**Rédiger en anglais et en 400 mots une synthèse des documents proposés, qui devra obligatoirement comporter un titre.** Indiquer avec précision, à la fin du travail, le nombre de mots utilisés (titre inclus), un écart de 10 % en plus ou en moins sera accepté.

Vous aurez soin d'en faciliter la vérification, en mettant un trait vertical tous les vingt mots. Toute fraude sera sanctionnée.

Vous indiquerez, en introduction, au minimum, la source et la date de chaque document. Vous pourrez ensuite, dans le corps de la synthèse, faire référence à ces documents par « doc.1 », « doc. 2 », etc.

Ce sujet comporte les 4 documents suivants qui sont d'égale importance :

**-** **Document 1: The big idea: should we colonise other planets?** (Philip Ball, 21 Aug 2023, The Guardian)

**-** **Document 2: Elon Musk, Mars and the Modern Economy** (Paul Krugman, June 7, 2022, The New York Times)

**-** **Document 3: The Musk superfans who want to live on Mars with Elon** (Charlie McCann, Apr 21st 2023, 1843 Magazine)

**-** **Document 4: Control from earth versus control on earth** (a cartoon byMike Smith, February 22 2021, Las Vegas Sun)

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**Document 1**

**The big idea: should we colonise other planets? Philip Ball | Mon 21 Aug 2023 | The Guardian**

*Is Elon Musk’s vision for the future a libertarian fantasy or scientific imperative?*

The question of human settlement on Mars is, for many people, not “if” but “when”. Elon Musk’s SpaceX company began speaking of the Mars Colonial Transporter around 2012. Its latest incarnation, the prototype for a massive spaceship called Starship that can house up to 100 passengers and crew, took off from Texas in April but exploded before reaching Earth’s orbit. Whether that counts as a success or not depends on who you ask, but it testifies to Musk’s determination to see a human presence on Mars in the next decade.

His view that colonising the cosmos is humankind’s ultimate and inevitable destiny is widely shared. The moon, lacking an atmosphere, short on water, and with weak gravity, is not a very attractive stepping stone, but Mars has none of those drawbacks and is considered a much more viable place to build the first off-world settlement. “Once the exclusive province of science fiction stories and films,” according to Nasa, “the subject of space colonisation has rapidly moved several steps closer to becoming a reality thanks to major advances in rocket propulsion and design, astronautics and astrophysics, robotics and medicine.”

Why, though, should we wish to dwell on a world that lacks what we need to survive? There’s a dismaying irrationality in the answers. Stephen Hawking claimed that “spreading out [into space] may be the only thing that saves us from ourselves” – from the threat of human-made catastrophes such as the climate crisis or nuclear war. Well, lord knows the world has problems, but supposing they can be solved anywhere other than Earth is an escapist fantasy; Nasa’s claim that “the urgency to establish humanity as a multiplanet species has been re-validated by the emergence of a worldwide pandemic” borders on misinformation.

The timescales just don’t add up. Climate change either will or won’t become an existential risk well before it’s realistic to imagine a self-sustaining Martian settlement of millions: we’re talking a century or more. Speculating about nuclear war post-2123 is science fiction. So the old environmentalist cliché is right: there is no Planet B, and to suggest otherwise risks lessening the urgency of preserving Planet A. As for the threat of a civilisation-ending meteorite impact: one that big is expected only every several million years, so it’s safe to say there are more urgent worries. The sun going out? Sure, in 5bn years, and if you think there will still be humans then, you don’t understand evolution.

For some, the justification for planetary settlement is not existential fear but our innate drive to explore. But at least “Because it would be cool” is an honest answer to the question: “Why go?”

So let’s go with that, and assume something like Musk’s big fat rocket can get us there. What might life in Mars City be like? Advocates for off-world colonies love to show images like those in the physicist and space activist Gerard O’Neill’s 1977 book The High Frontier: Human Colonies in Space – an orderly, utopian American suburbia of chic apartments and parks, simply transplanted elsewhere in the solar system. Science fiction, on the other hand, is full of grim outposts on bleak, frozen planets, and savage prison or mining colonies. If history is any guide, frontier settlements are no picnic, and certainly not the kind of places that nurture harmonious, tolerant societies. If you want to know what to expect from colonies established by *“billionauts”* such as Musk or Jeff Bezos, perhaps ask their employees in Amazon warehouses or the Twitter offices. Many advocates for space settlement are “neoliberal techno-utopians”, says the astrophysicist Erika Nesvold, who sell it on a libertarian ticket as an escape from the pesky regulation of governments.

The space industry doesn’t talk much about such things. As Nesvold discovered when she began quizzing commercial space companies in 2016, ethical questions such as human rights or environmental protection in space typically meet with a response of “we’ll worry about that later”. The idea is to get there first.

If the notion of a “colonial transporter” gave you a twinge of unease, you’re not alone. Associations of space exploration with colonialism have existed ever since it was first mooted in the 17th century. Some advocates ridicule the comparison: there are surely no indigenous people to witness the arrival of the first crewed spaceships on Mars. But the analogy gets stronger when thinking about how commercial incentives might distort rights afforded to the settlers (Musk has floated the idea of loans to get to Mars City being paid off by work on arrival). And if the argument is that these settlements would exist to save us from catastrophe on Earth, the question of who gets to go becomes more acute. So far it has been the rich and famous.

Perhaps the most pernicious aspect of the “Columbus” comparison, however, is that it encourages us to believe that space is just another ocean to sail, with the lure of virgin lands to draw us. But other worlds are not the New World; space is harsh beyond any earthly comparison, and it will be constantly trying to kill you. Quite aside from the cold and airlessness, the biggest danger is the radiation: streams of charged, high-energy particles, from which we are shielded by the Earth’s magnetic field. Currently, a crewed mission to Mars would be prohibited by the permitted radiation limits for astronauts. We don’t have any solutions to that problem.

Planetary scientists are often among the least enthusiastic about space settlements. It’s not surprising really – you may as well ask ecologists if we should build cities in the Amazon. But whether you think we should preserve Mars for scientific study or try to “terraform” it to give it a breathable atmosphere and a warmer climate, it would be best to have that debate before we arrive.

**Document 2**

**Elon Musk, Mars and the Modern Economy**

**June 7, 2022 | The New York Times | By Paul Krugman | Opinion Columnist**

Elon Musk is clearly having a moment; he’s trying to back out of his deal to buy Twitter, but he probably can’t without paying billions in damages. Perhaps that’s why he’s thinking about zooming off to Mars?

OK, I’m being unfair. (Am I about to receive a poop emoji?) While Musk’s decision to talk up a scheme to send a million colonists to Mars may reflect a desire to change the subject, his plan calls for doing so by 2050 — and he has been talking about that idea for years.

Still, the Mars talk caught my attention, largely because of the line about one million people.

What’s your reaction to that number? Does it seem absurdly high? In terms of the logistics of actually getting people to Mars, it probably is. But my original home field in economics was international trade. And if you know anything about trade, or for that matter the realities of industry, you realize that one million is actually an absurdly low number of people — far too few to support a modern economy.

Let’s instead treat the SpaceX chief’s Mars fantasies as a teachable moment — a chance to talk about the economics of globalization more generally.

Musk’s comments immediately called to mind for me a great essay by one of my favorite science fiction writers, Charlie Stross, that posed precisely this question: “What is the minimum number of people you need in order to maintain (not necessarily to extend) our current level of technological civilization?”

Stross’s answer was that given the complexity of modern society, you’d need a lot of people. In fact, writing back in 2010, he explained how Musk’s current plan is thinking far too small: “Colonizing Mars might well be practical, but only if we can start out by plonking a hundred million people down there.” I agree — if anything, that’s on the low side. To understand why, you need to think about why nations engage in international trade.

One reason is that countries have different resources and climates: It’s hard to grow pineapples in Norway. But another reason is that in the modern world there are often huge economies of scale in production. These economies of scale make it efficient to supply the entire world market for some goods from only a handful of locations — sometimes just a single location — with international trade delivering those goods to customers in other countries.

For example, a recent shortage of semiconductor chips — which seems, finally, to be easing — has drawn attention to the role of photolithography machines, which use light to etch microscopic circuits on silicon wafers. The world market for these it turns out, is dominated by a single firm in the Netherlands, ASML, which has a complete monopoly on the latest generation of machines, which use extreme ultraviolet light to make circuits even more microscopic.

So how many factories does ASML have assembling these cutting-edge machines? One.

These economies of scale mean that no one country can reasonably produce the full range of goods required to operate a modern, high-technology economy. International trade is essential, and more essential the smaller the economy — which is why Canada is far more dependent on imports than the United States, Belgium far more dependent than Germany, and so on.

Now, given access to world markets, even small countries can have full access to the benefits of modern technology; life in Luxembourg is pretty good. But the realities of transportation costs mean that Musk’s hypothetical Mars colony would have to be largely self-sufficient, cut off from the rest of the solar system economy. And it wouldn’t have enough people to pull that off with anything like a modern standard of living.

As I said, I see Musk on Mars as a teachable moment, an unintended thought experiment that helps remind us of the positive aspects of international trade. Yes, there are downsides to globalization, especially to rapid change that can disrupt whole communities. But you really wouldn’t want to live in a world without extensive international trade. And you really, really wouldn’t want to live on another planet, cut off from the globalization we’ve created on this one.

**Document 3**

**The Musk superfans who want to live on Mars with Elon**

**Apr 21st 2023 | By Charlie McCann | 1843 Magazine**

Self-confessed “space dorks” worry Twitter is distracting their hero

A hush fell over the crowd that had assembled less than four miles from the launchpad. In the distance stood the Starship. Some 120-metres tall – larger than the Statue of Liberty –, the Starship is the largest, most powerful rocket ever built, and in 60 seconds SpaceX would, for the first time, attempt to vault it into the sky. The rocket is intended one day to convey cargo and human passengers to Mars, the colonisation of which is Elon Musk’s great ambition. The success of this test flight would bring Musk, the CEO of SpaceX, one step closer to inaugurating a new space age.

The people who had gathered to watch its dawning were not casual space nerds. The viewing area is owned by Rocket Ranch, a motel and campsite near Starbase, the facility where SpaceX has been building and testing its rockets for the past few years. Some people had been staying there for months in anticipation of the launch. A few had even quit their jobs in order to be sure of witnessing it. Others were so captivated by SpaceX and Musk’s Martian ambitions that they had permanently moved to the ranch.

As the countdown neared zero, Galen Matson, a long-term resident of the ranch, watched the plumes of cryogenic fuels curl out of the engines. “I’ve got goosebumps,” he said. “I’ve been waiting so long for this. I really might cry.”

Given the seeming success of this test, how soon might we expect to make landfall on Mars? Matson reckoned it would take as little as seven, maybe ten years. He longs to go to Mars himself. On that morning as he watched the Starship ascend into the clouds, his fantasy sidled a little further into the realm of possibility. It did not matter that, a few minutes later, the Starship exploded.

Many of the people who flocked to the ranch in anticipation of the Starship launch were current and former NASA contractors, space-company executives, space-suit designers and space YouTubers and photographers.

The ranch is “a mecca for really committed space dorks”, said Matson. On the window sill stands a votive candle, with a picture of a beatific Musk wrapped around it. Musk deserves such a display of devotion because, as a Rocket Ranch Facebook post said, he “has done more to carry us through the open window” – to bring humans to space – “than any other person in our history”.

I quickly came to realise that people’s feelings about Musk were bound up with their feelings about travel to Mars. Musk, unlike NASA, is serious about settling Mars. His use of reusable rockets is drastically reducing the cost of space missions. That might bring down the cost of settling Mars from prohibitively expensive to just insanely expensive (without accounting for trivialities like the lack of a breathable atmosphere).

A startlingly high number of people with whom I spoke did not simply want to move to the red planet. They wanted to be among the first to go, even if the rigours of life there meant “that I would go and die in a month”, said John McCorquodale, a nomadic electrical engineer.

Underlying this yearning is a deep pessimism about humanity’s future on Earth. Many think a catastrophe will strike at some point, wiping out Homo sapiens. It is not clear what shape this calamity might take – climate change, an asteroid, a world war – but what is certain is that it is coming. Earth is overdue for a collision with a “planet-killer asteroid”, said Felix Schlang, a YouTuber. Harper, the executive-development coach who had been living at the ranch for the past two months, argued – citing Musk himself – that the catastrophe could be coming soon, making interplanetary travel an urgent priority. “The window may be very narrow.”

Would-be Martians long to labour in pursuit of a noble cause. For some the life of the earthling feels empty of meaning. McCorquodale said American culture has atomised society into suburban households and isolated individuals. The first ship to Mars, he hoped, would carry the kind of people he had met at the ranch, who want to knock down the white picket fence and commune with each other. The demands of survival on Mars will require new arrivals to work together. From that crucible of struggle, the pioneers may forge new kinds of social relations.

Several ranchers I spoke with referred to Musk’s master plan, the idea that all his businesses, or most of them, are intended to support the mission to colonise Mars (Musk himself has not claimed this). To avoid the punishing radiation on Mars’s surface, for instance, humans could live in underground tunnels carved by the giant drills of the Boring Company, one of Musk’s other ventures. The only source of power on Mars will be electricity; the vehicles could therefore all be Teslas. Happily, some of these companies’ products might solve problems on Earth, but according to this rationale, that is not their primary purpose.

The successful launch of the Starship (before it exploded) meant for Musk’s most ardent acolytes that, all of a sudden, Mars may be within reach. For that, and for other accomplishments, Musk is widely praised by ranchers. Their admiration sometimes borders on veneration. At the outpost, I met Praveen, an Indian engineer and college student, who drove for 22 hours from his university in Georgia to catch the Starship. “Musk is almost like a demi-god,” he said.

But I also detected some rumblings of ambivalence. When I asked the Rocket Ranch crowd what they thought of Musk, a minority, but a substantial one, responded with a “hmm”, or at least an acknowledgment that he was controversial. Many people did not understand why he bought Twitter last October; it was not obvious how it furthered the project of colonising Mars.

Musk’s Twitter antics have, at least for some, pierced an aura of infallibility that had enveloped him. According to McCorquodale many fans believed that when Mars was colonised, “Musk would be king”, because he seemed to possess superhuman levels of intelligence and focus that he was using to save humanity. But the acquisition of Twitter was “a giant error”, McCorquodale said. The saga taught McCorquodale that the visionary he revered was “just a dude”.

But when the Starship soared into the sky on Thursday, a lot of these misgivings seemed to fall away. No one I spoke to cared that not all of the engines had fired properly, or that the booster rocket had failed to separate as planned, or that SpaceX was forced to blow up the rocket. Gomez, the ranch organiser, was keen for me to understand that the launch still counted as an “absolute success”: progress is only ever achieved incrementally. As Musk says, “if things are not failing, you are not innovating enough.” But I wondered whether Gomez and the others would even be capable of an impartial assessment of the launch. At dinner a few days earlier, Gomez admitted he was struggling to keep his admiration for Musk in perspective. “I don’t like the hero worship,” Gomez admitted. “But I’m guilty of it myself.”

**Document 4**

**A cartoon by Mike Smith | February 22 2021 | Las Vegas Sun**

