

# Space and the Arts

Dr David Raitt

Senior Technology Transfer Officer, Technology Transfer & Promotion Office,  
European Space Agency - ESTEC, Noordwijk, The Netherlands

## Abstract

Space exploration is arguably the greatest voyage of discovery ever undertaken and just as artists have traditionally accompanied the great ocean and land voyages of the past, so artists have been and are at the forefront of space voyages of the future. Increasingly, the European Space Agency (ESA) is being asked to support or participate in artistic and cultural events, largely as a result of its study into science fiction literature and artwork. The presentation will first provide an overview of the relationship between space and art by discussing art that has been sent into space, orbital sculptures, art on Earth seen from space, and performance art and dance in zero gravity. The presentation will then provide an overview and discussion of ESA's involvement in some activities in this domain including the organization of science fiction and space art exhibitions and conferences, creation of a space arts database, setting up a space arts programme, and a study recently launched into how the European components of the International Space Station could be transformed into a platform for a wide range of cultural and artistic activities reaching out to the public at large and enabling them to share the human experience of space missions and interact with the sights and sounds of space.

## Introduction

Ever since humans started scanning the skies, many wonderful and fascinating images have been made available of atmospheric and cosmic phenomena such as rainbows, auroras, nebulae and galaxies, constellations and planetary landscapes. And not only images, but sounds too - including more recently sounds of black holes, auroras and solar flares. With the advent of spaceflight, film footage has been shown not only of launch vehicles, satellites and spacecraft, but also of humans themselves in space, as well as phenomenon only visible from space such as red sprites and planetary landscapes. Such sights and sounds have provided inspiration for artists and musicians, architects and designers and many others to create new ways of interacting with space and its human inhabitants.

Unlike NASA, the European Space Agency (ESA) has never had a formal arts and culture programme. However, largely as a result of the Innovative Technologies from Science Fiction for Space Applications study (see <http://www.itsf.org>) carried out by ESA's Technology Transfer and Promotion Office (TTPO), there has been a continuous and growing demand for greater ESA involvement in projects relating to art and culture - particularly as it relates to technology. For instance, EURISY asked ESA's TTPO to assist in organizing, together with the Austrian Space Agency, a one day symposium on Space Literature and Art in Vienna. The TTPO had already assisted in the organization of the Long Night of Science Fiction Movies, with expert discussion of the space technologies and science concepts employed in the films, in a shopping mall in Vienna. The TTPO was also requested to provide some funding for a special space opera to be held in Vienna as well as to support an art exhibition on the history of the cosmos at the Natural History Museum in Paris.

Various competitions have also been organized by the TTPO. The influence of space on design competition looked for ways of embodying the space technologies or the characteristics of space into new design forms (1). Another, the first Clarke-Bradbury Science Fiction Essay competition (2) attracted over 100 entries from around the world and was a way of encouraging young people to become more interested in space science and technology. A second Clarke-Bradbury competition focusing on the Space Elevator and also inviting artworks as well as essays is currently being judged. In addition, the British Design and Art Direction asked the TTPO to provide a design brief for

compact interior storage design for a national competition. The TTPO also participated in a fashion show in Paris at which designer clothing, incorporating space technologies, was modelled.

Besides these, the ESA TTPO is involved in other relevant space art activities and this paper will provide an overview of some of the ways in which ESA is supporting projects in this domain, including how the confined environment of manned space stations could be transformed into broader, more open arenas which would become the subject, canvas or theatre for a wide range of cultural and artistic activities. Such activities reach out to the public at large, thus enabling them to share the human experience of space missions and interact with the sights and sounds of space. But first, to set the scene, the background and evolution of space art will be summarized.

## Evolution of space art

Space exploration is the greatest voyage of discovery ever undertaken and, just as artists have traditionally accompanied explorers on many of the great voyages of scientific and geographic discovery, so artists have also been at the forefront of space exploration since its very beginnings. Since the first use of the telescope in 1610, before the invention of the camera, astronomers recorded their observations by making drawings. In 1870 Emile Bayard created woodcuts to illustrate Jules Verne's "Around the Moon" a sequel to his classic "From the Earth to the Moon" (1865). Around the same time James Nasmyth's illustrations were the first space landscapes to appear in a non-fiction book: "The Moon". Thus long before the advent of real spaceflight, artists were exploring space in the arts and literature and have continued their explorations ever since.

Art about space has not only been an integral part of space exploration since its beginnings, it has also played a vital role in its development as well. Visual artists and writers have created fictional images and scenarios on the development and evolution of space flight and such visions are one of the primary ways that the general public has been introduced to ideas about space exploration. Artists and writers, in fact, have laid and are still laying the foundation which makes future space activities understandable by the general public and thus helps secure the necessary political support.

While artists and writers of the past created many of the visions upon which the present space programme has been built, today, a new generation of artists and writers is serving the space community by helping to visualize future developments and by giving form to developing technologies. Others, inspired by the beauty and wonder of the cosmos and by the implications of humankind leaving its ancestral home planet, are creating new art forms and new art techniques appropriate to human expansion in this new environment. Therefore, having art included in humankind's activities in space is a logical and timely development.

### *The Definition of Space Art*

The term "space art" has many connotations and definitions even among the practitioners of this genre in the space community. Roger Malina, the editor of "Leonardo: The Journal of Art, Science and Technology", defines space art as contemporary art which relies on space activity for its implementation. Malina lists seven broad categories of space art:

- Fine art which exploits sensory experiences generated through space exploration. New landscapes become accessible through space photography and film. Space illustrators anticipated some of these and make use of the photographic record from space exploration.
- Art which expresses the new psychological and philosophical conceptions developed through the exploration of space. The primary example of this is the concept of the Earth as a whole system - a concept made concrete by the first views of the whole Earth seen from space.
- Art in space, viewed from Earth.
- Art on Earth, viewed from space.
- Art in space, viewed in space.

- The applied arts such as space architecture, interior design and furniture design.
- Fine art which takes advantage of new technologies and materials created through space activities.

Space artist and planetary scientist William Hartmann cites four roles for space art:

- Encouraging scientific exploration
- Recording historical evolution planetary exploration
- Promoting international cooperation
- Synthesizing information to stimulate new ideas about the universe and our relationship to it

To these can probably be added a fifth - informing the general public and creating a greater public awareness of and interest in the firmament and cosmos.

It is estimated that there are less than 2000 artists who are dedicating their talents to some form of space art and travelling through the territory where science and art overlap to depict and visualize the cosmos in a realistic way. The appreciation of this genre of art in all of its manifestations by the mainstream art community has been slow. Like much of science fiction literature, space art is rarely considered to be "serious" art but rather anecdotal to main stream contemporary art. Consequently, space art is most often found in technical museums and planetariums, although recently major art institutions and museums have begun to look closer at art dealing with space - partly because films with space or science fiction themes are extremely popular with the public and are financially very successful.

### ***Art Sent Into Space***

A number of artworks have officially and successfully been sent into space over the years - usually carried aboard a manned spacecraft. These include: a small ceramic tile carried on Apollo 12 in 1969 on which various artists, including Andy Warhol, drew images and geometric designs; the Fallen Astronaut - a small figurine by Belgian artist Paul Van Hoeydonk which was sent to and left on the Moon in 1971 as a part of an Apollo 15 astronaut's personal effects; an art conservation experiment consisting of four original oil paintings by Ellery Kurtz and other artistic materials sent into space on board the Space Shuttle Columbia in 1986 in order to evaluate the effects of spaceflight on fine art materials; an advertisement - the West cigarette company commissioned German artist Andora to paint the outside surface of a Russian Proton rocket launched in 1992 with examples of his art and an advertisement for the cigarette company; "Cosmic Dancer", a sculpture by Arthur Woods which was launched to the Mir space station in 1993 and which was designed to investigate both the properties of sculpture in weightlessness and the advantages of integrating art into the living and working environment of the cosmonauts; and the 1st Art Exhibition in Earth Orbit organized by Arthur Woods and Marco C. Bernasconi of the OURS Foundation in cooperation with the European Space Agency during the EUROMIR'95 mission whereby 20 original artworks and a laptop computer with 81 digitized art works accompanied German cosmonaut Thomas Reiter on his six month mission.

More recently, a text based work artwork by Australian artist Stephen Little entitled "Monochrome (for Mars)" was burned on a DVD and launched to Mars in July 2003 on board the NASA rocket carrying the first of two Mars Exploration Rovers; also in 2003 the European Space Agency's Mars Express spacecraft carried the Beagle 2 lander which was supposed to announce its safe arrival on the planet Mars by a musical sequence of notes composed by the pop group Blur, while a piece of modern art by British artist Damien Hirst was to be employed to calibrate the lander's instruments; a letter from Jules Verne was flown to the edge of space on the recent X-Prize winning flight of SpaceShip One and a first edition of one of his books may be aboard the inaugural flight of ESA's Automated Transfer Vehicle which is appropriately named Jules Verne; and the picture Single Mona Lisa 1:1 created by Russian artist Georgy Puzenkov in the form of computer pixels applied to canvas by means

of up-to-date technology was taken to the ISS in April 2005 by ESA astronaut Roberto Vittori together with a transparent crystal containing a tiny titanium-silicon plate on which is a nano-copy Single Mona Lisa 1:1 from a Russian nano-technology developer.

### ***Orbital Sculptures***

Orbital sculpture, because it is seen from Earth, is able to stimulate a global discussion of why should humanity explore and develop space. The scale and cost of such projects is enormous and there are complaints from those who consider such man-made artworks spoil the pristine view of the heavens. The first art-in-space concepts called spaceworks were proposed by Albert Notarbartolo in 1975. While he recognized the controversial nature of such concepts, he hoped that support for the launching of the first spacework would be obtained as a cooperative international venture under the auspices of the United Nations to symbolize the solidarity of mankind. Since then, the few art-in-space proposals that have been publicized and developed to some degree have indeed sparked enormous controversy and debate which is perhaps a signal of their communications potential. Most of these have also had a high symbolic content.

In 1986 Group Spirale proposed L'anneau Lumiere - a 24 kilometre diameter ring of 100 six metre diameter reflecting balloons which would have been visible as a circle in the sky larger than the Moon. This winning project to celebrate the 100th anniversary of the Eiffel Tower stimulated the most protest from the astronomical community and was eventually considered technically non-feasible as the sculpture concept did not have the necessary structural integrity.

Also in 1986, Arthur Woods proposed the Orbiting Unification Ring Satellite (OURS) project - designed to celebrate the new millennium. The one kilometre diameter inflatable toroidal sculpture would be visible as a circle in the sky approximately one-quarter the size of the Moon. The sculpture employed a chemically impregnated membrane that would harden or rigidize in the presence of sunlight. The sculpture would weigh almost 20 tons and would require an Ariane 5 or Titan 4 to launch. Woods followed this with the OUR-Space Peace Sculpture - a six metre diameter prototype of the OURS ring proposed for the International Space Year (ISY). A full size test model was constructed by NPO Energia in 1990 and a Letter of Intent for the launch was signed with Glavcosmos, but in the wake of the dissolution of the Soviet Union, funding did not materialize in time for the ISY. More recently David Raitt from ESA took up this idea and together with Arthur Woods proposed five interconnected rings to form the Olympic symbol in space. Detailed studies were done with a view to having the rings visible in the sky during the 2006 Winter Olympics in Torino, Italy.

Since then, there have been various other proposals for putting artworks or sculptures in orbit, as opposed to inside space stations or spacecraft - but until a really cheap method of launch into space is available then such orbital sculptures remain dreams.

### ***Art On Earth Seen From Space***

While Erik von Daniken may have believed that ancient Peruvian line markings were created for extraterrestrial visitors, to date, only a couple of artists have succeeded in producing artworks on Earth that were meant to be seen from the viewpoint of space.

As long as 25 years ago, American artist Tom Van Sant used a system of mirrors to create "Reflections" which was recorded by a satellite passing overhead. He followed this up six years later with "Desert Sun". French artist Pierre Comte used large sheets of black plastic to create "Signature Terre" which was photographed by the SPOT remote sensing satellite in 1989. Pierre Comte is working on another project involving children to create an image of a child which can then be seen from space. It is also worth mentioning that in 1947 the Japanese-American sculpture Isamu Noguchi, made a model of an earthwork in the shape of a face which was a sculpture to be seen from Mars. It was sadly unrealized.

### ***Performance Art In Zero Gravity***

Artists are training to become the next generation of space explorers and a branch of space art involves artistic experiments which have taken place during parabolic flights. Such flights typically give less than 30 seconds of weightlessness inside the aircraft per parabola, but this still enables artists and others to personally experience the effects of micro-gravity and incorporate it into their work.

Kitsou Dubois, a modern dance choreographer living in Paris, underwent a series of parabolic flights organized by the French Space Agency CNES in order to assist astronauts adaptation to weightlessness. She later translated this experience into a "modern ballet". In 1998 Frank Pietronigro became the first American to investigate art making in weightlessness with the creation of acrylic paintings suspended in mid-air. A year later, Slovenian theatre director Dragan Zivadinov's staged a performance called "Noordung Zero Gravity Biomechanical" during a parabolic flight organized through the Yuri Gagarin Cosmonaut Training facility in Star City. Since then there have been several zero-g parabolic flights arranged for artists, film makers, dancers, musicians and the like.

Another interesting experiment in zero gravity has been conducted by the Japanese in an attempt to perform East Asian ancient dances. The Flying Deities project aimed at examining the movements and music of celestial beings who fly through the air around the Buddha to praise his dignity and to protect him. Known from ancient paintings and images found in caves in China and murals in Japan, the postures of the flying deities are quite unique and the re-enactment of the ancient dances in zero gravity environment gave very useful insights into not only adoration of the celestial world, but also effective movements in microgravity.

### **Overview of recent ESA art-related activities**

Quite apart from arranging for a few pieces of artwork to accompany ESA astronauts into space and launching Mars Express with its arty Beagle lander, ESA, through its Technology Transfer and Promotion Office, has been involved in several significant art projects which are described below.

#### ***Rediscovering lost art***

Science fiction literature, artwork and films, are full of descriptions of space technologies and systems - often just pure imagination, sometimes based on some semblance of fact. Early science fiction authors, artists, and illustrators described space concepts and spacecraft based on and extrapolating the limited scientific knowledge available at the time, whereas more modern writers generally portray the same basic systems as used in real life space flight in their literature and art, even though artistic licence is often employed. It gives them the opportunity to promote their ideas which may not otherwise be possible through more formal scientific evaluation processes.

Many of these concepts, technologies and devices have been illustrated by artists over the years. Their artwork has played an influential and central role in science fiction literature - it has partly defined the scope of the genre and has brought the startling and imaginative visions of outer space, exploration of other worlds, interplanetary spaceflight, extraterrestrial beings into the minds and consciousness of the general public. In magazines and books, films and television, advertising and video, the artist's vision has transformed mere words into dazzling and compelling images which still today lift the spirits and brighten the soul.

The Maison d'Ailleurs (Mda) in Switzerland has one of the world's largest collections of science fiction books and magazines and the European Space Agency's TTPO funded the photographing of the book and magazine covers from part of its core collection. These covers are essentially lost art - seen only by a few researchers - and together with ESA, Mda organized exhibitions, with accompanying book (3), of some of these remarkable science fiction book and magazine covers from its collection

alongside images from ESA's own photograph archive. The idea was to show how close or how far apart was an early artist's conception from what has been subsequently built and launched and at the same time to demonstrate that spaceflight - probably more than any other technical discipline - is stimulating human aspiration and imagination.

In many instances we are not yet at the stage that science fiction authors and artists were - whilst we have successfully constructed a couple of space stations (in a far different form to that imagined by most SF art covers), we have not yet established settlements on planets (or indeed in space), nor have we yet achieved human interplanetary spaceflight. On the other hand, renderings of space suits or planetary landers or rovers in pictures from old book and magazine covers are similar in design to what is employed today. Advances in technologies and techniques such as miniaturization, robotics or propulsion systems provide modern SF writers and illustrators with the benefit of existing and proven technologies which they can just adapt. However, anything much before the first satellite, Sputnik, was launched in 1957 is going to be more a product of real artistic inventiveness. But independent from the "technical seriousness" of these artworks, they should be considered belonging to a special sector of fine arts which deserves to be recognised and cultivated.

### ***Space Arts Database***

The TTPO has also provided funding for the Space Arts Database, an initiative of Leonardo/Olats, the French branch of Leonardo/ISAST (the International Society for the Arts, Science and Technology), and the OURS Foundation, a non-profit cultural and astronomical organization based in Switzerland. Together they have embarked on an ambitious project to comprehensively document the vast and new genre of space art. To date, no comprehensive reference exists which can be used by artists, curators, art historians, critics, journalists and students, amongst others. The European Space Agency has provided these two organizations with a grant to set up a functional, accessible multi-lingual online tool.

As already noted, artists have been at the forefront of space exploration since its very beginning. Their works of imagination have stimulated and catalyzed a new human endeavour. Works of art and literature about space have both anticipated and stimulated space development while exploring destinations and technological concepts that were often too dangerous, too distant or too advanced for the science and technology of the moment. Artists have worked closely with space scientists and engineers to help them to visualize and develop their scientific and technological concepts making the dream of space exploration a reality. Science fiction literature with a space theme combined with cinematography has since become one of the most popular and financially successful art forms of all time. As such it stimulates the public's fascination with space exploration and likewise has a positive influence on maintaining the public's support for further space development. Today, a new breed of contemporary artists have initiated projects to explore outer space on their own terms by realizing their art beyond Earth or with their own bodies in weightlessness. The goal of "Spacearts - the Space Arts Database" is to document this important and exciting art form and make it publicly accessible on a Web site located at <http://www.spacearts.info>.

Spacearts is an online database providing information about the arts related to outer space from the middle of the 19th century until the present. It is a comprehensive reference that focuses on the artists engaged with the themes of outer space exploration and space development and documents their significant contributions. The database is international in scope and multilingual in practice with English, French and German language versions developed simultaneously. Furthermore, the content of Spacearts is being curated and it will be open to public submission and each record will be evaluated and edited before being added to the publicly accessible database

One aim of Spacearts is to show that after nearly 50 years of space activities space art in many cases has anticipated, through the visions and ideas it incorporates, many technological and space developments. In addition, space art is considered to be part of popular culture and of contemporary

art, containing a diverse, complex and variety of art forms. As such it is believed that the database thus plays an essential role in preserving the human fascination for space activities.

### ***Space Synapse System***

The Space Synapse System, Phase 1 of which has recently been completed, is a cultural space project conceived by Dublin-based artist Anna Hill which aims to provide a unique view of the global community and environment, transcending national, political boundaries from the perspective of space, as well as the existing boundaries between art, science and innovation. The concept of the project is to engage the public through inspiration and imagination with an artwork that is an interactive 'nerve centre' onboard the International Space Station (ISS). The idea is that interactive artwork will orbit with the European module (Columbus) and/or other modules of the Space Station and will interpret scientific data collected via or onboard ISS to interact with virtual and terrestrial art and design projects, interactive websites, as well as space education and outreach networks.

The intention is to place an interactive sculpture, the Symbiotic Sphere, in orbit with the ISS. Using communications links to connect the Symbiotic Sphere with other information synapses located on Earth, a Space Synapse System will be created through which and with which life, both on Earth and in space, will be able to interact. The proposed interactive artwork has three key elements: the Symbiotic Sphere actually onboard Columbus, Virtual Synapses using information and communications technology to create a global digital community, and Terrestrial Synapses that will be gallery, museum and architectural interventions on Earth. Initially funded under ESA's General Studies Programme, but managed by the TTPO, the project will essentially be not only an entertainment activity or plaything for astronauts, but also a means of bringing space closer to home. It is anticipated that Phase II, funded through the Irish contribution to ESA's General Support Technology Programme, will soon get underway.

Associated with this is the Auroral Synapse project, which TTPO is also supporting. The idea here is to create music based on the frequencies of auroras and also convert the frequencies, sounds or motion of auroras into lights embedded in a special intelligent garment. The prototype suit will interact with upper atmosphere data flows (co-ordinated with Sodankyla Geophysical Observatory in Finland) and is an example of how ubiquitous terrestrial synapses may interact within the space synapse system.

### **Space, arts and culture initiative**

Because ESA's Technology Transfer and Promotion Office has sponsored, and is continuing to support, a number of activities in the broad areas of the arts, it is believed both necessary and useful to establish a Space, Arts and Culture Initiative that would cover a wide range of artistic possibilities. Under this Initiative, the TTPO was instrumental in organizing the 7<sup>th</sup> Space: Science, Technology and the Arts workshop in May 2004 at ESTEC in Noordwijk, The Netherlands. Over 100 abstracts for the workshop were submitted by artists all over the world working in many different fields related to space and some 38 were selected for presentation and discussion. This was the first time that such a large group of space artists had come together specifically to show their work and discuss their concepts and ideas with their peers. Topics included flying sculptures in space, choreographing ballet dances in microgravity, drift painting during parabolic flights, simulating the overview effect on Earth, performing East Asian ancient flying deities dances in zero gravity, and creating artworks based on radio astronomy or atmospheric phenomena. Subsequent similar workshops, again involving the TTPO, have been held in Budapest, Hungary and Yverdon-les-Bains, Switzerland.

As another element of the Initiative, since ESA does commission artwork from time to time to give impressions of its projects, then it is worth building on this practice to institute a proper ESA Space Arts Programme as an official and important part of ESA activities. Artists are fascinated by the thrills and dangers inherent in space exploration and their work can make a vivid impact on the public at large. NASA has had a space art programme since 1963 to which over 250 artists have contributed.

This year the budget is \$50,000. Other US agencies with art budgets include the Army, Air Force, State and Interior Departments, and the Federal Reserve Bank. Many companies in the USA, Japan and Europe also buy artworks to grace their offices.

Under the ESA scheme various European artists, just like journalists, would be invited from time to time to be eye-witnesses for selected ESA space exploration events (this could include, for example, being present at Ariane launches of satellites or satellites undergoing tests at ESTEC, participating in parabolic flights, visiting ESA exhibitions at event such as the Le Bourget airshow, being at the ESOC control centre during a mission operation and the like).

One basic task for the artists would be to document, through their artworks, the story and achievements of the European space programme over the years. Their paintings (or sculptures or other artworks) could hang in the ESA conference rooms and corridors and could be loaned out to museums which might be doing a special exhibition on space. Eventually, it might be worthwhile to establish a special art gallery to house the art - and it would certainly be foreseen to publish a book of the collection at some point. It is important to note that the artwork should not simply be paintings, but also other creative works - sculpture, films or videos, music etc.

ESA could either provide small stipends to artists for pieces that emphasize different aspects of Europe's space journey, or it could simply commission artists to depict specific aspects on request, such as renditions of Mars habitats or landers, music simulating the Smart 1 spacecraft's spirals to the Moon, portraits of ESA astronauts and so on. This programme could eventually include the possibility of an ESA Artist in Residence. This is a growing phenomena which is finding its place also in the space community. JPL recently appointed Daniel Goods as an Artist in Residence and gave him six months to come up with some unconventional ways of communicating their mission. NASA has also given a classically trained violinist, Laurie Anderson, a two-year commission to produce a piece of work completely at her creative freedom.

One way to launch the Space Arts Programme would be to organize a competition whereby artists are invited to paint a picture or create an artwork depicting some aspect of ESA's space activities (especially past achievements to obtain a better historical record). This would have a number of advantages: it would enable ESA to have a ready supply of both known and unknown artists whom the Agency could use to depict its important events; it would yield an immediate supply of paintings or other artworks for the ESA Space Art collection; and it would bring greater attention to ESA's space activities to the general public.

General paintings or 3D images of spacecraft in different locations or of fantastic planetary landscapes have been around for ages and they all start to look the same to the general public. Although some of these may be relevant, something different, something special is needed to push the boundaries of concepts and media and let the public explore the meanings of space missions, (which may answer some of the most profound questions of humanity and its existence) in their own way. Artworks, more so than the printed word, have the potential to present space in ways people have never seen or even thought about, and allow them to share it more fully. This was evidenced with the Beagle 2 Mars lander where, to help with public relations, the pop group Blur wrote the Beagle 2 signature tune, a call sign to be beamed back from Mars to announce the arrival of the lander. In addition, the well-known artist Damien Hirst produced a trademark spot painting with different colours and textures to act as the calibration target for Beagle 2's cameras and spectrometers

Another specific idea regards art - namely graffiti - and the ISS. It can be argued whether graffiti constitutes art: some graffiti is just a mess, just a scrawl of tags, but other forms are really visual and attractive. Moreover graffiti can be seen as an artistic expression of sentiments and emotions. So the question arises what about graffiti in space - someone is bound to do it sooner or later - so why

not ESA? Maybe an ESA astronaut could create an attractive tag on the outside of the European Columbus module of ISS on a space walk! Or perhaps well-known graffiti artists could decorate the outside of Columbus or the Automated Transfer Vehicle (ATV) while they are still on the ground.

This led to another idea - why not run a competition to paint an imaginative scene on the outside of Columbus? Artists could be asked to submit sketches and then the winning design would be duly painted on the module amid much publicity and public interest. Some guidelines - for instance, it must relate to Columbus in some way - eg his ship depicted on a stormy sea. In the same way, artists could paint the outside of every ATV. The fact that the ATV would burn-up during re-entry, so the art work would be lost forever, should add a poignant dimension. In fact, 2005 is the 100th anniversary of the death of Jules Verne and the Maison d'Ailleurs in Switzerland has recently bought the important Jules Verne collection of books and artworks. Since the ATV is named Jules Verne and will be launched for the first time next year, the TTPO is facilitating the possibility of sending a first edition of one of Jules Verne's books up in the ATV which would subsequently be brought down by an ISS crew member.

One further example, which the TTPO is supporting and trying to arrange, is leaving an artwork on the surface of Mars. The brainchild of English artist Lyn Hagan the idea is to perhaps have a painting on the ExoMars rover protective shell which would become visible as the rover leaves it to venture out into the real red world. The rover's camera would look behind it and send images of the painting back to Earth.

### Cultural events on the ISS

What would the creative minds of Michelangelo, Johann Sebastian Bach or Shakespeare have made out of the International Space Station, if it already existed at that time? Would Michelangelo have liked to paint frescos on its walls? Johann Sebastian Bach inspired by the unique environment onboard the ISS might have composed a Fugue and Shakespeare could have used it as a location in his plays. So far the question of cultural utilisation of the ISS is a fairly academic one as the Station is used for scientific and application purpose only. However, Japan has reviewed several cultural activities for their ISS module and ESA has recently launched a study to explore the cultural potential of the ISS. The aim is to raise public attention and interest in the ISS and to emphasize the European participation in this global endeavour.

The ISS offers a unique environment. With the demise of MIR, it is now the only human outpost in space, circling the earth every 90 minutes, and providing a shirtsleeve environment for astronauts in weightlessness with an amazing view on the earth and the universe. On a clear night the ISS shines brighter than all the other stars in the sky and can often be seen speeding overhead with the naked eye. Known as a platform for science, research and applications the ISS always had a intercultural meaning. It is the world's largest and most spectacular international cooperative project for peaceful purposes and is a symbol for East-West partnership after the Cold War.

The International Space Station is a cooperative programme between the United States, Russia, Europe, Japan and Canada for the joint development, operation and utilisation of a permanently inhabited Space Station in low Earth orbit (average 400 km altitude). Europe is contributing inter alia a multipurpose laboratory (Columbus) and an unmanned logistics vehicle, the ATV, that will regularly supply cargo to the ISS. When finally assembled, the ISS will permanently host half a dozen astronauts in its different laboratory and habitation modules

Europe joined the programme in 1988 with the objectives of fostering global cooperation for peaceful purposes; reinforcing European political and industrial cohesion; developing European capabilities and knowledge with respect to human spaceflight and operation of a complex outpost in space serving as a platform for future space exploration missions; enabling science, research, development and

applications in space as well as demonstration of new technologies (including commercial activities); and enhancing the use of space for supporting education programmes on Earth. However, the cultural dimension of the International Space Station is not yet sufficiently recognised as a means for ISS utilisation. Such cultural dimension rests in the capacity and potential of the ISS to provide a platform and environment which offers unique conditions, impressions, inspirations and stimulations for creative minds in the cultural scene. While this issue has been fairly intensively studied in Japan, and to a lesser extent by NASA, it has not yet been looked into in any depth in Europe.

Cultural utilisation of the ISS means looking at all possible forms of utilising the ISS - in particular Columbus and the ATV - for exploiting this cultural dimension, i.e. utilising the ISS as both the subject and platform for cultural activities and entertainment events or artistic performances/expressions; using their unique capabilities, environment and position relative to Earth for educative formats and non-scientific purposes; and using them as a tool for expressing European cultures. Such cultural utilisation of the ISS should lead to a significantly increased visibility of the ISS (in particular of Columbus and ATV) in the eyes of the general public since it will give them the possibility to "experience" the ISS for themselves - something that the prime utilisation (science, research, applications) can achieve only to a limited degree. The strengthened public perception of the ISS will see it as the only human outpost in space at present; a symbol of international cooperation for peaceful purposes; and a unique facility primarily for the purpose of science, research and applications.

It is with this background that the European Space Agency recently initiated a study to come up with ideas and concepts of how to bring cultural events to the ISS and how to include the ISS in cultural activities. The study, being carried out by the London-based Arts Catalyst which narrowly won the tender action, sets out to probe and focus the interest of the cultural world in the ISS, to generate a policy for involving cultural users in the ISS programme in the longer term and to develop a representative set of ready-to-implement demonstrator projects in arts, culture and media. The study is expected to identify the features and factors which make the ISS attractive for cultural utilisation, as well as the cultural sectors which, being potentially attracted by the notion of art and culture in space, are interested in using the ISS and its components for cultural purposes. In addition, not only will the kind of cultural events that might take place within the ISS or associated with it on the ground be assessed, but the likely audiences for cultural utilization events will also be ascertained. The study will also assess the feasibility of these concepts and find ways to implement the chosen ideas. In essence, the study should in effect show how the confined space of the ISS, specifically the European contributions Columbus and ATV, can be transformed into a broader, more open arena which will become the subject, canvas or theatre for a wide range of cultural activities which reach out to the hearts and souls of the general public. Of course, any such use of the ISS modules for cultural activities will first necessitate that certain requirements (technical, safety, crew, other) to implement the selected cultural activities are identified and addressed.

## Conclusions

There is a cultural and artistic dimension in space activities that is being increasingly recognized and in which the European Space Agency is increasingly being asked to participate. This is manifested in a plenitude of art works and initiatives, some of which are described in this paper. But there is even more to exploit in the context of ESA's exploration and other programmes. In particular the ISS, which represents a new era of human presence in space, offers new opportunities and stimulation for cultural and artistic expressions. Just as the first spectacular view of Earth from space opened our eyes to the vulnerability of our planet and presented a perspective of a world without borders (as well as having, incidentally, a strong cultural connotation), so the permanent human presence in space and future space exploration will create an outward looking experience, which should be accompanied and interpreted by artistic means. This paper is a contribution to a necessary discussion on the objectives and direction of an ESA Space Arts Programme, which will stimulate and motivate artists in translating

the experiences of space into artwork and by so doing will broaden our perspective, consciousness and imagination towards space as a new and significant dimension for mankind.

## References

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I am indebted to Arthur Woods for permission to use his material in the section above on the Evolution of Space Art. A longer discussion on the history of space art complete with images and videos can be found at <http://www.arsastronautica.com/history.php>

Dr David Raitt  
Senior Technology Transfer Officer  
Technology Transfer & Promotion Office  
European Space Agency - ESTEC  
PO Box 299  
2200 AG Noordwijk  
The Netherlands  
e-mail: david.raitt@esa.int  
tel: +31-71-5653017  
fax: +31-71-5656635  
<http://www.esa.int/ttp>

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Examining space in art must always take into account the complex social and cultural standings of a given time. Space is not something that was always represented with the pure artistic ideas behind it. Sometimes, the needs coming from the outside of the artistic world influenced the way space was understood and depicted. In what follows, we track some of the changes in its depiction, and give a few examples to stimulate further thinking about spatial relations in art. Anish Kapoor- Leviathan, 2011. Photo Benjamin Bergery. Image via [blog.bergery.net](http://blog.bergery.net). Types and Examples of Space in Art. Negativ Show project title and artist name. Show Pro member artwork first. Featured. Space Marine. Michael Weisheim Beresin. Pro. Space Tank. Paul Chadeisson. Pro. Space Cadet. Alex Trevino. Pro. Explore how artists use space, what negative and positive space means, and why it matters. Art historians use the term positive space to refer to the subject of the piece itself—the flower vase in a painting or the structure of a sculpture. Negative space refers to the empty spaces the artist has created around, between, and within the subjects. Quite often, we think of positive as being light and negative as being dark. This does not necessarily apply to every piece of art. "Space art" (also "astronomical art") is the term for a genre of modern artistic expression that strives to show the wonders of the Universe. Like other genres, Space Art has many facets and encompasses realism, impressionism, hardware art, sculpture, abstract imagery, even zoological art. Though artists have been making art with astronomical elements for a long time, the genre of Space Art itself is still in its infancy, having begun only when humanity gained the ability to look off our world and