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Towards a cooperation between the arts, space science research and the European Space Agency – Preliminary findings of the ESA Topical Team Arts and Sciences (ETTAS)[☆]



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ABSTRACT

The arts offer alternative insights into reality, which are explored by science in general, and broadened by the activities conducted by the European Space Agency [4] and other space agencies. Similar to the way the members of ESA are ambassadors for spaceflight and science, artists and cultural professionals are ambassadors for human expression, experimentation, and exploration. In June 2011, the ESA Topical Team Arts and Sciences (ETTAS) held a three-day workshop at the European Astronaut Centre in Cologne, Germany. During this workshop, topics and ideas were discussed to develop initiatives between the arts, sciences and ESA. The aim was to foster and expand the human and cultural aspects of space exploration, and at the same time offer a means of communication that aims to reach audiences beyond the scope of traditional space-related channels. The consensus of the team was that establishing and sustaining a transdisciplinary professional community consisting of ESA representatives, scientists and artists would fuel knowledge transfer, and mutual inspiration. Potential ways to provide a sustainable cooperation within and between the various groups were discussed. We present the preliminary findings including a number of measures and mechanisms to initiate and conduct such an initiative. Plausible organisational measures, procedures and consequences, as well as a proposition on how to proceed are also discussed. Overall, the involvement and cooperation between the arts, space science research and ESA will enhance in the citizens of the ESA member states the sense of public ownership of ESA results, and participation in ESA's research.

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1. Background

The arts have made a significant contribution to the development of astronautics. At the European Space Agency [4] there has been a ‘programme in the making’ through an accumulative build of initiatives and multiple foci in this domain and yet a formal pathway towards a

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sustainable cooperation is still being explored, refined and championed. Unlike NASA, ESA has never had a formal arts and cultural programme but there is recognition of a continuous and growing demand for ESA involvement in projects relating to art and culture [16].

Since Acta Astronautica published an overview of ESA's involvement in arts activities [16], the purpose of this paper is not to give an historical context and analysis of ESA arts activities in this field, rather to present a very relevant and timely development within the European Space Agency. We contextualise what is understood to be firstly space-related art, and describe the kinds of contributions that have inspired ESA. To understand the point of departure, we refer to Roger [11] and abridge his description of the kinds of *contemporary* space art projects that have been sought, proposed, attempted and realised:

- Art in space viewed from Earth.
- Art on Earth viewed from space.
- Art in space for engagement in space.
- Applied arts such as design and architecture.
- Art arising from space-related spin-off.
- Art expressing new epochs of experience or philosophy arising from space exploration.

We note that ESA has also expressed vested interest in technology transfer from the arts praising: Science Fiction inspiring technology transfer; Astronomical artists and popular media forms; Artist as innovation consultants; ISS Cultural utilisation; Data visualisation; and Performance in Zero-G [15]. Our challenge is to learn from prior art and related work to practically unify requirements and interests for further cooperation.

2. Introduction

In 2010, Dr. Barbara Imhof, space architect and CEO Liquifier Systems Group in Vienna, successfully tended a proposal for an ESA Topical Team with the ESA Human Spaceflight, Microgravity and Exploration Division under the support of the former ELIPS: ESA Life and Physical Sciences in Space Programme. The main objective of an ESA Topical Team is to attain an effective coordination of the activities of the different research groups represented by the team members through the organisation of ad-hoc meetings. Such meetings enable an efficient exchange of the most recent scientific results obtained by the different groups, and aim at agreeing on research priorities.

In June 2011, the ESA Topical Team Arts and Sciences (ETTAS) held a three-day workshop at the European Astronaut Centre EAC to explore an ESA initiative aimed towards cooperation with the arts. The initial team comprised of an astronaut, artists, curators, philosophers and cultural theorists, ESA scientists including other ESA Topical Team members, a founding member of the International Astronautical Federation (IAF) Technical Activities Committee for the Cultural Utilisation of Space ITACCUS, an artist from JAXA, NASA collaborators and Anna Hill of Space Synapse, to further reinforce the benefits of mutual exchange and cross-transfer between artists and ESA.

The team represented a range of arts-related practices, positions and experience within space, art and science collaborations. Therefore the team recognised that the topic of establishing efficient means of cooperation between the arts and science, space agencies in particular is not new, but it was still critical for it offered a significant opportunity to stimulate the internal interests of the agency and public notion towards ESA's goals. Furthermore the outcomes of such innovation and cooperation promised to reach larger and more diverse audiences in support of ESA's and Europe's new endeavours 'out of this world'.

The inaugural Topical Team workshop at EAC in 2011 enabled an efficient exchange. To begin the process, each team member gave a short presentation of their most recent results in relation to international and European approaches to convergence between arts and science in astronautics. This highlighted the diversity of interests and experiences within the group. We also learned that many commonly used terms in astronautics do not translate directly to the frames of reference in the arts and vice versa. For example, there were differing interpretations to the notion of engaging in "research", and what the undertaking of a "residency" means. We only noticed the issue when confusion arose regarding the related requirements, timelines, and verification supporting our interest in "research" and "residencies". The implications of this terminology being unwittingly exchanged without clarification, threatened to misalign poor assumptions and impede progress down the track. Once the matter was identified, we found a suitable translation mechanism: a simple 1 page glossary that helped us with better understanding.

Our next challenge was to identify the possibilities and limitations of our respective expectations. The process revealed that artists were engaging in research-oriented, multidisciplinary projects already. Many of the artists have experience in fieldwork and directing labs; they regularly publish and hold patents. Likewise, it was revealed that scientists were regularly commissioning illustrators and animators, and working with internal ESA communications, education and marketing. Many of them also played an active creative role in design and communication of their own ideas and ESA projects.

There was some certainty that we could therefore defer to archetypical stereotypes of how the arts and sciences might relate: the scientist could see the value in directly employing skills from the arts to enhance communication and interpretation of their results through the illustration of science and thus help promote their research and reach new audiences. The artists identified the value of taking inspiration from the sciences, learning from scientists' processes, and using their data as raw material for new artworks. In both cases, the respective professionals were describing what they needed to *take and benefit from* a cooperative engagement with the other.

By day two, there was some frustration and concern that we might not be contributing anything new to the Agency until one scientist asked '*why do artists need scientists?*' The response to the question provoked discussion about what we could each *give and share* through an EAI. By transferring the discussion from a consumer-service-model by debating mechanisms that might give

currency to an exchange, into a vision-focused mission, we had a stronger sense of purpose and this catalysed us into contribution-focused action.

On the final day of the workshop, interdisciplinary micro-teams were regrouping to report back with almost the same findings: each describing very similar practical organisational measures, procedures that could be easily implemented and sharing views on the consequences of adoption between ESA and the Arts. We concluded that the shift in our collective focus became pivotal to enable the team to quickly become united by difference; to understand the resources that already existed for such cooperation; to share excitement for new discovery; and unanimously agree on priorities.

The subsequent sections are dedicated to a more in-depth view of the outcomes regarding organisational actions and procedures, as well as a proposition on how to support arts and science related activities with ESA.

3. Cooperative approach

“Only minds can conduct science and produce art” (Richard Buckminster Fuller, 1978).

As the visionary engineer and designer Richard Buckminster Fuller taught and practiced how to connect the different worlds – of science and arts – we present a number of activities herein to initiate, and conduct, a European Space Agency ESA arts initiative (EAI).

Prior research shows a huge variety of current formats of artistic immersion and cooperation between artists and space agencies. We present a range of options, which can tie either easily into the existing ESA structure, or can be adopted without major efforts. The three main options are via an:

1. Unsolicited project (or) open/invited call
2. Residency
3. Fellowship

The following outlines top-level criteria on how these formats could be implemented at ESA: for example individual unsolicited projects or projects invited upon solicitation or during an open call. See Table 1.

Another mode is an artist residency. The artist becomes an ESA affiliated member. The selection could occur by solicitation or via an open call. See Table 2.

Alternatively, a committed position similar to an ESA's Young Graduate Trainee Programme (YGT), Post-docs, or other time-based contracts as described in Table 3.

The form of artistic immersion, cooperation, and production could take place across ESA's entire infrastructure. The specific infrastructure and supporting personnel would be defined and prepared before a call for tender for artist residencies, while the requirements supporting Individual projects – either acquired directly or through an open call could be supported and implemented on a case-per-case basis.

4. Terms of engagement

Those engaging in an EAI may conduct their work as individual artists-researchers by working in their studio spaces, inside ESA facilities and/or in collaboration with scientists, engineers, technologists or artists of various fields. The authors suggest that ESA supports a variety of ways for artists and scientists to collaborate:

- Solo (individual research/work);
- Tandem (concerted development, based on direct interactions between an artist and ESA member);
- Cluster (concerns mutual work of group activities);
- Strategic (consultant artists and persons from the cultural sectors are embedded into the scientific discourse to specify cultural policies).

5. Strategic relations

A list of strategic relations relevant to the theme are suggested to broaden the audience and strengthen the thematic field of space, arts and science within manifold communities, and to explore a range of funding options. The list is incomplete, but it shall give the reader an overview of possibilities. In addition, more options of dissemination channels are derived from strategic relations. To begin, partnerships with the following institutions and organisations can be established:

- Higher education (art academies and universities): engineering, science and arts and humanities.
- Well-known art academies in ESA member states such as, Academy of Media Arts, Cologne (KHM), Goldsmiths,

Table 1
Individual projects (unsolicited/upon solicitation or open call).

Format:	External cooperation
Time frame:	Variable
Location/access level:	Where needed and negotiated
How to apply:	Individual agreements between ESA members and artists, application, open call
On-site support:	Contact person, mentor, facilitator (Cultural/Scientific Coordinator?)
Project budget:	With/without budget
Contract/fees:	With/without contract
Internal impact:	New ideas, guest lecture
External impact:	Exhibition, talk, workshop, conference, publication, media
Examples:	http://www.synapse.net.au , http://www.artscatalyst.org http://www.antarctica.gov.au/about-antarctica/antarctic-arts-fellowship
Risk:	Token interaction between ESA and artist, and ESA has less opportunity to co-create content
Gain:	High quality output likely

Table 2

Artist residence (affiliated member, upon solicitation or open call).

Format:	Artist in residence, guest lecturer
Time frame:	Short residency, scheduled and/or flexible (1–6 months)
Location/access level:	Lab (all platforms), onsite office, studio
How to apply:	Individual agreements between ESA members and artists, application, open call
On-site support:	Contact person, mentor, facilitator (Cultural/Scientific Coordinator?)
Project budget:	With/without budget
Contract/Fees:	With/without contract, daily allowance
Internal impact:	New ideas, guest lecture
External impact:	Exhibition, talk, workshop, conference, publication, media exposure, patent
Examples:	http://artistsinlabs.ch , http://www.synapse.net.au , http://www.antarctica.gov.au/about-antarctica/antarctic-arts-fellowship , http://arts.web.cern.ch
Risk:	Residence may result in production delays, and reduced output
Gain:	Intense exposure to artist

Table 3

Committed positions (post-doc, internships).

Format:	Fellow, internship, post-doc, employment (PI or co-PI)
Time frame:	Long residency (1–2 years, or as defined by disciplines)
Location/access:	Lab (all platforms), onsite office, studio
How to apply:	Employment, application, open call
On-site support:	Mentor (Cultural/Scientific Coordinator?)
Project budget:	With budget
Contract/fees:	With contract
Internal impact:	Profound exchange, lectures
External impact:	Exhibition, talk, workshop, conference, publication, media exposure, patent
Example:	http://www.esa.int/esaMI/Careers_at_ESA/SEM19DX04HD_0.html
Risk:	Project may lose spontaneity, since art practice is different to academia
Gain:	Process and output can be precisely planned, timed and managed

University of London, Central St. Martins, London, AIA, London, La Sapienza GAUSS, Rome, University of applied arts Vienna, Kunstuniversität Linz, ZHdK Zurich.

- Well-known scientific institutions with art collaborations: CERN, Ars Electronica.
- Cultural institutions: libraries, archives, art galleries.
- Well-known museums in ESA member states: Tate Modern, London; Centre Pompidou, Paris; Museum of Contemporary Art, Ljubljana; MAK Vienna; ZKM, Karlsruhe; Steijdelijk Museum, Amsterdam.
- Organisations: International Astronautical Federation (IAF), European Commission, European Research Council, JAXA, NASA, Roskosmos, Cultural Centre of European Space Technologies (KSEVT), Interpolar Transnational Art Science Constellation (I-TASC), Arctic Perspective Initiative (API), The Arts Catalyst, London, and The International Academy of Astronautics.
- Media cooperation with art magazines such as Leonardo, Frieze, Art Review, Parkett, Art Forum, Neural, and WIRED.
- Experts: well-known individuals (scientists, artists, engineers, theorists, other professionals).

Dissemination needs to be planned carefully as major part of creating strategic relations both within and external to ESA.

We recommend using existing ESA dissemination tools such as the authorship of publications (ESA Arts Initiative Publication Series, co-branding with an art-magazine, scientific publications), collaboration with the scientific community (such as poster sessions, abstract submissions, presentations),

exhibitions (local and global) and a website including the use of social media. The impact ESA gained can be described in a manifold way:

- ESA will multiply audience platforms;
- ESA will be perceived as a culturally committed organisation (example: CERN);
- ESA will receive increased media coverage.

6. Financing

There are many options for ESA that range from no cost, some in-kind contribution to specific funding. For example, residencies or fellowships could be accounted for by provisioning of ESA infrastructure and personnel. Additional cost could be cross-financed either under the patronage of specific ESA divisions, a division-independent ESA Art Fund, or in cooperation with third parties for example, cultural partners and external institutions. Funding or in-kind support provided by ESA may include:

- No cost option through branding;
- In-kind options through existing infrastructures;
- Financed options through mechanisms in place;
- Financed options through new mechanisms;
- Possible in-house funding mechanisms;
- ESA Arts Fund;
- Per cent for Arts: a percentage of a permille of all ESA science project budgets to finance EAI
- ESA-Young Graduate Trainee (YGT);

- External funding provided;
- National grants (for citizens of member states);
- European science foundation (collaboration for people with scientific background);
- European commission (cultural, science and society programmes);
- Private art foundations;
- Other scholarships/grants.

7. Quality management

The most important measure of success of an EAI would be the control of work quality. As art often exists as a subjective level, we acknowledge that quality assurance is a complex issue and ties closely to the quality of the working relationships and deliverables. In order to assure this quality, ETTAS suggests employing modes of operation, selection standards and reporting mechanisms, which are modelled following established programmes, like those maintained by international residency programmes or tendering agencies such as CERN and the National Science Foundation.

We recommend appointing a board of specialists to support the cooperation between ESA and the Arts. The board will join ESA representatives to assess solicitations and open calls by examining projects, portfolios and entries. In addition to the selection process, the board would be responsible for reporting and assessment processes. It is preferable that the board of specialists consists of acclaimed artists, curators, art historians and journalists and ESA personnel. The contributions of the board shall assure ESA of the quality of the work and relevance to ESA. For example, the board may wish to establish crossover

criteria for the purpose of evaluation. This may include a common ethical and legal standard of collaboration (IPR).

In addition to the creation of a board, it is advisable to establish the position of an internal facilitator or liaison officer bridging ESA, the specialists and the participating artists. This role is seen as critical to the structure and ETTAS propose that without it, we would deem EAI impossible to support through a board comprising of internal and external experts.

The recommended structure for the suggested execution of an EAI is based in the inter-relationship of the main personnel and their communication and roles. See Fig. 1 [9].

The structure consists of high-level components; however, a simplified version is imaginable.

The main roles would comprise of:

- Cultural/Scientific Coordinator across ESA facilities (administrative work);
- Mentors: ESA Scientists/Engineers;
- Board of Space/Cultural Advisors (curatorial);
- Artists;
- Revolving cultural jury of experts (curatorial work, quality management).

8. Prospective results

By referencing the prior art of ETTAS members and ESA arts projects, we present examples of work similar to that, which could result from an EAI:

- Projects which are pre-imagined by the artist and implemented with/by ESA exponents.

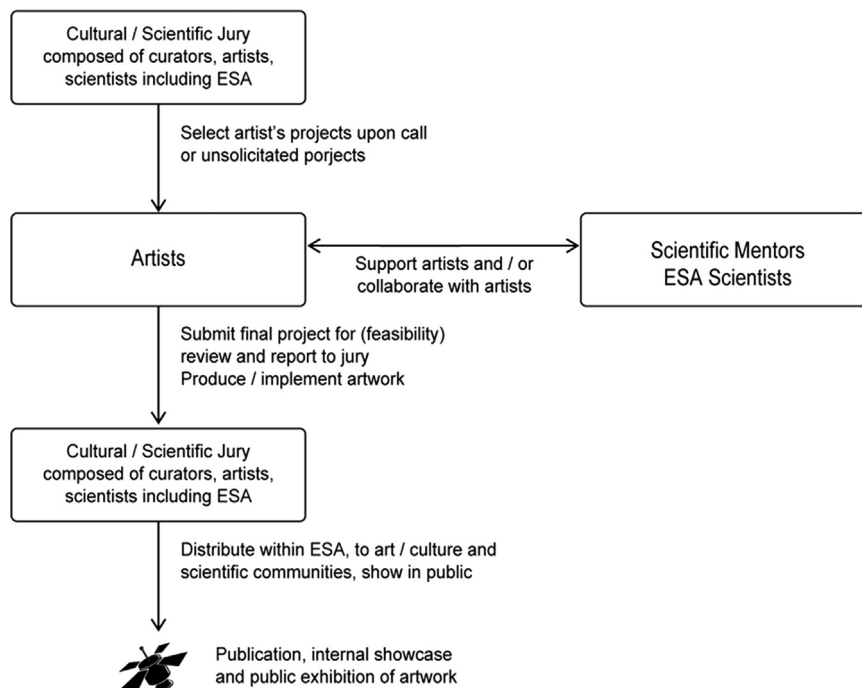


Fig. 1. Executing structure for the suggested EAI.

- Artworks that use ESA results as starting point, aesthetic guide or inspiration.
- Artworks that use ESA infrastructure as agent.
- Artworks that contribute to ESA projects.

EAI Example 1: Ayako Ono & So Negishi – Space Musical Instruments:

Space Musical Instruments consists of a pair of musical instruments suitable for weightlessness, which can be played easily (with or without musical accompaniment) [Fig. 2]. The aim of this project was to foster the development of new musical communication tools, and to inspire the public about space and science. The instruments were launched to the ISS on October 31, 2011. NASA astronaut Daniel C. Burbank played the instruments on the ISS on February 10, 2012, extending his time of involvement beyond the procedure manual. Two pieces of music were played (with specially prepared background music): *Dream Starts* (composed for the

space musical instruments by artist Jaakko Saari), and a 2-min edition of *Kiyoraka na sora*, composed by acclaimed pianist Akira Takahashi.

EAI Example 2: Christian Waldvogel – The Earth turns without me:

Earth's rotation was cancelled by travelling westward across the Alps at the speed with which the earth turns in Switzerland (1158 km/h). In order to reach this speed, the artist established a relationship with the demonstration team of the Swiss Air Force [Fig. 3].

The aim was to document (or prove) the standstill; a military jet was converted into a supersonic pinhole camera, using a red filter gel and film that are susceptible only to blue light. During the 4 min of standstill, in which the earth turned by one degree of longitude, this pinhole camera was used to photograph the sun in a single exposure. Due to the relative motionlessness between the camera and the sun the resulting image



Fig. 2. Space Musical Instruments, 2009–2012 ©2012 JAXA & Ayako Ono/So Negishi.



Fig. 3. The Earth turns without me, 2010/11 ©2010 Christian Waldvogel.

shows a point, instead of a streak, which would result when using a camera that turns along with the earth. Furthermore, a film was made that shows the earth turning as seen from a point fixed in space, by filming out of the front cockpit. Camera crews on the ground and aboard a chase plane provided footage for a documentary movie.

EAI Example 3: Marko Peljhan – Makrolab:

A 10-year project, consisting of the design, manufacturing and operations of an autonomous solar and wind powered mobile laboratory for the common work of artists, tactical media workers, engineers and scientists in remote areas of the world [Fig. 4].

The project was setup in Germany, Scotland, Slovenia, Australia, United States and Italy. The main three fields of research and enquiry for the *Makrolab* were the global systems of Telecommunications, Migrations and Weather and Climate. More than 100 artists, scientists, tactical media workers and engineers participated in the project during its lifetime and several technologies from sensor networks to satellite communications interception and data processing systems were developed in its framework. A very large number of artworks were created during the projects lifetime, from films and videos to music, sculpture and literature. The project has evolved into the I-TASC (Interpolar Transnational Art Science Constellation) initiative and the API (Arctic Perspective Initiative) series of works.

EAI Example 4: Tim Otto Roth – From the Distant Past:

In collaboration with the Space Telescope Science Institute, ESA and NASA the German artist Tim Otto Roth presented three laser based light art exhibits at the American Museum of Natural History (AMNH) in the heart of New York City, the Maryland Science Center in the Inner Harbour of Baltimore and at the Istituto Veneto di Scienze, Lettere ed Arti in Venice [Fig. 5]. Each evening green waves projected by high-power lasers were pulsing across the facades of the buildings.

The wave patterns, which echo a heartbeat or brain wave, tell a story about some of the oldest colours in the universe. The waves represent astronomical spectra that result from the dispersal of light by a prism. These spectra were recorded by the Hubble Space Telescope and represent data about the most distant objects in the universe. *From the Distant Past* is not only an art and science project about the origins of the universe, it is also an artistic reflection on the phenomenon of colour by the means of concept art using laser light as a minimalist tool of graphical notation.

EAI Example 5: Bradley Pitts – SINGULAR OSCILLATIONS:

This project attempts to know the oscillating space of parabolic-flight in its own right rather than use it to understand its effect on other phenomena [Fig. 6]. The project is an ongoing collaboration between Bradley Pitts, Projekt Atol Flight Operations, and the Gagarin Cosmonaut Training Center in which the entire cabin of the IL76-MDK is cleared except for one subject who is allowed to float and fall freely with their eyes closed, ears blocked, and naked. This immerses the subject in the variable-gravity space and heightens their awareness of it, while minimising their affect upon it. The art explores the empty volume of the plane in and of itself. While the project takes place within the context of a scientific facility, the expressed aim of the project is to produce immeasurable, subjective experience.

ESA Example 6: Damien Hirst – Spot Painting, Beagle 2:

A 16 multi-coloured spot pallet on a $5 \times 5 \text{ cm}^2$ aluminium plate was sent to Mars aboard ESA's Beagle 2 Lander in 2003 [Fig. 7]. The colours would be used to calibrate the camera, while a special composed song of the British pop-band Blur would be played to check the sound and accompany the arrival of the Mars Lander.

Unfortunately, the sequel of Darwin's exploration vessel was last seen heading for the red planet after separating from mother ship Mars Express on December 19, 2003, and vanished without trace...



Fig. 4. Makrolab, 1997–2007 Zavod Projekt Atol, Marko Peljhan.



Fig. 5. From the Distant Past, ©2010/2011 Tim Otto Roth.



Fig. 6. SINGULAR OSCILLATIONS, ©2008 Bradley Pitts.

9. Discussion

Unlike ESA's Beagle 2, the arts will never disappear without a trace from astronautics but we can build upon prior art.

ESA has achieved initial arts-related milestones through its Transfer Programme Office (TTPO) and also by endorsing collaborations and artwork to accompany ESA astronauts and vehicles into space. A few examples include: *The Fallen Astronaut* a $2 \times 2 \times 2 \text{ cm}^3$ aluminium statuette by Belgian artist Paul Van Hoeydonk laid on the Moon August 2, 1971. It travelled as a part of the personal effects of NASA Apollo 15 astronaut David Scott. Placed beside the piece in tribute, was a sign of all the names of astronauts who had died since the beginning of spaceflight. The project arose from a chance dinner between the artist and astronaut, and was realised with the aid of ESA, the joint crews and Flemish ground-base support [18].

The ESA Directorate of Manned Spaceflight endorsed the 1st Art Exhibition in Earth Orbit by The OURS Foundation in 1995. The *Ars Ad Astra* project took place as part of the EUROMIR 95 mission. A graphics package including 20 original artworks (drawings, paintings and graphics) expressly created by artists from all over the world, and a laptop with 81 digitised art works were flown to the Mir space station with ESA astronaut Thomas Reiter [3]. Reiter and Russian crewmates, Yuri Gidzenko and Sergei Avdeev, became an art jury selecting the one that they liked the best to remain on Mir announced via a live transmission from Mir to an audience in Belgium [20].

In 2011, the kinetic sculpture *AtlasCoelestisZeroG* by Arturo Vittori (IT) and Andreas Vogler (CH) was deployed in the International Space Station by ESA astronaut Roberto Vittori during the STS-134 mission; the final mission of the Space Shuttle Endeavour. The aluminium sculpture comprised of 13 rings within a 287 mm diameter



Fig. 7. Spot Painting/Beagle 2, ©2003 Damien Hirst, photo by Mike Levers.

representing the solar system. It drew inspiration from Galileo's invention of the telescope and our understanding of the universe [19]. ESA astronaut Paolo Nespoli also demonstrated playing with the sculpture in microgravity in May 2011, during the concluding moments of an emotional special linked communication between the STS-134 and Expedition 27 crewmembers from the Kibo module of the ISS and Pope Benedict XVI in the Vatican.

In addition to the art sent into space, the ESA TTPO has provided funding for the Space Arts Database, international workshops, publications, competitions, artist residencies, and arts activities with ESA's Zero-G training flights for example [16].

The ESA TTPO also commissioned an important study focusing on how ESA might use the European components of the International Space Station for artistic and cultural events [1]. The report, an executive summary and a user guide for artists and cultural users, was released in 2005. It identified the features and factors of the ISS that make it attractive for cultural utilisation; provided a range of ready-to-implement demonstrator projects; and probed interest to support the generation of policies involving the cultural utilisation of the ISS in the longer term. For the most part, the study was academic (since the ISS is currently only used for scientific and application purposes) but it showed how the ISS and specifically the European Columbus Module and ATV could be become transformative and inspiring for the cultural world, and effective in broadening public interest towards space. The main strategy for realisation of future projects depended on curatorial rigour. As experienced arts and science producers in this domain, The Arts Catalyst recommend themselves to ESA as the vetting-agent for projects and cross-collaboration as a quality-assurance measure. As intended, the study inspired artists and impressed ESA.

For the purposes of understanding how there came to be an ETTAS, it is hypothesised that The Arts Catalyst model represented a narrowing of opportunity for artists to access space, and ESA to access artists, rather than a

broadening. As we see with the examples, artists continued to create their own pathways to space as they had always done by including new ways to circumvent the single-channelled system that had been proposed.

The ESA report however led to the establishment of the IAF (International Astronautical Federation) Technical Activities Committee for the Cultural Utilisation of Space (ITACCUS) of which The Arts Catalyst is a founding member. The aim is to promote and facilitate the innovative utilisation of space by cultural sectors of society internationally. ITACCUS was publically launched at the Less Remote symposium at IAC 2008 and continues advocacy and pilot projects. By 2011, the ITACCUS Chair called for “new ways of linking arts and sciences” [12].

We also note that in 2005, Irish artist Anna Hill successfully applied to an open call for proposals to be hosted at the ESA ESTEC Business Incubation Centre (BIC). The ESA BIC programme was established by ESA's Technology Transfer Programme Office (TTPO) to encourage entrepreneurs to turn space-connected business ideas into commercial companies [2]. Her idea to develop an astronaut device with “Space to Earth” communication software as a payload for the Columbus module on the ISS was incubated under the ESA Technology Transfer Programme and the company Space Synapse was established [8]. It was not that ESA set out to ‘support an artist’, rather that the artist had become an entrepreneur to provide creative business and technology services to the Agency. Since 2012, Space Synapse has also been leading an ESA feasibility study in the Telecommunications and Integrated Applications Directorate (ESA-TIA) as part of the Integrated Applications Promotion (IAP) for a project called Earth Rider. The ESA IAP programme ARTES 20 (Advanced Research in Telecommunications Systems Element 20) supports business developments that provide added value services to existing and future ESA space activities [17].

So too, ETTAS has also achieved some major milestones since 2011. Various gatherings have occurred to assess and refine strategies, timelines and resource management.

The ETTAS co-chairs have hosted and participated in conference panel discussions, given keynote addresses, contributed submissions to peer-reviewed publications, white papers and journals of strategic importance in the Arts, Space Sciences and STEM Education [10].

An excellent feature-length video was professionally produced in 2012 and screened/exhibited at strategic international space events in the UK and US [6]. It showcases the intent and outcomes of a range of exemplary projects by international artists and their collaborators in spaceflight, ground and analogue science. The design and publication of the website: www.esaartscience.com has also been live to the public since 2012 and dissemination is underway.

These efforts underpin the goal to successfully communicate the possibilities for an EAI to key stakeholders. It should be noted that additional research, development, publication and production efforts have been made possible through the spirit of the team. Artists and co-chairs have contributed the rights of previously commissioned work, recorded additional video interviews, dedicated IP, and contributed design skill, production, administration and experience in their free time, and using their own resources.

Thus a second meeting was held at ESTEC in November 2012. The team installed a public exhibition of artworks, gave lunchtime salon lectures, reviewed new material, exchanged with ESA professionals and toured the facilities. The first planned collaboration for 2012–2013 was between artist Christian Waldvogel and ESA scientist Dr. Jack Van Loon. There is also a good prospect of a symposium of space arts accompanying a major European space exhibition in the Bundeskunsthalle Bonn, Germany in 2014. One or more ETTAS EAI undertakings should be undertaken to refine the proposed model and demonstrate the impact and reach of results in preparation for the 2014 exhibition.

10. Conclusions

Since 2011, a transdisciplinary professional community consisting of ESA representatives, scientists and artists has been engaged to explore ways to enable a sustainable cooperation between ESA and the arts: the ESA Topical Team Arts and Sciences [ETTAS]. The purpose of an ESA Topical Team is to conduct meetings and report on research priorities. The consensus was that establishing and sustaining an ESA Arts initiative [EAI] would meet ESA objectives, fuel knowledge transfer, and enable mutual inspiration between key stakeholders.

Preliminary findings include a number of measures and mechanisms to initiate and conduct such an initiative through existing mechanisms and the frameworks of ESA, ESA-related exponents and the international arts community. The team has recommended plausible organisational measures, procedures and formats, with currently available resources, and relating the kinds of benefits this would bring. While formal and informal arts and science cooperation and collaborative partnership discussions have commenced, the team welcome input,

support and cooperation to achieve optimum impact and sustainable viability, vitality and visibility.

There is a great opportunity for ESA representing an overall European space programme, and we recommend ESA continue to financially support, foster and promote efforts of ETTAS, towards the installation of an ESA arts initiative. Ultimately, the authors wish to achieve a formal ESA programme of research-oriented project collaborations between artists and scientists where the artist can take an active role in the research, technology transfer, and/or ESA discovery. These are big steps however until ESA – like other big research entities such as NASA, CERN – have their own Arts Initiative, the mission has a long way to go.

Disclaimer

This manuscript reflects the opinions of the authors and is not an official ESA document.

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