Scientists for Global Responsibility

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Unscrambling a space career from military forces

By Dr David Webb

A Scientists for Global Responsibility briefing

This briefing provides an insight into the implications of choosing a career in any field associated with space exploration or space technology. The forces that drive developments in space technology are complex, often political, and very often linked – either overtly or covertly – with a military imperative. The briefing aims to facilitate a deeper appreciation of these forces by offering a perspective on this military influence on the space industry that's rarely seen elsewhere. It can be read in conjunction with other material on the same issue available from SGR (see www.sgr.org.uk/arms.html).

Unscrambling a space career from military forces is of relevance to students and graduates of:

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Cosmology
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Mathematics
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Political Science
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Statistics

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This briefing is part of a series entitled ***Thinking About an Ethical Career in Science and Technology*** **(www.sgr.org.uk/ethics.html)**.

Thinking about an ethical career in science and technology

Thinking About an Ethical Career in Science and Technology is intended to give young scientists and engineers an understanding of the wider ethical dimensions of various careers in science and technology. Each briefing focuses on an area in which science and technology can play a major role, either good or bad, and examines the social and environmental controversies in that area. It then gives guidance on how to make an informed, 'ethical' career choice.

Space and controversy

Activities in space, whether scientific, military or civilian, have always been controversial. They give rise to questions like: How do we justify so much money being spent on this type of high technology when there are so many social programs needing finance? What are the short and long term environmental consequences of this activity? Do military developments in space make the world safer or more dangerous? Can scientific missions in space be separated from military activities? Are scientific missions in space a way of justifying and improving military activities?

In a democratic society it is often argued that in order for a project to obtain funds from the public purse, it must be approved and scrutinized by a democratically elected government or its appointed servants. This means that individuals do not need to justify their participation in these projects as they have already been sanctioned by society.

However, others argue that people should make their own moral and ethical judgements, especially when public policies may have been arrived at through compromise, misinformation and/or powerful lobbying by vested interests. There is much evidence to suggest that many space-based projects and policies have been, and still are, subject to more than one of these undemocratic influences.

The historical context

To date there have been nearly 5,000 worldwide orbital space launches. The major players in the development of space systems have traditionally been the United States and the Soviet Union (now Russia), although recently Europe (through the European Space Agency, ESA), China, India, Israel and Japan have been able to add their names to the list of "space capable" nations, with Pakistan and North Korea fast developing the potential.

The UK, of course, has long abandoned its rocket programme due to costs, and now often uses the French Ariane rockets to launch scientific satellites. However it has also relied heavily on US systems for the development of scientific and defence projects. A comprehensive history of US developments in space can be found in[1] – including a description of how its roots were founded in Nazi Germany, of all places, by Werner von Braun – the same man who developed the V1 and V2 rockets used against London towards the end of World War II.

The research potential of space has also long been appreciated. It was back in 1955 that the US first announced its intention to launch a satellite for the purposes of scientific study: specifically to observe the upper atmosphere during the coming International Geophysical Year (1957-8). The Soviets announced their intention to launch a satellite at around the same time, which they managed in 1957 with Sputnik 1. The US followed closely in 1958 with Explorer 1. It was data from Explorer 3 that led to the discovery of the Earth's radiation belts.

However, the most basic investigation reveals that the influence of military and political agendas on space exploration overwhelms scientific motives on many fronts, and that this has always been the case. The first scientific and explorative space missions employed hardware originally developed for military purposes and the race to send astronauts (most of whom were recruited from the military) to the moon was politically motivated.

The military use of space could be said to have started with the German deployment of the V2 rocket towards the end of World War II. But it was the first test detonations of the hydrogen bomb in 1952 by both the Soviet Union and the US that accelerated military space developments. The hydrogen bomb is a much smaller and more powerful nuclear weapon able to be carried on a rocket. Thus both sides were spurred into a race to develop such rocket technology.

The US National Security Council (NSC), meanwhile, laid out recommendations to effectively separate the military and civilian sectors of the US space effort. In July 1958 the US government passed The National Aeronautics and Space Act, which officially divided the civilian and military sectors and created the National Aeronautics and Space Administration (NASA). NASA was devised to be a strictly civilian enterprise, thereby limiting the military's role in the national space programme.

And, also as a counter to the possible risks from the militarisation of space, the UN General Assembly in 1967 introduced The Outer Space Treaty, which reserves space for peaceful purposes. It is now agreed by 91 nations including Russia and the UK (although the US has not renewed its support). The Outer Space Treaty bans nuclear weapons and other weapons of mass destruction from space and also says that nations shall not "contaminate" space; that "states shall be liable for damage caused by their space objects" and that "the exploration and use of outer space shall be carried on for the benefit and in the interests of all countries and shall be the province of all mankind".

NASA's Dale Gardner with two failed satellites.
NASA

NASA: not so independent

However, the US Congress always wanted a stronger military role in space than that supported by the international community – and the National Aeronautics and Space Act. Its response to the division between a civilian space agency and the military needs was to create the Civilian-Military Liaison Committee, which coordinated NASA and the US government's Department of Defense (DoD) activities; and also the National Aeronautics and Space Council (chaired by the President as commander in chief of the US military, to create national space policy). And after a sharp funding cut to NASA at the end of the Apollo moon exploration programme, Congress instigated a US government policy stipulating that NASA should be more involved in co-operative ventures with commercial and military projects.

Since then NASA has moved very clearly in a direction away from the strictly civilian enterprise that it set out to be. Its new head, Sean O'Keefe, was appointed in early 2002. O'Keefe was a former Navy Secretary during the first Bush government in 1992, and earlier served as the Pentagon's (i.e. the Defense Department's) controller, so it was perhaps no surprise that he expressed a wish to work more closely with the Pentagon on research and development and on actual missions. "I don't think we have a choice. I think it's imperative that we have a more direct association between the Defense Department and NASA … Technology in the course of the last decade ... has taken us to a point where you really can't differentiate ... between that which is purely military in application and those capabilities which are civil and commercial in nature," he said at the time of his appointment.

Missile defence?

Space exploration throughout the latter half of the 20th and the beginning of the 21st centuries has seen remarkable achievements: projects to put men in orbit, to walk on the moon, and to send complex scientific probes out to the far reaches of the Solar System.

But what have also been prominent are ever more ambitious "missile defence" (MD) systems proposed by the world's superpowers – effectively, attempts to achieve military dominance of space. In the 1980s, the same decade that the first space shuttle was launched, President Ronald Reagan made his famous Star Wars Speech, in which he announced the Strategic Defense Initiative (SDI), calling for defensive measures to render Soviet missiles obsolete and undermining the ABM (Anti-Ballistic Missile) Treaty signed by the US and the Soviet Union in 1972.

The SDI Organisation became the Ballistic Missile Defense Organisation (BMDO) under President Clinton in 1993, and a 'Memorandum of Agreement' was signed with NASA to exchange information and participate jointly in various activities. When George W. Bush became President in January 2001, he appointed Donald Rumsfeld as Defense Secretary, who immediately produced a report emphasising the protection of US "space assets" as a top priority and setting out the administration's policy on militarising space. More than 30 years after SDI, Washington was saying that it needed a missile defence system designed to protect the US from a potential new threat of missiles fired by "rogue" states such as North Korea, Iran and (at that time) Iraq. The BMDO was given more prominence and elevated to the Missile Defense Agency (MDA) in 2002.

The US has so far spent over $120 billion in developing missile defence systems. The proposed MD budget for 2004 is now $9.6 billion. (Compare this with the estimated additional annual cost of providing clean water for the world's entire population: $10 billion, according to the Worldwatch Institute.) In a January 2003 report *The Full Costs of Ballistic Missile Defense* prepared by the Center for Arms Control and Non-Proliferation in Washington, and Economists Allied for Arms Reduction in Pearl River, N.Y., the total life-cycle cost for a layered missile defence system is put at nearly $1.2 trillion through to 2035.

At the time of writing, the US aims to turn on the first stage of its 'Son of Star Wars' system on 1st October 2004, despite evidence that such a system can still be circumvented or swamped by large numbers of actual or decoy missiles or low flying cruise missiles[2], and a scientific study by the American Physical Society that the favoured "boost-phase system" (where missiles are intercepted while their rockets are still burning) would not be effective against potential missile threats from North Korea and Iran[3]. For further evidence of the political and military agenda behind the US domination of space, see Loring Wirbel's book *Star Wars – US Tools of Space Supremacy*[4] and the US Space Command's 'Vision 2020'[5], which argues that the protection of space requires superior US space warfare capability.

An artist's impression of a GPS satellite in space.
www.space4peace.org

And remember that in January 2003, the UK's Blair government gave the US permission to upgrade the radar at Fylingdales in Yorkshire for use as part of the Star Wars plan, despite warnings that the radar upgrade would make Fylingdales a target for potential enemies, and dismissing concerns about the health effects of electromagnetic radiation due to the radar. In January 2004 a question in parliament revealed that the UK has already spent some £30 million on missile defence projects since 1994. The Fylingdales upgrade is due to be completed by September 2006.

Missile Defence is seen by many analysts and politicians as less a deterrent and more an internationally destabilising initiator of an arms race to develop more high technology (including nuclear) weapons, to be deployed through and in space.

Just a satellite…

Satellite technology, while an invaluable tool for scientific studies of the geosphere, also plays a key part in communications and surveillance within modern warfare. The need to protect important military satellites is a major imperative behind increasing research into weapons systems to defend spacecraft. The information they provide is used by military commanders to monitor battlefields, develop strategies, organise forces and target weapons.

In 2003 satellite systems were a key component of the execution of the war on Iraq. Just nine days before the start of the war, a new US Defense Satellite Communications System was installed in space to connect ground forces, ships, planes, the Pentagon, the White House, the State Department and the U.S. Space Command. Over 50 military satellites supported the US and UK war effort as well as 27 Global Positioning System (GPS) satellites, around two dozen communications satellites and a number of weather forecasting, TV and other systems.

While the use of satellites in this context is clearly military, there are other cases in which differentiating between military and the civil applications for a satellite, or indeed any space-related project, is not trivial. This is the issue at the core of this briefing: in order to make a decision with which you are happy, it is important to have all of the information. Where space projects are concerned, all claims should be closely inspected.

Nuclear power in space

Much space travel quietly makes use of radioactive material. Devices such as Radioisotope Thermoelectric Generators (RTGs), for example, use large amounts of plutonium 238 (e.g. 33 kg on board the Cassini mission to Saturn) to generate electricity.

According to NASA, if the Cassini probe had made an "inadvertent re-entry" into the

Earth's atmosphere during the fly-by part of its route, it would have broken up. In this case, plutonium would have been released and – in NASA's words – "approximately 5 billion of the…world population at the time…could receive 99 percent or more of the radiation exposure." Many attempts were made to estimate a possible human death toll. Some suggested hundreds of thousands, while others thought millions was more likely.

In February 2002 NASA announced plans for a 10 year, $1 billion program to develop a nuclear rocket known as "Project Prometheus". Such a rocket could reduce the amount of time it would take to get to Mars by a factor of 2 – and would also have military applications. Given the alternative of solar power as a viable energy source for most space missions, and the alarming failure rate (1 in 7 so far) of rockets that have been launched with nuclear materials on board, it's important to think carefully about the health, safety and ethical implications of any space project involving nuclear energy.

Beware: creeping militarism

So, you've done your research and you're sure that your chosen project is free from sinister imperatives. Let's say, for the sake of simplicity, that you have decided not to be involved in any military research. Watch out: just because a space project appears not to have any military interests, it doesn't mean that will always be the case. Very often space projects are sold to the public for one reason (e.g. spotting ecological disasters), but as soon as the technology can be demonstrated, are sold out to the highest bidder (i.e. the military).

For example, in March 2000 the Ottawa Citizen reported that Canada's Radarsat 1 satellite, launched in 1995 as a remote sensing satellite, was to become a military spy satellite. The Canadian Space Agency had said the system would be used solely used for peaceful assignments – such as mapping forests and charting the movement of ice in the oceans to help ships navigate. However, documents obtained by the Citizen though the Access to Information Act show that the Canadian Department of National Defence intended to use Radarsat for military purposes from the time of its launch. Not only that but Radarsat 1 information and images are routinely passed to the US DoD, and military spying will be the main job for Radarsat 3, to be launched in five years' time.

The original European Space Agency (ESA) statute limits its activities to peaceful purposes. However, in November 2000 ESA and the European Council issued a joint strategy paper on Europe's role in space[6,7] in which they make it clear that dual-use is inherent to all space technology, that space plays an important role in a European defence system, and that they see it as "logical to use the capabilities of ESA also for the development of the more security-oriented aspects of the European Space Policy".

Using space for war is not a marginal activity. The director of space operations for the US Air Force, Maj. Gen. Judd Blaisdell, has estimated that 33,600 people at 36 sites around the world are involved in space-war activities[8]. Therese Delpech, the director for strategic affairs at the Atomic Energy Commission in Paris, has stated that "the 20th century added a new dimension to warfare with the nuclear bomb, and the 21st could well be remembered for bringing the arms race into space"[9].

Recent US announcements relating to plans to send a manned expedition to Mars and to build a base on the moon should also be analysed in this light. The moon, for example, would be a useful place to establish a presence as war-fighting moves into space. This has been considered by the US, according to evidence documented by the Global Network Against Weapons and Nuclear Power in Space (www.space4peace.org).

Justifying space missions

The decision to initiate or progress on a space project will usually involve considering its benefits, costs and risks. Any discussion of the 'worthiness' of a project should include one or more of the following fundamental questions. Why go? Where do we go? How do we go – and at what cost? How do we prioritise activities and spending? How do we ensure

Soyuz rocket launch.
NASA/Scott Andrews

international "good" behaviour?

Of these the first four may involve financial questions and the final will involve political appraisal and the possible implications of international treaties. However, the first three may also involve some ethical considerations, especially when there may be some danger to life (human or other) or the environment (of space, Earth or some other body).

In assessing whether to become involved with any mission, planned or underway, this might be a useful checklist to run through with the organiser in order to establish the motives and benefits of the operation. But more information will be required for a full analysis, and also some means of assessing whether ethical standards are being, or will be, maintained.

One useful source of information comes from a conference held in 1999 by the Interdisziplinäre Arbeitsgruppe Naturwissenschaft, Technik und Sicherheit (IANUS) of the Technische Universitat Darmstadt (TUD). Called: 'Space Use and Ethics – Criteria for the Assessment of Future Space Projects', the conference took place at TUD in Darmstadt, Germany from 3-5 March[10]. At this conference Jürgen Scheffran[11] suggested that the worthiness of science and technology projects should be evaluated by considering:

- The costs and resources needed to realise the project;
- The goals and benefits expected from the project;
- The undesired consequences and risks from the project.

Scheffran also suggests that we should also ask who gains what, who pays the costs, and who takes the risk. Very often these are quite different groups of people. In the 21st century, space technology should contribute to solving conflicts and problems on Earth. In this context, he suggested that future space projects should:

- Exclude the possibility of severe catastrophe
- Avoid military use, violent conflict, and proliferation
- Minimise adverse effects on health and environment
- Assure scientific-technical quality, functionality, reliability
- Solve problems and satisfy needs in a sustainable and timely manner
- Seek alternatives with best cost-benefit effectiveness
- Guarantee social compatibility and strengthen cooperation
- Justify projects in a public debate involving those concerned.

Decision-makers could find these criteria extremely useful when judging and/or prioritising future space missions. If you are involved in a space project, perhaps you can find a way in which to introduce these criteria into the decision-making process.

The list may also be useful for judging the acceptability of a particular activity or project in which a space agency is engaged, or indeed any other organisation or company connected with that activity, in order to help decide whether you, as a prospective employee, find that job or organisation ethically acceptable.

Conclusion

In the above I have attempted to show that military, commercial and scientific endeavours in space are closely linked and that the military requirements predominate.

There is not space here to fully cover important areas such as the use of nuclear power and weapons in space, the ethics of using our valuable, finite resources to search space for life forms on other planets while at the same time endangering life on Earth, or growing concerns over the exploitation of the natural resources of Earth and other heavenly bodies. Some of these issues are covered in additional space-related briefings also available from the SGR web site[12]. However, I hope that the above discussion of how space travel and satellite technology has evolved in conjunction with military agendas reveals enough of the otherwise hidden complexity to give an idea of the forces at work.

Of course, not all space projects are harmful. There are many astronomical and physics experiments that are entirely aimed at increasing our knowledge and understanding of the universe. It is right that these capture the imagination of enthusiasts and the general public. Astronomy and space exploration are fascinating areas in which to work. Space-based technologies can also offer positive contributions, like the Earth observation satellites that are crucial to the task of monitoring the state of the environment.

But we must be careful with whom we associate in space related projects. Many major scientific and technological projects are initiated for political and/or military reasons rather than those of intellectual curiosity or in a search for knowledge. Projects are frequently either taken over by the military or are used to justify or deflect from associated military activities. If we do not believe this to be the right way to progress, we must be vigilant and speak out against exploitation and false representation. We can refuse to participate, particularly in life threatening activities. And above all we can remember to be well informed and to allow others also to see the full picture. Ignorance is often at the root of inactivity.

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[12] See http://www.sgr.org.uk/arms.html.

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