



Report

Role of the current young generation within the space exploration sector



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ABSTRACT

The space sector gathers together people from a variety of fields who work in the industry on different levels and with different expertise. What is often forgotten is the impact and role of the current young generation. Their engagement is of great importance as undeniably today's young 'space generation' will be defining the direction of future space exploration.

Today's vision of future human and robotic space exploration has been set out in the Global Exploration Roadmap (GER). This focuses on sustainable, affordable and productive long-term goals. The strategy begins with the International Space Station (ISS) and then expands human presence into the solar system, including a human mission to Mars.

This paper presents a general overview of the role of today's youth within the space exploration sector and the challenges to overcome. To complete this perspective, we present results from a survey made among students and young professionals about their levels of awareness of the GER. The respondents presented their opinion about current aspects of the GER and prioritised the GER's objectives. It is hoped that the paper will bring a new perspective into the GER and a contribution to the current GER strategy.

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1. Evolution and current status of space exploration

In order to understand the role that young people have in current space exploration it is useful to understand the evolution of space exploration itself.

The history of space exploration has been divided into four different phases with specific duration and characteristics [1]. The first steps in space exploration, or the 'Proto-space Age', started right before the Second World War. It was a time characterized by individual space leaders such as Robert Hutchings Goddard in USA, Konstantin Tsiolkovsky in Russia, Hermann Oberth in Germany and Pedro Paulet in Peru, and organizations often influenced by the work of science fiction authors (Jules Verne, Herbert George Wells or Karel Čapek among others). This phase represents the first attempts made by scientists and engineers in rocket development; their advances were not always recognised by their peers, but they certainly marked the kick-off of space exploration.

During the Cold War, space exploration entered a second stage ('Space Exploration 1.0'), a competitive scenario dominated by the USA and the USSR and driven mainly by geopolitical and national supremacy interests. Budgets allocated to the space agencies were increased significantly (up to 4.4% of the Federal Budget for the USA) as was the number of employees. With the end of the Cold War and the disintegration of the USSR, the sector entered in a third stage often referred as Space Exploration 2.0. The competitiveness of previous decades gave way to international cooperation driven by scientific and technological interests [1,2]. The earlier duopoly situation no longer exists, instead, more and more countries are participating in the space sector either by developing their own space program (e.g., China, India, Japan ...) or through cooperation agreements with intergovernmental agencies.

Traditionally, space exploration missions are organised as a result of intense consultations between national space agencies, the scientific community and the space industry. However, with the current economic crisis impacting western economies, international cooperation and global thinking are top priorities to ensure progress in this field [3]. An example of how national agencies are cooperating together to move forward is the ISECG and the Global Exploration Roadmap [4].

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Within the current economic scenario, entrepreneurial endeavours supported by large private capital are also arising. Companies such as Golden Spike, Bigelow Aerospace, SpaceX and Mars One are willing to change the existing scene. These types of companies have the potential to establish strong relationships with well-established space industry (i.e. Airbus Group or Boeing) and lead the space exploration field with larger budgets than those managed by national agencies.

On the other hand, the development of more capable, affordable and reliable space hardware allows many universities and even the general public to have an active role, often stimulated by international competitions such as those organised by the X Prize Foundation [5]. Participative space exploration formed by innovative companies, universities and the general public is now flourishing and it may represent a new stage in space exploration. The Space Exploration 3.0 phase will be driven by the pursuit of knowledge that transcends science to include other disciplines such as art and humanities and it may represent the step needed to become a multi-planet species in the medium long term future [1,2].

2. Today's young generation in the space sector

With the overall picture of the space exploration field in mind, the direction that will be followed in the future will depend on today's young generation of space professionals. The culture in which they have been raised as well as the roles and experiences they are facing now will determine the decisions they will take tomorrow.

2.1. Characteristics of the young generation

Despite being a challenging task, there are several studies that try to classify the behaviour of an entire generation according to certain patterns and labels. One of the soundest generational theories is the one proposed by Strauss and Howe [6] which groups generations based on their attitude towards life. According to Strauss and Howe, the current young generation (individuals born between the early 1980s to the early 2000s) comprise the so-called “Millennials”, or “Generation Y”. Its basic features are summarised into 7 core traits: Special, Sheltered, Confident, Team-oriented, Conventional, Pressured and Achieving. Millennials are supposed

to have a team-oriented optimistic approach during the economic crisis and they emerge as energetic and confident senior professionals that will end up featuring as powerful leaderships in our society [6].

However, as expected in such ambitious studies, there are numerous discrepancies. The “Generation Me” concept, for example, describes Millennials as a selfish narcissist generation where everyone considers themselves a special person with a successful career. This point of view is partially explained by the strong influence that media had over children at the beginning of the Information Age [7].

Nonetheless, Millennials are repeatedly described as individuals seeking personal and professional fulfillment rather than stability, hence they will tend to have a nomadic approach in order to achieve their ultimate targets [8].

2.2. Young generation within the space sector

During the first stages of space exploration, most of the young professionals were hired by national agencies, i.e. during the cold war, the percentage of NASA's permanent positions filled by people under 35 years old reached peaks of up to 30%. With the end of the USSR and the space race in 1989, this percentage started a sharp decline (Fig. 1) with a slight increase in the last 5 years (12% in 2013) [9–12]. Nowadays, the changing space exploration scenario marked by a complicated international economic situation along with the sociological profile of the young generation, allows for a tendency to increase efficiency and promote excellence and international cooperation. Most of the young professionals not hired by national space agencies will seek an opportunity in the rising space exploration industry. Furthermore, pushed by high unemployment rates and even higher levels of competitiveness, many young space professionals will not hesitate to create their own space exploration businesses.

3. Global exploration roadmap (GER): survey and results

The student and young professional community were surveyed to find out the levels of awareness of the GER in the 18–35 age group, and canvassed for their opinions about its central themes of robotic and human space exploration. Over 50 people replied and this is a summary of the results and ideas.

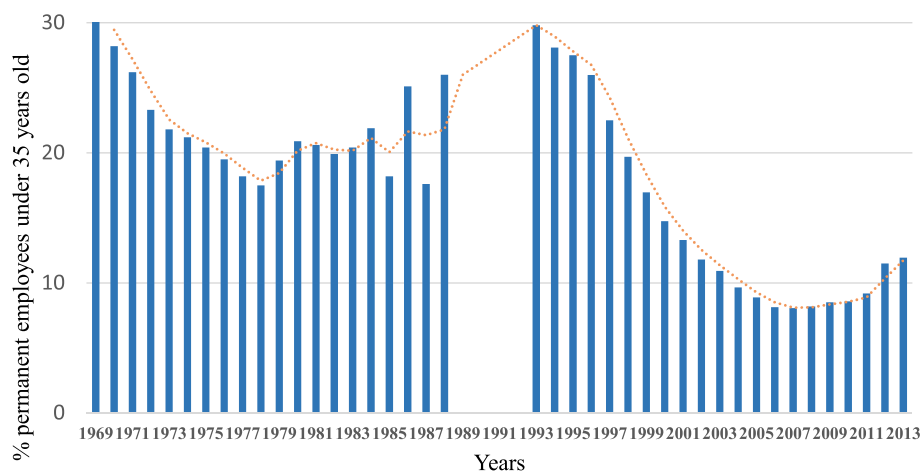


Fig. 1. Graph showing the variation of the percentage of permanent NASA employees under 35 years old since 1969. The first observed decreasing slope may be caused by aging of the employees. From 1978 to 1988 we observe an irregular pattern of young employment with a general tendency to increase. However, after 1993 the decreasing slope is very steep reaching a minimum of 8%. There is a slight increase in the last 6 years but it is highly improbable back to levels of the early nineties. Data obtained from the NASA People Human Resource website and the NASA Historical Data Books.[9–12]

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