

École Polytechnique – Écoles Normales Supérieures
École supérieure de physique et de chimie industrielles
Concours 2014 – Filières MP et PC

Proposition de correction

I. Première Partie (A). Synthèse de documents

Tableau de synthèse

<u>Document 1</u> Article, <i>The Observer</i> , Oct. 20th, 2013	<u>Document 2</u> <i>The Observer</i> , New publication, on the occasion of Neil Armstrong's death, of article of April 3rd, 2008,	<u>Document 3</u> Article of May 24th, 2013 by space expert S. Fred Singer	<u>Document 4</u> Graph of NASA's budget in constant \$ over the last 50 years
<p>3 phases in the history of space exploration :</p> <p>a. confrontation. Context : the Cold War.</p> <p>b. collaboration. imposed by costs of satellites and launchings</p> <p>c. commercialisation. A necessity. e.g. through collaboration with existing private companies (<i>SpaceX, Reaction Engines</i>), or possibly through the commercialisation of space trips.</p>	<p>Retrospective of NASA's foundation and its achievements, notably the Moon landings.</p> <p>Feeling of unease :</p> <p>a. NASA beset throughout its history by political and financial problems, owing to budget cuts.</p> <p>b. At present, NASA dependant on Russia for launchings and supplying the ISS.</p> <p>c. Shadow on glorious achievements : much improvisation and risk taking in the Moon expeditions.</p>	<p>Disappointment in the ISS :</p> <p>a. meagre scientific contribution.</p> <p>b. it has not fulfilled the successive missions assigned to it.</p> <p>c. hence a lack of public interest in it despite its cost to the taxpayer.</p> <p>The problem is a lack of precise goals with clear justifications :</p> <p>a. ludicrous military objectives originally.</p> <p>b. a manned Mars mission ?</p> <p>c. a Moon colony ?</p> <p>d. a mission to capture asteroids or store them ?</p> <p>→ Suggestion of amateurism (« armchair astronauts »).</p>	<p>A peak in 1963</p> <p>A quick drop immediately after.</p> <p>Budget more or less stable in constant \$ throughout the last 3 decades.</p>

Main points :

1. The cost of space exploration and the budget problems of space agencies.
2. The necessity to reassign precise objectives to NASA.

Suggestion de synthèse

Commercialisation is probably the solution to NASA's financial problems

The documents presented all hinge on the problem of funding space agencies in general and NASA especially, and on the necessity to reassign precise objectives to the agency, to help it optimize its funds and find new resources. The first text, taken from *The Observer*, a British weekly, focuses on the history of NASA to advocate commercialisation in order to do just that, while the second, also from *The Observer*, takes the opportunity of Neil Armstrong's death to republish an article covering the history of the agency since its foundation by President Eisenhower in April 1958, during the Cold war. The third, by space expert Singer, is critical of NASA's achievements, either past or present. The fourth document, a graph, shows how NASA's budget peaked in the 60s, but has since remained pretty stable in constant dollars.

The cost of space exploration is prohibitive and the problem of funding does not concern NASA only. Other space agencies such as the European Space Agency have pooled their resources to face it, but the ten countries involved find it difficult to adjust their policies, which is a problem of NASA too. It is actually beset by political and financial problems, recurrent since its foundation. The result is that, with the space shuttles abandoned as obsolete and risky, it is now deprived of suitable means to supply the ISS which the American taxpayer helps maintain and depends on Russia for it, with all the geopolitical bargainings this entails. The ISS itself has proved disappointing by not really successfully fulfilling the successive missions assigned to it, such as for instance serving to the exploration of the solar system. Its scientific contribution has on the whole been meagre.

The real problem, however, perhaps lies not so much in the costs as in an insufficiently clear definition of NASA's goals. At the time of its creation, its aim was to conquer space supremacy over the USSR in the Cold War context. The launching of Sputnik I in 1957 had been a trauma and no effort was spared to conquer the « New Frontier » of space described by President Kennedy. This resulted in the epoch-making Moon landing of July 1969 and in the success of the Apollo missions, although they apparently entailed a lot of improvisation and the taking of great risks. But the period of confrontation is now over and this has left NASA with a lack of precise goals. Several objectives were successively proposed: establishing a base on the dark side of the Moon for astronomical purposes, making the Moon a relay for Mars expeditions... Loonier projects have been to catch asteroids and store them on libration points so as to study them. But these do not proceed from a strategy and a redefinition of NASA's overall mission imposes itself.

What are the solutions, since the administration appears unclear in its doctrine about space ? As pointed out above, an obvious one would be to reassess the objectives and stick to a policy. As for new resources, they are not to be expected from public funding, since the public at large seem to have lost much of their interest in space exploration and are probably not ready to accept a significant rise of the NASA budget. An interesting path to explore might be to develop collaborations with private commercial companies, such as *SpaceX*, which supplies the ISS, or *Reaction Engines*, which has designed a reusable spacecraft functioning

on the oxygen of the atmosphere. But this does not exclude the possibility to propose space trips to people ready to pay in order to fulfill a dream.

The next few years are probably going to see a new impulsion to space research, particularly with the project of a Mars expedition. But the problem of cost will have to be solved first and that inevitably implies a refocusing of NASA on strict, but feasible, objectives.

(646 mots)

II. Seconde partie (B). Texte d'opinion

What surprises — and indeed shocks — most on reading this text is the detached tone with which it argues in favour of sending astronauts to their death on a no-return trip to Mars.

Of course, space exploration is vital to find new resources and test the possibility of colonizing other planets. But Lawrence M. Krauss concentrates solely on the cost of a Mars expedition and not only brushes aside any human consideration but uses spurious arguments to justify his stance. Shielding astronauts from cosmic rays on the way or making plans for their return to Earth is simply out of question. Astronauts thus become consumables, to be discarded when no more of use.

One wonders what is more indecent of Lawrence M. Krauss's cynicism or naivety. His idea of preferably sending ageing astronauts because they wouldn't be expected to survive for long anyway after being exposed to cosmic rays, with the implicit suggestion that aged people become financial burdens to society, is simply sordid. But that of sending young scientists, when they could perhaps still have the time to give their full potential, is pure callousness.

His argument that the colonists and pilgrim fathers of old did not entertain much expectation of ever returning home is flawed. Of course European immigrants to America were happy to turn their backs on poverty and tyranny. But it was because they expected to live and thrive, not ail and perish as Mars astronauts would be doomed to.

As for his reference to « informal » surveys conducted among his students in order to justify his view, it was demonstrated years ago, and confirmed time and time again since then, that people surveyed tend to answer as they think the pollster expects them to. One can very much doubt if Krauss's eager students would start merrily packing their bags for a dip into the unknown, with sure death at the end, if they were told that take-off is tomorrow.

An interesting point is that Lawrence M. Krauss takes it for granted that mankind will have to colonize Mars « should something terrible happen back home ». The hypothesis of having to colonize other planets because of the depletion of Earth's resources and a polluted environment is worth considering in itself, and actually founds the present search for exoplanets capable of sustaining life. But what is that « terrible thing » in Mr. Krauss's mind? The formula sounds like a self-fulfilling prophecy where the necessity to leave Earth would be hastened by horrors (the fall of an asteroid? vast epidemics of new disease ?)... It sounds as if Mr. Krauss relishes the idea..

Last but not least unpleasant is his reference to « the stumbling block of political considerations » that would prevent enlightened technocrats from having it their way. This attitude doesn't suggest much respect for democracy in the writer's mind. Considering that the end justify the means is characteristic of tyranny. The mental world of Lawrence M. Krauss esq. is that of *Brave New World*. Heaven forbid !

496 words