

Space exploration is the best investment for life on earth and beyond

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Where does this passion for Mars and space exploration come from?

My passion for space started when I was little. I clearly remember wanting to travel in space when I was four years old, just like many other children. Yet my dream was very persistent and never really went away, even as an adult when pure reason, noting the scarcity of spatial travellers to-date (560, but that's about to change), the absence of any marked course, and the improbability of actually going should have changed my mind.

Yet, the future is often uncertain and is never linear. Space has certainly been among some of our most intentional collective dreams and Mars has been a key step in space exploration since the beginning. I realised about 20 years ago that our generation was seeing a technological window open, one that might allow us to learn how to live on another planet and carry out a potential transition for civilisation. It was a sudden realisation that actually made sense and that I wanted to fully contribute to.

What was your reaction to the announcement of the Mars One mission launch?

Like anyone passionate about space exploration and Mars, in particular, I was actively watching the mission develop for quite some time. I found out about Mars One in 2012, before its exposure the following year, through an article by the selection committee comparing the stakes of the expedition with those of Endurance, the expedition from Shackleton.

Like many of us, the idea of a one-way ticket and the reality TV model instantly disturbed me. Of course, I knew that, unofficially, since the 90's there has been a consistently argued discussion about "Mars to Stay" or "Strive to Stay" that concerned the structure of the mission and that societal ethics, which slowly changes over time, makes us question if it is humane. Yet, even if we can defend the idea intellectually, there's a world of difference between considering going and never returning and proving what that actually means once the spaceship is ready to take off. This is obviously a major psychological challenge. The idea of an indefinite stay on Mars is too simplistic. I share a more complex vision that goes deeper than this, but it may be too long to explain here.

In regard to the media coverage of the adventure, from the team selection up until the mission itself, passing by the training, which of course is part of the space exploration mission today, it not only helps its development but also inspires people globally through one large positive event and shows the constructive values of all space exploration programs that the world needs. It is bigger than reality TV which doesn't include anything real and only shows negative events that discourage people today.

Be that as it may, because I was curious and passionate about the

question, I tried to understand what was so intriguing about the Mars One project and space exploration, going farther than first impressions.

How does it feel to be the only French person to be part of the 100 preselected people for the mission?

Knowing that I would have to play the media coverage game, a position that I was happy to put myself in during the first two years of the selection process, I always knew that I risked being misunderstood and drawing my family into this distorted idea. I also understood that restrictions of media coverage only allowed for a superficial story. Therefore, I concentrated on ways that I could go deeper and make people think rather than automatically judging or feeding the sensational.

How have you prepared for the different steps of selection? How do you plan on preparing for the next ones?

At first, by being authentic. We know that certain personality traits, coping strategies, and management of emotions will help protect someone in isolated and confined situations and extreme environments. These traits help you psychologically protect yourself. The best training for this mission is life's journey itself.

Secondly, the simulated missions allow you to put yourself in those conditions, to identify with the other team members and test everything that is necessary. That said, some aspects of the mission, like the unprecedented distance that grows between us and our precious planetary home, cannot be tested beforehand. It's a big gamble that humans will be capable of adapting to the restrictions of the "extra-

terrestrial" life. You could be optimistic about it like me, or not.

Finally, I wanted to stop testing the challenges purely hypothetically and advance my skills by testing them. For example, I went on a mission in the war zone in northern Mali for several months as a doctor for the United Nations helicopter rescue to create this vital "desert experience." Confronting situations head-on is finally what makes simulations and hypotheses into a reality.

If the trip becomes a reality, what are you expecting? How are you going to prepare for this type of trip?

Finding and training teams that have a good chance of responding to all the numerous problems implied in such a trip is a challenge in itself. This is why the most important tool of Mars One is human resources. Space engineering which is, of course, a necessary secondary tool with regular reconfiguration of the roadmap, along with indispensable agility. However, starting with human resources allows the project to take off flying from the beginning.

The main challenge being the group's behaviour, the first thing to do is to preselect the teams and train them for 10, 15, or 20 years in all the important domains (maintenance, operations, astrobiology, planetary science, medicine, etc.) all while regularly testing isolated missions and putting acquired skills into action. The particularly long duration of the assignment suggests that the first groups chosen won't necessarily be operational teams if the space exploration program succeeds, which is the opposite of normal logic because it is an international team training for a very specific mission. The members of the team are selected as a group, not as individual astronauts who will lead long multifaceted careers.

In order to be able to solve unexpected problems more efficiently and to increase collective intelligence, diversity is vital. It is important to make sure that team members are very different in terms of backgrounds, culture, and how they work. In doing so, the conflicts that arise from cultural differences year after year will allow the members to get immersed in the culture of the team itself. The path leading to the trip is a passionate one!



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What do your friends and family members think about you leaving for another planet eventually?

Human nature is full of contradictions and overcoming propositions is

often counterintuitive. Contrarily, signing up for such a project that has so much meaning is also apparently exclusive, and it intensifies the presence of our loved ones. I am very aware that I have everything I need, and I am not chasing after happiness, it is already all around me. I signed up simply because it makes sense in a certain world perception. It brings my passion for humans, knowledge, exploration, and discovery altogether.

I make sure that I am completely present unconditionally as a father and that's what my children really need, as well as letting them find their own paths. If I had to leave tomorrow during their childhood and adolescence, I assure you that I wouldn't go. However, the role of a parent changes once they reach adulthood.

As for my wife who has been by my side for 24 years now, she knows that I am faithful to my engagements and she has all the intelligence, humour, wisdom, and love that is necessary to devote herself to the moments that we share now and to take a step back to look at it with an inclusive perspective. I suppose that she also thinks that I will end up not leaving.

Overall, just like in a cockpit, you must regularly go back and forth between the horizon of a future to build and the very concrete present moment of your instrument panel. You must be conscious and in tune with this partially constructed bigger picture that we should all explore.

For you, what is the intrigue of such a mission like Mars One? How many programs like Mars One were already attempted? Why do you think it is so difficult to launch such

projects?

The way we have approached Mars One is what allows an inhabited mission to Mars not let its 30-year goal keep getting pushed farther into the future. We could ask ourselves what is the rush of climbing the cosmological ladder so soon, but if the technological window is open now (we are closer to going to Mars now than we were at the beginning of the '60s of going to the moon), it could close sooner than we think (the catastrophism of Musk, Hawkins, massive human extinction to the era of the Anthropocene, a large environmental catastrophe, near-Earth object asteroids, etc.).

It doesn't make sense to leave the next generations, who will already have many challenges, all the projects that we could be working on right now. Learning to live on an unwelcoming planet is clearly working for a durable development for Earth (protection of natural resources, renewable energy, autonomous habitats, telehealth, etc.).

Space exploration is the best investment for humanity and life on Earth, where repercussions are already present. Opening our world to new perspectives and certain aspects of infinity transforms our ideas of societal priorities that often cling to a world that is perceived as being at fault and closed off (limited resources leading to conflicts, competitions, widening of inequalities, withdrawal, etc.). This transition would need to be accompanied by investigations and substantial actions starting now, without waiting any longer, through collective desire. I hope to see us reach towards this vertical dimension and a new perspective.

Space exploration agencies have been preparing for far-off space exploration since the 90s and long-term missions (Poliakov, One-Year Mission, etc.), certain private initiatives (Mars Society, for example) or hybrids (Hi-Seas NASA, Concordia ESA, Mars 500 Roscosmos-ESA, etc.) lead to comparable simulations. More so than space exploration missions,

analyses of social psychology data, and harsh environments like polar winters, underwater, special forces, etc., we are always building bigger and better.

You are a qualified aerospace doctor; do you think that we will be able to live on Mars in 2084? Could we modify our physical qualities and our genes to be able to live better and longer?

More complex than extremophile bacteria, the true multicellular mushrooms “physiologically” adapted to space are the Tardigrades who can withstand all space conditions (empty space, radiation, pressure, temperature, etc.). We humans depend completely on life support systems in order to live in such conditions, like in certain places on different planets. However, our immaturity relative to space exploration, which has pushed us to develop technology as well as fiction, culture, and cooperation, gives us without a doubt the best chances of adapting to another planet and the conscious life that we know. My optimism makes me think that not only will we be able to survive, but also live on another planet.

In the beginning, not everyone will be able to adapt. Pioneers will more so resemble “monks of space” or the nomads of the desert than “space cowboys” of pioneer astronauts.

If the environment and history have continuously transformed our physical characteristics and our epigenetics, it seems that we are at a point of acceleration and widening of a field of possibilities with NBIC technologies. However, from my point of view, our advantage is human nature, not transhumanism. “Advanced” humanity already exists in a certain way, but transhumanism was born from a rather materialistic

philosophy according to which properties emerge from complexity such as the consciousness of a neural network and a curb of exponential AI with strong originality, from the search for technological resolution to an existential anguish, and a performance society. I have a tendency to see the “sigmoid” curbs with steps in the place of exponentials and incompleteness of Gödel in the place of a deterministic complexity. I prefer more mature humanity over advanced humanity...

Be that as it may, years go by, we help the same movement of democratisation of space exploration just like what took place last century in aviation, which space is an extension of. There is an entire range of space exploration experiences that are emerging (zero-G flights, suborbital flights, orbital flights, hotels in orbit, even lunar and Martian villages are on the horizon). The ticket prices are still clearly high, which shows the inaptitude of such trips, but will see a price drop throughout the decades. Let's not think linearly anymore. This working democratisation of space exploration should be thought about today because it contributes to revolutionising the world tomorrow, not like a geo-anthropocentric continued present but a large step for civilisation.

Exercise, nourishment, meditation. For you, what will be the driving forces of our well-being in 2084?

Our well-being, as I see it, is being consciousness of the four circles of what we do: “I take pleasure in what I do,” “I have skills in what I do,” “I can use these skills,” and also “I contribute to changing the world into what my idea of an ideal world is.” This is the Japanese Ikigai, which is similar to entrepreneurial “purpose” but goes much deeper than that.

Well-being goes hand in hand with the perception of good health, and it's true that the most important and natural pillars in order to achieve good

health are good eating habits, physical activity, and altered states of consciousness. Nutrition has always been the first healing method and today is comprised of macronutrition, micronutrition, chrononutrition, functional nutrition, and nutriomics. Nutrition will follow with the evolution of medicine, which is changing from evidence-based medicine, which is a little reductive, to medicine driven by the P4 (for preventative, predictive, personalised, and participatory), AI, and Big Data that takes into account the complexity of health and not just causes. I see nutrition being very personalised and sophisticated, yet it still recognises the importance of pleasure, the togetherness of sharing a meal, and the act of cooking.

This joins together all the altered states of consciousness that many cultures haven't forgotten to continue practising and uphold many virtues like meditation, full consciousness, self-hypnosis, cardiac coherence, binaural sound, lucid dreaming, and even "work naps." Physical activity is indispensable and is much bigger than sports or high performance. It can include a contemplative function (walking, running, etc.) but should also include functional activities like posture, heart health, and endurance on a regular basis. Artistic activities are creative and just as important.

These fundamentals are already in place in 2018 and have been for a long time. History is often more useful than anticipation in order to predict the future and I think that we will find these pillars still in place in 2084. That said, the future is often unlikely and the best way to predict it remains to create it together!

*This article was originally published in French as *L'exploration spatiale est le meilleur investissement de l'humanité pour notre vie sur Terre* in August 2019 on Maddynews.com.



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