up here and then crawl to my bunker when you're all dying."	4557	34
MyFrogCroaked	If we can't manage to attract enough support to keep species alive on Earth, why would you expect to protect Earth's species on Mars? Maybe we should invest more in #conservation on Earth first...	19005	174

ElliotElinor	A wanker deluded by his money into thinking there's a Planet B.	26376	307
itsupthen	We can’t even tackle climate control correctly on this Planet but you want to be multiplanetary	452	0
notimportant80	I doubt we will ever be able to make life multiplanetary. Life is dependent and feeds of on other lives, from bacteria to microbes,plants and animals, good and bad. Nature works on complex close loop cycles which tooks millions of years to be formed.	64	0
danadonnelly	what if you took all your dumb space money and put it toward ending hunger and homelessness	173007	1477
lfcJ7_	Elon Musk when there’s still millions of homeless, starving children on the streets but he can take a group of multi millionaires to Mars	7829	232
mollyroooo	Imagine thinking making the species multiplanetary is a good use of your billions when only 1% will be able to enjoy it while the other 99% languish in a poverty-ridden police state.	2549	0
adamliaw	Billionaires indignant that the media are calling what they’re doing vanity space joyrides, while they want it to be called pioneering exploration, while in reality it’s a land grab to control the future of satellite infrastructure independent of geopolitical regulation.	121997	501
SUEtheTrex	For me, space represents CHAOS and PAIN, but by all means do your little billionaire space race.	81344	501

stephanevw	Is the space for everyone or just for rich people?	113228	455
Edaphosaurus	Yeah, or by the time you've managed to drag a couple of chickens to Mars most of life on Earth will have been wiped out by you and your billionaire cronies exploiting every last resource in order to compete in this pathetic dick-measuring contest you call a space race	5685	79
Rubberbandits	They all want to fuck off and give each other handjobs on Mars In their square cars while we all drown in fart water	269773	597
KarlreMarks	Counterpoint: with everything we know about air travel, space travel will be ten times as annoying. Let's construct the scenario:	195660	466
TinyWriterLaura	when space travel becomes as common as air travel we'll have destroyed earth's environment and the rich will have set their sights on destroying another planet with their entitlement	9368	50
bambooney	we'd just destroy the new planets too lol	52645	388
TheRahulMahajan	There is a big lack of a Humanity on earth then how it will reach to Mars ? Mr musk	158355	40
BrotherAugusti2	I genuinely don't care about space exploration or "life on other planets." Given the disastrous state of our current planet, what reason is there to think we'd do better on a different one? Power-lust and sin won't be left here on Earth, they will travel wherever mankind does.	4075	49

Tweetermeyer	Can someone explain how humans might make this uniquely hospitable planet uninhabitable, but somehow not do the exact same thing to far, far less hospitable planets? Please, game that out for me.	30074	186
maplecocaine	I'm glad people are finally getting wise to the fact that space is an absolute piece of dog shit. There's nothing there! It's fucking boring. I like places that have gravity and shit to do such as planets	38567	320
jeffvandermeer	Space...The Bullshit Frontier	67420	266
rerutled	Elon Musk should track down the asshole who launched this attack on space. ....wait, I'm now being told that this is the Starlink satellite system disrupting ground based observations on space, and the asshole who launched it was Elon Musk.	6829	258
PleaseBeGneiss	“those who attack space” lmao we aren’t the ones shooting cars at it	125562	1514
JoshuaPHilll	Yeah so that's animals being taken into space while the masses are kept away by armed guards. Seems pretty accurate.	268773	11833
vanillatary	Semi-unpopular opinion: Mars missions are a good thing aspire to, with public investment and developing new technologies, and progressive anti-space exploration doomerism is one of the the weakest and lamest angles to go after absolute goons like Musk	14994	265

BicycleLobby	Millions and millions of dollars to prove something we know all too well here on Earth: that there's no place cars can't ruin.	35972	297
UrbanistaSol	🔴 Save Mars from cars.	6262	22
AgnesCPoirier	Who on earth authorised Tesla man to dump more litter in our common space?!	20773	13
DrSeeboth	Choose wisely. In the beginning, yes, but not forever. There must be strategies in place to avoid exactly that. We don't need #pollution in #space. #multiplanetary #orbit #environment @elonmusk	1355	0
jameelajamil	People hope for healthcare. For universal income. For an end to homelessness. For an end to authoritarian regimes. An end to corruption. For gun safety. For prison reform. For basic justice. For climate justice. Only the wealthy can afford to see hope in space.	1067103	10566
CoreyRForrester	Replace "space" with "a living wage"	217694	8469
RonniSalt	A decent meal to stave off hunger, not getting shot in the head, a roof over their heads, the ability to see the people they love again . . . these are the things people hope for. I've never met, read or heard a person ever say: "You know what I hope for? Yearn for?" "Space."	88352	988

RepJayapal	Space may represent hope to some. But not being able to afford health care, housing, and child care epitomizes hopelessness for so many more. It's time to tax the rich and invest in our communities.	617291	817
fayemikah	ur right space represents hope for me like how much I hope you fly to space and don’t come back 🙏🏻	156049	423
heathercampbell	space used to represent hope back when a single parent could buy a house and support two kids they’d think: if I can do this what else can I do? and they’d look to the stars.	52734	291
AdrianXpression	Lol pls. Space represents hope for billionaires to mine resources so they can build monopolies.	31576	235
IronStache	hope doesn’t fill a starving person’s stomach and there isn’t food in space	196038	219
janellelapointe	Space represents hope for people who have no connection to the land on Earth.	6829	90
whereisdaz	Or... we could just not screw up the one planet we know for sure can harbour complex life.	27246	402
anthonyvclark20	I can't pay no doctor bill. (but Whitey's on the moon) Ten years from now I'll be payin' still. (while Whitey's on the moon) The man jus' upped my rent las' night. ('cause Whitey's on the moon)	54821	355

	- Gil Scott-Heron		
parismarx	I can't pay no doctor bill. (but Whitey's on the moon) Ten years from now I'll be payin' still. (while Whitey's on the moon) The man jus' upped my rent las' night. ('cause Whitey's on the moon) No hot water, no toilets, no lights. (but Whitey's on the moon) —Gil Scott-Heron	41316	303
donmoyn	and yet other people would simply like billionaires to pay their taxes and fix earth’s problems	70843	1382
kaaningilamo	or we could just solve earth problems first	2018	1178
hutchinson	Doesn’t solve the climate crisis or risk of nuclear war.	338069	512
anylaurie16	I reported this tweet for targeted harassment against Earth.	103850	170
DavidOAtkins	No one is attacking space. The problem is humans can't live without earth given current tech, advancing that goal requires new advances in physics, and if you want to save humanity and give people hope you should focus on dire problems here on earth.	38772	82

kilnfiendpotter	those who attack space realize that there are literally billions of people who need help on earth you privileged twat	7287	66
hughhowey	This idiot still thinks people are gonna raise their kids anywhere but Earth.	30057	57
Scribulatora	I'm still waiting for "humanity" to reach all of earth. Imagine thrusting this into the aether like it's a fucking accomplishment. Maybe the next "big step" for mankind ought to be saving this freaking planet. You absolute piece of trash.	16313	45
a_h_reaume	Or maybe we just stop climate change. And stay on this planet that we're actually able to breathe on.	25267	37
pramsey342	People like you could make Earth represent hope, if you wanted	42418	5906
ninaturner	We should take care of the poor here on earth. We should take care of our planet first.	598744	308
JUNlPER	can we just fix earth first please	171674	2522
jessphoenix2018	Realistic take: Protect Earth and; its unparalleled biodiversity NOW. Any off-planet activity should be a bonus, not a sci-fi/horror mashup. If @BlueprintEarth had even a fraction of the funds Musk sends into space, we	79129	128

	could unlock the secrets of entire ecosystems.		
taradublinrocks	You will never live in space. It would be great if you focused on the people who need help down here on Earth #TaxTheRich	104605	67
MULLET_FAN_NEO	*CAN BARELY AFFORD TO EXIST ON EARTH* YEP, SPACE SOUNDS LIKE THE TICKET FOR ME!	12243	80
coL_AliasV	I dunno, Elon. War, famine, mass shootings, pandemics, disease, lack of healthcare. All those seem far more dangerous to humanity than a lack of babies being born. How about we fix those first? Just a thought.	17616	140
Toure	We just want health care. And to not be shot by cops.	227706	892
atRachelGilmore	cool, can we do climate change and world hunger first though?	40149	341

ahmedusa2005	Majority of People are living in poverty on earth. We should make sure that everybody on earth has enough food and not dying of hunger. Before people expand humanity to become multiplanet or think about the universe, need to live in peach with no war or afraid of not having food.	1	0
Tiagojdf	If we keep letting some plants and; animals die out on Earth, we won't be able to make life multiplanetary, and there may come a day when some plants and; animals will be extinct	276	1
AlAmin18237781	This kind of tweet makes human disappointed if you can't solve all the problems of earth why do you talk about multiplanetary? NOTHING BUT DAYDREAM AND BULLSHITS. OUTCOME WILL BE ZERO. Pls focus on the real problems the earth faced, facing will face and try to solve em🤣😡🙏💯	72	0
alvin_tal	We got enough problems here on Earth to solve why in the hell do we need to be a multiplanet species	792	0
iRespectAshley	MULTIPLANETARY??? We can’t even manage the planet we got🤔	780	0
Thecryptomojis	Planet Earth is a mess and @elonmusk is always fantasizing about Mars. Let's fix Humanity first, solve Global hunger (food should be free IMO) bring poverty and unemployment to minimal levels.	467	0

	Then we can think of interplanetary domination		
XenocidalEnder	Can we focus on minimizing our suffering before we create multiplanetary suffering	36	0
hblodget	I often think of Mars, Elon! And still absolutely no desire to go there. I love Earth and air and life without a helmet. Happy to send an avatar on endless space missions, but if Earth goes down, my flesh is going down with it.	144923	37
komallsalman	Can we make life liveable on this planet first? If we can make life multi-planetary, I'm sure we can save this planet and the people living here too.	17284	15
clairewillett	this is basically evangelical rapture theology for secular dudebros it makes you tired to think about putting in any effort to make the here and now any better, so you just move on emotionally to daydream about how restful it will be when you can just straight-up bail on Earth	48678	228
lacalaca85	Elon, if it's about threats to the planet: spaceships! rockets! Mars colonies! To infinity and beyond! Elon, if it's about threats to current society: IDK maintain whatever we do	1095	5

	now, make kids who will pay for my retirement and buy my cars please		
KaraonTW	kinda tired of billionaires shrugging off everything on earth being destroyed by industrialization because they have this fantasy of a multiplanetary life that simply does not and will not exist in the way they think it will if everything on earth continues as it currently is	2899	7
ClimateGeoMap	This planet is worth saving. Multiplanetary life is a pointless pursuit. This is an untold level of stupidity.	688	0
JKSteinberger	Billionaire wants proles to have "hope" rather than pay a wealth tax or act on climate. News at 11.	70826	220
ShahidForChange	This kind of wishful thinking could drive humanity off a climate cliff. Technology won’t solve the #ClimateCrisis. Only the political will to end the private extraction of fossil fuels can do that. We must nationalize fossil fuel industries to save life on Earth.	102424	156
mjfree	Earth could use some too.	247336	80

DinoDJ14	Can we fucking stop with this idiotic narrative and idea that SpAcE TrAvEl gives us (and by us I mean namely rich idiots and politicians) an excuse to shit on our planet because “bRo We”lL JuSt Go LiVe On MaRs Lololol” how about just helping the planet we have now	5390	50
canitti	You really think the amount of nuclear bombs needed to terraform Mars [if that is even possible] could be produced in peace, without causing WW3, here on Earth? :) Good luck with that...	487934	65
mathiasverraes	The carbon footprint of moving a significant enough chunk of the population into space will be so devastating that we're more likely to destroy ourselves in the process.	13807	45
mojogottojo	apne planet mai abhi bhi, we fight for resources aur hum doosre planet mai jaake kya ukhadne waale hai? If anything itll just increase the class divide and I don't even want to get started with interplanetary imperialism	1058	9
defconfuck	de-colonize your language, and drop your guises for why you want to make life multiplanetary 🤪	828	7
NebraskaMegan	we love space every person loves space we just want to be able to go to the doctor	38915	2300
ElaineWelteroth	Food, shelter, and healthcare also give people hope.	65850	394

karrymi	Honestly, Mr. Musk I just want to eat tonight.	674	305
Tweetermeyer	Can someone explain how humans might make this uniquely hospitable planet uninhabitable, but somehow not do the exact same thing to far, far less hospitable planets? Please, game that out for me.	30074	186
SayedModarresi	Until humans learn to behave less like animals, nothing is assured, except mutual destruction. And the unchecked wealth of billionaires, even as many starve to death, only accelerates that dystopian fate.	48864	242
AmberDevlin01	I celebrate multiplanetary exploration but what about earth? No one can just walk away, there is only one #earth. Would make sense to invest billions into recoveryand; repair of this home planet. @elonmusk Why not put your money into healing earth ? @JeffBezos #home	942	1
honestduane	Elon, Respectfully, I share your long term dreams for humanity to be multiplanetary but things are getting too bad here on earth, right now, and the worry I see most is that we wont make it that far. You need to double down on Earth.	641	0
EmperorPyros	Again, let's fix the planet we're on now before talking multiplanetary expansion	508	0
christowerz	It ain’t gonna be multiplanetary if we keep destroying this one...	494	0

PharrowXL	Yo just asking for a friend but before we go multiplanetary can you convince some more billionaires to make life bearable on the planet we have now Because y'all are the only ones who are planning this far ahead. A lot of us are rationing food because we can't afford to eat.	80	0
priyakingerb	The vigor and vitality of this planet is crucial before we go to Multiplanet and interstellar zones! #SaveSoil	33	0
Hazik_Zadik	Listen, I'm all for interplanetary travel/economy but there are many steps in between now and getting humans on mars. Of course, there are far fewer steps of you don't care about present people's well-being.	7	0
I_M_A_Trader	Let's sort out planet Earth first mate Pandemic ongoing unless you want to take the virus multi-planetary as well?	3633	0
Feisty_Waters	Healthcare and a living wage would also give people hope, fucko bucko.	32467	192
AnaPimana	we only want healthcare and a living wage	4166	179
VABVOX	Food, shelter, medical care represent hope for way more people.	142875	173
SophieRunning	Yeah, but can we sort childcare first?	63819	172

MalloryMcMorrow	Hear me out: maybe instead of a billionaire space race we should ensure everyone pays their fair share in taxes so we can fund universal child care, family leave, and early childhood education so people don't have to choose between kids and career.	256649	135
BlackLanterrn	Every billionaire who spends money on spaceships should immediately have their wealth confiscated and redistributed	140859	125
jakewoolf	people dont want hope they want healthcare	29194	97
mshannabrooks	bitch you know what represents hope? Health care that’s affordable. Wages that are competitive. Drinking water that won’t kill your kids. A planet that’s not on fire. Space represents a galactic dick-measuring contest and utter disdain for your fellow humans.	12132	97
heyitsandy_	people are dying of starvation you weird prick, no one cares about fucking space	13663	95
judson	no one can afford healthcare <3	9261	61
cliffordmyers	There's 85 homeless people living in my community. I would rather help them first before spending billions on interplanetary travel. Curious about helping Cobourg, Ontario?	339	1

mysticklemom	#HeyElon If you spend as much money on cleaning-up drinking-water from Cloud-to-Table as you guys are spending on multiplanetary exploration, Then WE (Earthlings) won't have to worry about extinctions.🤦	20	0
waiterich	if you like creative accounting to claim carbon neutrality you're going to love creative accounting to claim net-zero interplanetary biodiversity loss	9989	183
hermit_hwarang	Hmmm I wonder if the ecological and atmospheric disruption inherent in interplanetary expansion would have anything to do with this hypothetical "dying out" of life on earth	40587	46
kzada_	Think if for achieving multiplanetary life ,only animal die on earth is human; will it not huge cost ? Why we dont try to make earth more liveable. In name of industrial revolution and scientific achievement we are destroying earth.	214	1
AidaGreenbury	There's no other planet like earth. It's our duty to protect earth for all living creatures, not just humans. Multi-planetary or not.	12086	34
SX_Falcon_5	I feel sorry for the FAA people that have to review the comments and see nothing of worth. Everyone just regurgitating the endless versions of "Planet B" and "Make Life Multiplanetary"	1504	20

RealisticBull	What I hate Musk the most for is ruining my life-long passion for astronomy,astrophysics,sci-fi (Asimov,Clarke),space travel and; Mars colonization. Everytime I think of this topic, his face pops up spewing out bullsh*t vaporware about Mars/multi-planetary future/population decline.	106	13
AllieAwesome415	Something dawned on me the other day: If multiplanetary colonization is necessary because life on earth is doomed doesn't that imply that Tesla as a company is sort of pointless?	30560	13
jagmavi	We aren't going to become a multiplanet/intersteller species until we learn how to live on this one without destroying ourselves. Going to other planets doesn't solve our fundamental problems because they are behavioural and you can't run from them.	1268	11
LTrotsky21	If humans die out on Earth because they poisoned it, they won't survive very long after on Mars, dummy. - Interplanetary Colonization for Dummies	6727	9
chrimbs	As much as I am excited about inter-planetary travel and humans setting for on Mars I see much greater need for a circular economy. Otherwise we just export our failing economic concept to other worlds. Agent Smith was right when stating that humanity is (currently like) a virus	120	1

Not_ur_avg_Jon	Really overlooking the fact that the main calamity destined to destroy earth is man. Musk is just a vector for multi-planetary virus.	129	0
IsicaLynn	If we cannot design a method of organizing society that is sustainable on the abundant Earth, then our society would surely falter in space or any other less hospitable planet. If human designed systems cannot support thriving here, those systems are sure to fail everywhere.	11114	210
JaneOst_	how do people fall for this shit? if we can't keep a planet life evolved on hospitable then there's no way it's gonna work out on fuckin' Mars.	12426	1885
LeftyCharms	All the time, money and resources that would be used to set us up for multiplanetary life could be used to fix... idk... the fucking problems here on Earth. 🤦🏼‍♀️	1418	7
samuel_elzinga	Dawg use that money and make earth better instead of trying to become an interplanetary despot	789	7
TileTony	Interplanetary travel is still a dream, one that is logistically impossible today. That money would be far better spent on the one we have, the one we are fucking up for future generations.	1196	5

westmm4028	The environmental damage to achieve a multi-planetary state is not worth it. We need to use our resources to fix our environmental disasters here on earth before we spread our greed and thoughtlessness to other planetary bodies. It's like spreading a frat party to another house!	1281	2
katielegweak	If we invest the money that would potentially be spent on developing multiplanetary life on preserving the world we're ~currently~ on instead, there may come a day when we can stop worrying about the Earth dying... but what do I know right	577	1
LeftySquirrel	I don't want to sit back and allow billionaires like Musk, shrug away and justify the destruction of our biosystems just because they have some idiotic vision of fantasy space interplanetary living. Just, no. #WealthySociopaths #FuckOffElon	1876	7
Halflight96	In other words, fixing and helping life on earth isn't profitable so capital must be exported and expanded through "multi-planetary" means.	1252	6

OutRagingBull	- Space travel is exhausting and can kill most people. - The least habitable place on earth is 500 times better than any place on mars. -Low gravity on mars can shrink all your bones. You don't want to make life multiplanetary, you just need investors for your next project	135	0
carolynporco	And Musk continues to endanger life on Earth by pushing this nonsense. Just like the nonsense that humanity can terraform Mars. See a pattern?	62038	63
Kalzsom	I somehow don’t believe that an oversized population standing on an overstretched resource consumption is safer from collapse than a decreased world population. Ofc I know he thinks about the future with humanity as a multiplanetary species but let’s not get ahead of ourselves.	73	0
IntuitMachine	The logic here is that civilization is at risk if it's not interplanetary. An over-populated Earth drives people to take a one-way trip to inhabit Mars. A sustainable Earth does not. Hence it's a risk for human civilization.	11095	4

fega_rk	I maintain that this is Elon trying to justify his urge to keep birthing kids. Do you bro. Just quit pushing the “Underpopulation Crisis” narrative. That’s being manipulative. We’d be interplanetary and terraform other planets quite alright, but we do not need lies for that.	1458	0
HowKeen	Does deluded nitwit troll Elon "I'm voting fasc now" Musk really think forced births will solve the "problem" of low fertility rate that was threatening to derail his interplanetary colonization chid's fairy tale?	711	0
kushanf21	Alternate view: He may be trying to drive demand for his business ventures too😅. More the population the more resources we shall need. That gives more incentive to make humans an interplanetary species like he wants it to be. On the way to Mars he is launching 5-6 rockets/month!	344	0
HanaTensor	Elon Musk has just mentioned population growth. “Population collapse is potentially the greatest risk to the future of civilization.” — Elon Musk He believes that increasing the population will lead to the prosperity of a multi-planet civilization.	234	0

rising_serpent	These are the same people trying to colonize other planets because there's no space on Earth.	185909	32
parismarx	Elon Musk loves the idea of humanity and what the species could theoretically be in the future. He doesn't care much for actually existing humans, be it his workers who suffer terrible abuse or those around the world who struggle and starve while he amasses unimaginable wealth.	41315	1519
DrFunkySpoon	Such an ignorant take. An egomanical engineer's take on the problems of human civilization.	31023	60
JGrantGlover	Lest we completely destroy our planet—not off the table!— the future of capitalism requires interplanetary colonization. It's no coincidence that so many billionaires become obsessed with it.	3617	2
FKettle_Witch	Also we'll get to have interplanetary war eventually cos that's humans for ya.	724	1
BirdLawyer4	What if war or pandemic breaks out between two planets? Do we need an United Planets, Galaxy Health Organisation, Interplanetary Monetary fund?	35	0
lonewanderer25	If humanity becomes multiplanet planets will just end up being rivals and possibly at war. This Star Trek view of the future that we'll all be expanding humanity for the greater good at the expense of	10	0

	accumulating wealth, territory or power is very naive.		
RogerGreeson	This may happen much quicker than @elonmusk thinks if the airlines all go out of business this winter. But at least when humankind inhabitants 2 planets we can wage interplanetary wars! 🚀🚀	1337	1
42Kmi	you know what? We should preemptively ban interplanetary warfare, and end intraplanetary warfare too.	1541	0
95MohdAfiq	We're gonna have an interplanetary giant robot war soon..👀	806	0
Johns10S	How long will it take for the colonies on other worlds to revolt and demand independence, I say 2 centuries before the first human, interplanetary war.	2061	0
nowly101_devi	Then there will be interplanetary wars.	1827	0
emlawcatmom	Elon, have you seen "The Expanse?" Spoiler alert - Mars and Earth don't get along. The Mars terraforming project doesn't work and Martians r jelly of Earth so there's interplanetary wars and it just ain't good	543	0
KushyTheClown	Once humanity reaches mars, how long until we start to tax mars and there is a interplanetary civil war?	314	0
ElizzaSays	Pretty sure the last thing we need is a people of earth vs. people of mars interplanetary feud	288	0
makemyDavid	Wait till the interplanetary war	168	0

jeffyguy	Because Mars is not a viable alternative to earth. If you get a million people there, you still won't be able to build a 21st Century economy. There are 1.5 million people in the iPhone supply chain. And if you think shipping from Asia is expensive. Try interplanetary shipping	8048	1
katedoc24	And here we have the billionaire MO, fuck the world and everything on it cause we'll build a *special* place on Mars for *special* folk. This is a nightmarish attitude. Clearly the only life he intends to make interplanetary is wealthy human life	58	1
soundmigration	How dull will Mars be in 2000 years, full of the offspring of white reactionary billionaires. Interplanetary 'long termism' is a dystopian cultish religion, promoted by tech bro all making Earth ever more uninhabitable right now.	13548	1
packedby776	Let us all remember that the "multiplanetary" life of which Elon Musk is waxing poetic will probably be exclusively reserved for the mega-wealthy. The rest of us will be left to die on a dying planet killed....by the same mega-wealthy.	1333	0
saucerspecial	For Billionaires to become multiplanetary*	443	0

mashaer2022	There is already a multi-planetary life on earth. Having such gaps in living standards has already planetized us. I have worked all my life just to survive. I couldn't even see my own planet like most of us.If you elites move to another planet, maybe we can make this life livable	121	0
chanddni	Not if you head settling on a whole new planet — it’s bad enough that BIWOC have nowhere to go on one planet to escape patriarchy lol. Imagine giving cis male chauvinists more power for multiplanetary settling and; most definitely rule. Sounds like a nightmare actually. 1/	72	0
shibl	I do not understand the link between curiosity and multiplanet expansion. The number of new fundamental science questions that living on Mars will produce is probably 0.	1202	1
robby_brown13	Love Elon's goals...but we don't have to be multi-planetary to be happy about the future. Find happiness in the simple things in life and build from there. Family, friends, food, water, shelter. Be thankful for what you have #HappyFriday	3000	0
ianrosewrites	Suggesting that transportation is the only impediment to multiplanetary civilization is either dumb or wildly irresponsible, and Musk isn't dumb.	1026	0

EndlessGarage	This sounds cool, but I just wonder if there is an actual value in this, ya know? Could that time, money, and research be used to help with things here on earth? I'm sure there is some overlap, but I just don't know if I buy the value of a multiplanetary future.	215	0
Tree_Hug_Champ	Ask any engineer or scientist… the ability to make life multiplanetary does not currently exist, nor will it exist for another 1000 years even on our current technology curve. It's not just a matter of tech, but resources too. Someone take Elon's crack pipe(joke) from him…	151	0
SA_Talibiyin	Make Life multiplanetary need more ressources! Where #ElsonMusk found ut?🤔🤔	93	0
DuboisAD1463	Maybe we should actually figure out how to become an interplanetary civilization before we clamor for a population boom? If we run out of resources here, we never get to there.	149	0
evanescentall	More like - Make exploitation multiplanetary!	121	0
FredHarveyMD	Let's work on our home first. It's delusional to think about interplanetary capitalism while capitalism eats our planet and destroys our home. We can be curious without trying to pollute another planet	84	0
ClintonAlden	Making life multiplanetary expands resource extraction and; exploitation, not to mention expand slave labor markets	774	2

	where there is 0 regulation, or any type of government. 😐		
DpStateFuneral	Hopefully the "philosophy of the future" will not include interplanetary class-based apartheid. The test case is whether we can repair the damage we've already done to our own planet before leaving it behind, populated by those who could not afford space travel.	654	1

Appendix 4: Correlated topic modelling results for multiple topic runs from 2 until 10 topics.

Topic modelling terms	T2	T3	T4	T5	T6	T7	T8	T9	T10	Sum
afford									1	1
awesome								1		1
bad							1			1
birth			1				1	1	1	4
car(s)						1		1		2
care								1	1	2
change					1				1	2
civilization								1	1	2
climate				1	1		1	1		4
day					1		1	1	1	4
doge							1	1		2
earth		1	1	1	1	1	1	1	1	8
future		1		1	1	1	1	1	1	7
global							1			1
hope			1	1		1	1	1	1	6
human(s)				1	1	1	2	1	1	7
humanity		1					1	1	1	4
kids	1		1	1		1	1	1	1	7
leave									1	1
life				1		1	1	1	1	5
live	1		1		1			1	1	5
love		1		1	1	1	1	1	1	7
mars	1	1	1	1	1	1	1	1	1	9
money				1		1	1	1		4
moon				1	1	1			1	4
musk	1	1	1	1	1	1	1	1	1	9
people	1	1	1	1	1	1	1	1	1	9
planet		1	1	1	1	1	1	1	1	8
population			1		1	1	1	1	1	6
rate									1	1
real			1		1	1	1		1	5
rich						1				1
save								1		1
space	1	1	1	1	1	1	1	1	1	9
start								1	1	2
tesla				1	1	1	1		1	5
tweet					1	1		1	1	4
twitter									1	1
white						1			1	2

Legend:

Excluded = grey
Population topic = yellow
Climate topic = green
Future of civilization topic = blue
Space topic = orange
Elon Musk topic = red