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First Orbit

A new film of Yuri Gagarin's flight,
created to celebrate the first 50 years of human spaceflight.

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To mark the 50th anniversary of human spaceflight on the 12th April 2011 a feature-length film, *First Orbit*, was produced to bring the story of Yuri Gagarin to a new generation. In collaboration with the European Space Agency, NASA, Roscosmos and the Expedition 25 through 27 crews on board the International Space Station (ISS), a new view of Earth was recorded from the station. It was filmed over several weeks as the ISS passed over the same ground track at the same time of day as Vostok-1 had done on its flight. The resulting footage was edited together with the original voice recordings from Gagarin's mission and a new musical score from composer Philip Sheppard. On the 12th April 2011 the film was premiered on YouTube, generating the largest audience for a long-form film release in the web site's history. During the same month the film was screened at over 1600 venues in more than 130 countries around the world; making it one of the most widely released independent films of all time. This paper presents a description of the whole project; from the conception and production of the film, to a comprehensive analysis of how this experimental documentary and its associated media were received around the world, while outlining plans for its future development.

I. ORIGINAL CONCEPT & CONCEPTION

In late 2009, following the success of his previous documentary film projects *In the Shadow of the Moon* (2007)¹, *Moonwalk One – The Director's Cut* (2009)², and the video installation *Apollo Raw and Uncut* (2009)³ – which projected the entire Apollo flight film archive into public gallery spaces in London and Montreal, Christopher Riley began looking for another archive based film project to celebrate the 50th anniversary of human spaceflight.

Yuri Gagarin's Vostok-1 flight of the 12th April 1961 was not captured in any significant way on film or video and documentaries made about his mission since then have always used rather poor quality black and white views of the Earth from later Vostok missions to illustrate Gagarin's new perspective on his home planet.

A single TV camera on board Vostok-1 was used briefly to transmit an image of the cosmonaut inside his capsule during his flight over Soviet territory⁴. But, as Gagarin headed East over the Pacific Ocean, the

transmission signal was lost and no attempt was made to continue recording pictures on board the spacecraft.

Audio recordings of the flight loop between Vostok-1 and mission control were recorded throughout the flight; both on board the spacecraft and back on the ground when communications allowed. Translated transcripts have been widely circulated since then, but to Riley's knowledge the complete audio recordings were never released outside of Russia.

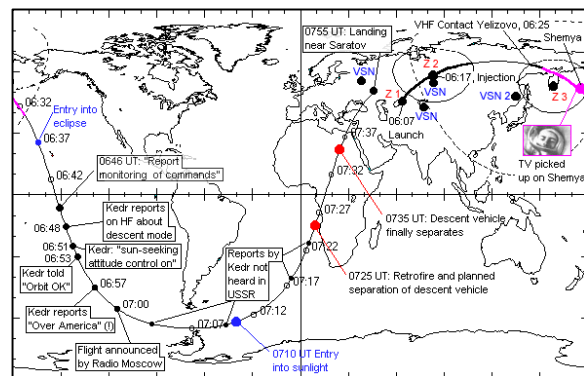


Figure 1: The ground track of Vostok-1
(Courtesy of Sven Grahn⁵).

The creation of a new Vostok-1 film was considered; constructing a view of the Earth which Gagarin could have seen by piecing together existing archive footage shot in Earth orbit over the same ground track and at the same time of day as he flew. Maps of the Vostok-1 trajectory were taken from sources on the internet⁵ to guide the archive research needed for such an approach (see Figure 1, previous page).

Gagarin lifted off from the launch site, near Baikonur, not far from the Aral Sea, at 06:07 UTC on the 12th April 1961. He flew northeast across the eastern part of the Soviet Union and Siberia, and on across the terminator and into night over the Pacific Ocean. At 07:10 UTC he emerged into sunlight again over the Southern Atlantic and passed over Africa, the Mediterranean Sea, Turkey and the Black Sea before landing just north of the Caspian Sea, 108 minutes after launch.

Following a brief review of the range of Earth view footage in the NASA archive, shot over the past fifty years, it was concluded that it would be too difficult to source existing media of consistently good-enough quality to make the film in this way and the idea was shelved.



Figure 2: NASA astronaut Tracey Caldwell-Dyson in the ISS Cupola, during Expedition-24.

However, in early 2010 when the Italian Space Agency's cupola was installed on the International Space Station (ISS), much was made in the media about the unparalleled views of the Earth which it gave (see Figure 2), and the idea to film Vostok-1's orbit from scratch was born.

Such a project could potentially capture new high-definition digital video views of almost the same

ground track at the same time of day that Vostok-1 had flown almost fifty years before. The resulting footage could then be edited together into a 108 minute film and combined with the original voice recordings, if they could be found, to create a new video installation for gallery spaces around the world.

To match the season, as well as the time of day and the ground path of Vostok-1's flight, it was hoped that some filming might be possible around April 2010, and an approach was made to the European Space Agency (ESA) to see if the time on board the ISS to undertake the project could be sponsored and coordinated by them. The film production would be funded and produced by Riley's production company The Attic Room.

II. PRODUCING THE FILM

Pre-Production

With the support of Bob Chesson, Head of the Human Spaceflight and Exploration Operations Department at ESA, an initial feasibility study was undertaken.

	Vostok-1	ISS
Orbit	302 x 170 km	350 x 350 km
Inclination	65.04°	51.6°

Table 1: Comparison of Vostok-1 and ISS Orbits

Full orbital elements for Vostok-1 proved impossible to track down. Even for those parameters that were identified, there were small discrepancies in their values between different sources. The figures adopted for *First Orbit* were eventually taken from 'Man's First Space Flight – a TASS Report'.⁶

Using these values, and the map of Vostok-1's orbital ground path (see Fig. 1, page 1), ESA's Gerald Ziegler performed the initial calculations to see if the Space Station's ground track ever matched that of Vostok-1. Ziegler concluded that a similar ground track would be made by the ISS every 48 hours or so. However, when the extra constraint of this taking place at the same time of day as Vostok-1 was applied, the frequency of such occurrences dropped to around every six weeks.

Due to the different orbits of Vostok-1 and the ISS, an ISS ground track which started above Baikonur could not follow that of Vostok-1 for an entire orbit. As a result, there was no chance of capturing a complete 'Gagarin view' during a single pass around the Earth.

Instead, Ziegler recommended breaking up Vostok-1's ground track into a series of five separate segments, which would then be matched to future ISS ground tracks (see Figure 3, below). The filming opportunities for each segment could then be identified and the footage captured on different days and then edited together to give the illusion of the single 108-minute flight around the Earth that Gagarin originally took.

The five segments – labelled A-E – were:

- A. Launch site near Baikonur to Eastern Russia
- B. Eastern Russia into the Pacific
- C. Pacific night pass to Southern tip of Americas
- D. Sunrise over the South Atlantic to Africa (crossing Angolan coast)
- E. Central Africa to Mediterranean and on across Black Sea and home.



Figure 3: ISS ground track segments A-E chosen for filming purposes to most closely match the ground track and time of day of Vostok-1(see Fig. 1).

It would have been desirable to have a seasonal match with the flight of Vostok-1, i.e. to film from the ISS in April 2010. However, given the very short timescale this would require, this was deemed impractical. Instead ESA started to make plans for Italian astronaut Paolo Nespoli to carry out the filming towards the end of 2010 when he arrived on the ISS as part of Expedition 26.

Based on the five filming segments A-E and using translated transcripts of the mission audio as a guide to what Gagarin was seeing at different times during the flight, a draft shot list was compiled, noting the preferred camera positions and directions for each orbit segment. The specified camera – a Canon G1 HDV is one of the standard video cameras on board the station.

This initial shot list required the camera to be moved

every 5-10 minutes during each orbital segment, to give plenty of different Earth views to cut between. Following a review of this rather labour-intensive approach, a decision was made to restrict the filming of each orbital segment to a single camera position, so reducing the total amount of crew time needed for the project substantially. Given that there would be multiple opportunities to film each segment of the orbit during the time Nespoli was on board the ISS, this would still provide a wide-enough variety of shots from which to construct the film.

The revised shot list allowed the camera to be set up in one fixed position, the recording started and the camera left to run for the duration of the ground track segment without needing further crew time until the end of the segment. At this point, the camera would be stopped and equipment stowed if necessary, until the next filming opportunity.

Under the guidance of ESA Flight Directors Roland Luettgens and Giovanni Gravili, the shot list was converted into a large spread sheet which broke each instruction into an 'ISS-friendly' work flow. Camera directions were also specified using the ISS Cupola Window and Shutter Numbering System seen in Figure 4a (below) and 4b (overleaf).

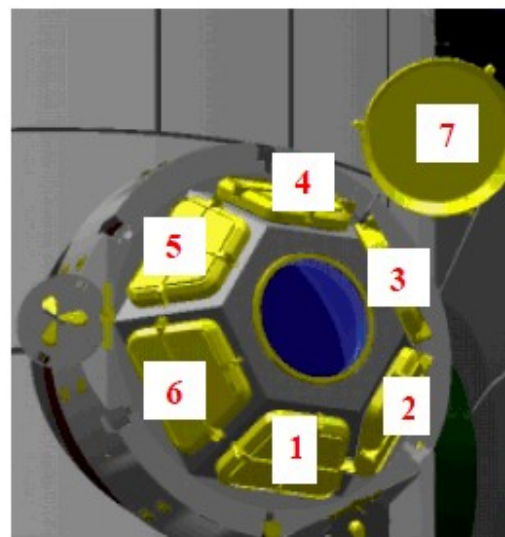


Figure 4a: Cupola Window and Shutter Numbering System.

Window #1 is situated on the cupola positive x axis. The remaining side windows are numbered sequentially up to #6, in an anti-clockwise sense when the cupola is viewed from an external position above the top window. The tip window is #7. Shutters are numbered per the windows which they protect.

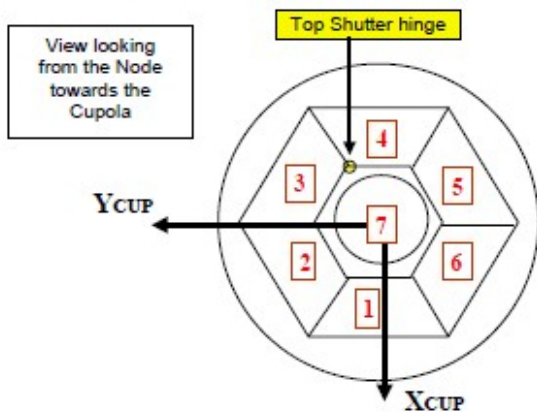


Figure 4b: When viewed from inside the Cupola the side window numbering sequence runs in a clockwise direction.

Filming

In October 2010 NASA Astronaut and Expedition 25 Commander Douglas Wheelock performed a test shoot inside the cupola, placing the camera in the node, looking straight down through the central window (#7) towards the Earth below. The high definition (HD) footage captured was compressed into a single file and transmitted to Houston through NASA's Tracking and Data Relay Satellite System (TDRSS) network and then on to ESA-ESTEC in Noordwijk in The Netherlands where it was shared with Riley through an ESA media centre ftp link, coordinated by Jean Coisne and Melanie Cowan.

After reviewing the test shoot, modifications were made to the shooting instructions spreadsheet and an updated filming schedule was prepared with Ziegler's latest calculations, based on the most recent ISS orbital data.

Nespoli was launched to the ISS on Soyuz TMA-20 with NASA astronaut Catherine Coleman and Russian Commander Dimitri Kondratyev on the 15 December 2010. They arrived two days later and Nespoli began working on the film at the first opportunity, at the end of December 2010.

During the filming period, Ziegler worked closely with Riley to regularly update the filming schedule in response to slight changes in ISS orbital element data. Revised filming schedules were circulated to ESA flight directors who did their best to incorporate the new timings into crew schedules.

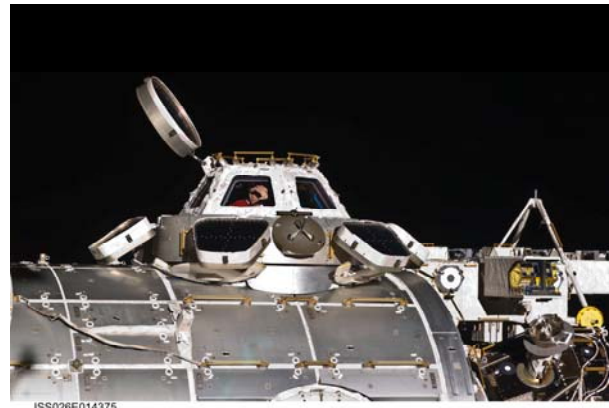


Figure 5 – ESA Astronaut Paolo Nespoli inside the Cupola during filming of First Orbit in early January 2011.

Nespoli made every attempt to accommodate these revised requests, filming as much as possible between the 31 December and the end of the first week of January.

However, because of ISS crew operational constraints, it soon became apparent that not all the filming opportunities for each orbit segment could be accomplished. New shooting requests continued to be submitted until the 8 January 2011, when the attempted assassination of Gabriella Gifford occurred in Tucson, Arizona. Gifford is the sister-in-law of NASA astronaut Scott Kelly, who was serving as Expedition 26 commander on the ISS at the time. Flight controllers immediately sought to minimise disruption to core ISS activities so as to reduce any unnecessary additional stress on the crew and filming from the cupola was restricted.

By this date, Nespoli had filmed just one pass over segment A, and two from segment D. One of these D segments had been left to run long, giving coverage of segment E as well. In addition, footage from the segment A pass also covered a significant part of segment B meaning that only segment C was missing. Capturing this night pass over the Pacific proved impossible, as every opportunity coincided with crew sleep periods, which could not be interrupted.

To supplement the high definition on-board footage Nespoli had captured, ESA flight directors recorded additional passes over other orbit segments using remote controlled standard definition (SD) cameras mounted on the outside of the ISS downlinked live to recorders on Earth. This procedure did not require any

crew time and was easier to conduct, but the quality of the footage from the poorer resolution external ISS cameras was not as visually compelling as the cupola footage. In the film editing, the use of this footage was avoided as much as possible.

To cover segment C, NASA was approached with a request for archive footage of night passes over the Pacific. This was generously supplied a few weeks later.

The Moon had not been visible to Gagarin during his Vostok-1 flight and he had written in his autobiography, *Road to the Stars*, that he would ‘...try to see it next time’⁷. Sadly, for Gagarin there was no next time in space. As a consequence, Riley decided to use the shots of the Moon from NASA’s Pacific night footage to give Gagarin the Moon he never got a chance to see from space (this story was noted on the project’s web site and picked up by several writers and broadcasters covering the project in the weeks that followed).

Nespoli’s HD footage was compressed and returned to Earth in late January 2011 in the same way in which the test footage shot by Wheelock in October 2010 had been.

Editing

Constructing the film with editor Stephen Slater was undertaken between January and March 2011. The first challenge was to work out which video file related to which part of the orbit. This task was made harder by the fact that the cameras used to capture it were often in different orientations to the direction of travel of the ISS. As a result, footage would sometime pass from camera top to bottom, or left to right and sometimes from right to left and bottom to top. These visual inconsistencies resulted in a serious disorientation for the viewer and one of the first tasks was to transpose all the footage so that the direction of travel was consistently towards the top, or the right of the frame.

First Orbit was made so that the view of the Earth from space at any point matched the timings from Gagarin’s flight. To achieve this, the new footage from the ISS, which travels slightly higher and slower than Vostok-1, needed to be adjusted.

In addition, it was suggested that *First Orbit* might be shown at exactly the same time – but fifty years later – as Gagarin’s flight, starting at 06:07 UTC. To ensure

that the film would match the Vostok-1 timings, it became necessary to create an opening titles sequence which would last as long as the mission’s ascent phase from launch to jettison of the aerodynamic fairing, approximately three minutes after lift-off. Another closing title sequence would also need constructing to cover Gagarin’s parachute descent and the end of the mission.

Additional archive footage was sourced and donated by Footagevault to construct these opening and closing titles. Edited by Tabitha Moore, the opening sequence aimed to set the scene for Gagarin’s flight, blending footage of his preparation together with opening credits and a special speech Gagarin had made prior to launch. The closing sequence, which sought to simulate Gagarin’s re-entry was constructed from Apollo 10 onboard footage, and his parachute descent was simulated using Project Excelsior III archive and V2 test flight footage from White Sands.

Further shots contributed from Footagevault and the ESA archives helped to construct the missing parts of segment B, including the dramatic view of the setting Sun, seen as Vostok-1 passed through the terminator and into the night side of the Earth. A final shot from Footagevault’s archive - a portrait of Yuri Gagarin holding a dove, seen fixed to a wall inside the Russian section of the ISS, was included after the titles as a final tribute to the world’s first space man, still orbiting the Earth in spirit 50 years after his pioneering flight.

Music

Although the original concept for the film involved no music, it quickly became apparent in the edit that a musical score was really needed if the footage was to engage an audience and keep them watching. Composer Philip Sheppard, who had worked with Riley on *In the Shadow of the Moon*, was approached. Quite by coincidence it turned out that he’d been working on an album called *Cloud Songs*, inspired by spaceflight; which he generously donated to the project, along with some additional tracks.

In a further coincidence, NASA astronaut Catherine Coleman, a friend of Sheppard’s, had carried *Cloud Songs* up to the ISS on her Soyuz flight with Nespoli in December 2010. Although it was not known at the time, at one end of the ISS Nespoli had been filming *First Orbit* whilst, at the other end of the station, Coleman had been listening to *Cloud Songs*, the music that would eventually accompany his footage!

Gagarin's Voice Recordings

From the start of the project Riley had enlisted the support of human behaviour performance specialist and native Russian speaker Iya Whitely, to help source the original voice recordings from Vostok-1. Whitely's search took her from the National Archives, to contacts at the Russian Federal Space Agency Roscosmos, NATO, the British Embassy and even the Russian military. However, the recordings could not be traced and by February, with the edit of the film underway the team started to source fragments of the mission's audio from a number of websites featuring clips taken from documentaries made at the time. These were supplemented with recordings from the period by the BBC and Radio Moscow.

However, in mid-February 2011, only a few weeks before the film was completed, Whitely tracked down the original recordings to the Russian State Archive of Scientific and Technical Documentation. With the assistance of Alexander Shaposhnikov and Vladimir Smirnov from the archive, Vitaly Davydov and Tatiana Fomicheva at the Roscosmos and Andrea Rose and Alexandra Smirnova at the British Council, the full mission audio from the flight was acquired. Whitely painstakingly undertook subtitling of the audio into English, with particular attention being made to the technical words and phrases used by Gagarin and the Ground Controllers.

Gagarin is most vocal during the first 20 minutes of the mission, and as he passes out of contact with the ground he becomes quieter. He speaks very little after passing into the night side of Earth, over the Pacific, only commenting briefly on the view of stars he has. After sunrise, over the South Atlantic he makes one more brief comment about the direction of travel of the sea below, and then does not speak again. This silence might be to do with the lack of contact with mission control, with Gagarin feeling no reason to speak. Alternatively, his silence might be to do with the well-documented problems with the flight, which began shortly after crossing the coast of Angola, as Vostok-1 began re-entry.

With the help from a post-production company called Unit, in Soho, London, the film was completed at the end of February 2011, about five weeks before the anniversary. Including opening and closing titles its duration is 105 minutes; just three minutes short of the full 108 minutes of Gagarin's flight.

III. RELATED MEDIA (APPS, TWITTER AND FACEBOOK)

In addition to the main film, supporting media were created around the project. This included an iPhone and Android app which compressed the entire orbit into a single 100 second video clip - the equivalent of orbiting the Earth at over a million miles an hour. The apps were designed by Riley and coded by Duncan Walker of Trashgames. To cover development costs, these apps were sold on the Apple and Android market for an entry level amount (around 0.7 GBP). Links to them can be found on the firstorbit.org web site.



Figure 6: First Orbit's Twitter Channel.
Screen grab on the 12 April 2011 during a transcribed stream of Vostok-1's original mission audio.

A Twitter channel (<http://twitter.com/FirstOrbit>) was also set up to promote the film and to carry live tweets of the mission audio (in English) at exactly the same time as Vostok-1's flight 50 years before (See Figure 6, above).

A Facebook film page was also set up to promote the project (<http://www.facebook.com/firstorbitfilm>). See the results below for further information on these aspects of the project.

IV. DISTRIBUTING THE FILM

The original idea had been to project the finished film into a gallery space in London's South Bank arts area. At the start of the project a concerted effort had been made to engage the Hayward Gallery in London and other South Bank venues in the project. However, by

autumn 2010, with no response the project's attention turned to the planet-wide nature of the anniversary, which the film was celebrating, and the potential to share the film more globally.

A new strategy for distributing the film was embraced, enabling anyone on Earth to download it from a bespoke website and screen it at their own celebratory event. On reflection, such a method of sharing the film was felt to be much more in keeping with the global nature of the anniversary.

In early 2011 the domain name firstorbit.org was registered to do just this. Zahaan Bharmal, Head of Marketing Operations (EMEA) at Google London was also approached to partner with the *First Orbit* team to share the film through YouTube. Google were enthusiastic and made the channel youtube.com/firstorbit available and helped create the design and look of the page (See Figure 7, below). In collaboration with Riley, John Bradley at ITCenta built the firstorbit.org web site (see Figure 8, right).



Figure 7: The youtube.com/firstorbit channel.

Via co-author Chris Welch, chair of the UK's YuriGagarin50 (www.yurigagarin50.org) and a former Yuri's Night organiser, a partnership with the Yuri's Night (www.yurisnight.net) was established to encourage people holding Yuri's Night events around the world to apply to download the film to use at their own events.

Riley approached the BBC to screen the film on their network of twenty city centre screens around the United Kingdom, as a breakfast premier starting at 07:07 BST (06:07 UTC), the exact time of Gagarin's original flight, repeating the screening again at 12:30 to catch lunchtime footfall.

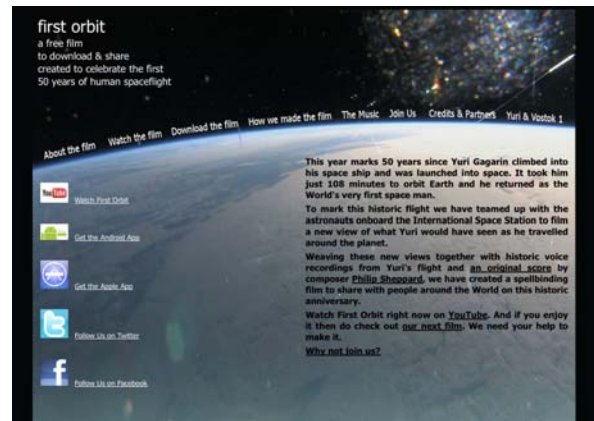


Fig. 8: The firstorbit.org home page as it appears today, 6 months after the film's release.

To satisfy the demand for downloading the full HD media files of the film, to screen around the world, further partnerships were forged with institutions and organisations around the world, who could host the files on mirror sites. Welch issued a request for assistance with this aspect of the project at the International Space University (ISU) symposium in February 2011 and via ISU and other networks and eleven collaborating partners had joined the *First Orbit* project within a couple of weeks (listed at www.firstorbit.org/credits-and-partners-2/).

Each mirror site carried the movie files at three different resolutions and bit rates, to allow people to acquire an appropriate copy of the film for their event.

Applications for advance downloaded screening copies of the film were handled through firstorbit.org, which went live a month before the anniversary, with the applications to download the film going live from the 23 March 2011, when the story about the project broke (see section V below).

On this date the YouTube channel was also launched with three trailers for the film.

On 12 April, the day of the film's global YouTube premier, a short 'making of' film was also added to the project's channel – bringing the total number of *First Orbit* films on YouTube to five (three trailers, a making of and the main feature).

V. HOW THE FILM WAS RECEIVED

Six to eight weeks before the film's premiere the communications agency Sister (www.sisteris.com) was recruited to promote the project around the world. Their director of special projects Rufus Stone coordinated the campaign, creating a number of different press releases for distribution through the agency wires and Sister's personal connections. Their highly effective campaign generated over 65 major international articles and features on *First Orbit*.

Media Coverage

Press coverage of the project was broad and ranged from tabloids to UK broadsheets such as *The Guardian* and other high-traffic sites such as Wired, to news and video aggregators. Almost all the sites linked to, or embedded the YouTube video of the trailers, in the run up to the 12 April and to the main film after this release date.

Others linked to the Android platform or the project's twitter feed (www.twitter.com/firstorbit) or Riley's personal web site (www.chris-riley.com). Broadcasters such as the BBC, and Russia Today recorded reports and interviews for their outlets.

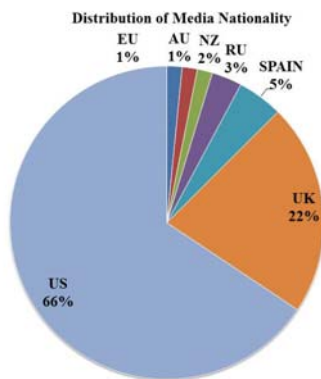


Figure 9: Distribution of media coverage of *First Orbit* by country.

As Figure 9, above, shows, media coverage by country was dominated by the United States (66%), followed by the United Kingdom (22%). Other significant media coverage originated in Spain, Russia and New Zealand. Most media carried just a brief description of the project in 1-4 paragraphs. The European Space Agency (ESA) website, Guardian Online, El Pais, the BBC, the MoonAndBack, the Russian site Moscow Nedelia and

the British Interplanetary Society all ran more extensive articles of a full page or two in length.

Applications to download the film

Starting on the 23 March 2011, applications to download advance screening copies of the film went live on the firstorbit.org website, coinciding with the publication of journalist Jonathan Amos' coverage on BBC News online⁸, which broke the story of *First Orbit*. Over four hundred requests were received in the first day, with a steady stream continuing during the following weeks, rising steeply the day before the premiere to 668, and further still on the day of the film's release; to almost 2000 on the anniversary itself (see Figure 12, below).

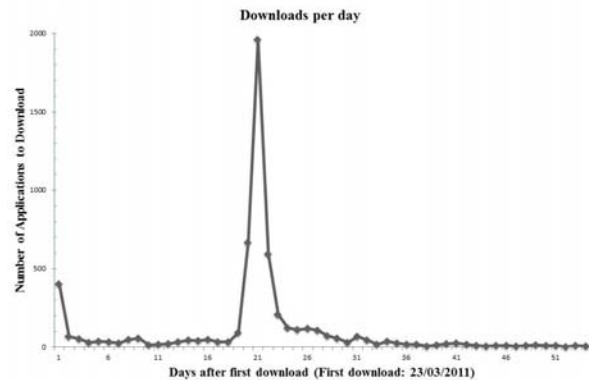
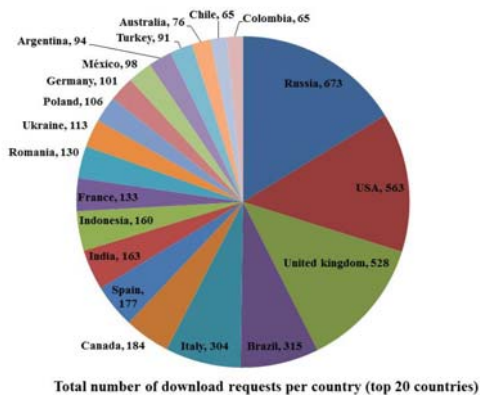
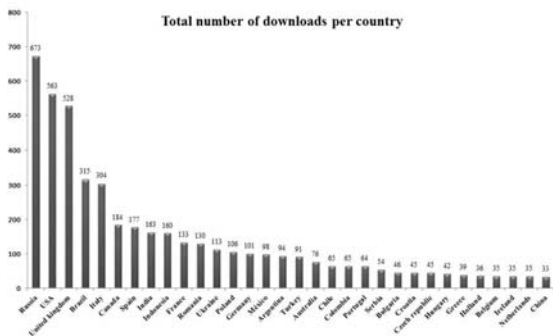


Figure 10: Numbers of applications to download *First Orbit* submitted to the firstorbit.org web site from the 23 March to end of April 2011

This figure probably represents only a fraction of the Internet traffic received on the 12 April, which crashed the project's server, temporarily suspending service of the firstorbit.org web site and preventing visitors registering their interest in the film. Normal service, in terms of response speed for the web site, resumed only the following day.

The volume of registrations on 12 April also pushed the firstorbit.org GoogleMail account into a spam alert state, which prevented the team from replying to anyone for twenty-four hours. By this time, the film was already available to watch on YouTube, and many of the prospective viewers, unable to access www.firstorbit.org, watched the film there, (see analysis overleaf).

In total, firstorbit.org recorded over 5500 applications to download the film. Not surprisingly, Russian applications topped this list at 673 requests, with US interest coming a close second (563). Applications from the UK were third (528), with Brazil fourth (315). Italy came fifth (304), which was probably due to the involvement of Italian astronaut Paolo Nespoli in the project and the media coverage of the film in Italy which resulted (See Figure 11a and b, below). Brazil's very high interest in the film could be connected with the prominence of its own national space program.



Figures 11a and b: Download requests submitted by country.

Other countries with relatively high interest in downloading the film included Canada (184 applications), Spain (177) and India (163) - all nations with their own, prominent space programs. Also in the top 20 were Indonesia (16), France (133), Romania (130), the Ukraine (113), Poland (106) and Germany (101). These latter are thought to be due to the historical connections with the former Soviet Union and interest in the original Vostok-1 flight.

Interest in downloading *First Orbit*, expressed as a percentage of 2011 internet users per country (taken from Wikipedia)⁹, also reflects this historical link with the original Vostok-1 flight (see Figure 11c, above right), with Romania at the top with 0.00167% of its internet population registering to download the film. This is followed by 0.00113% of Russian Internet users, with the UK third at 0.00103%. Italy is also quite high in this ranking at 0.00101%, compared to just 0.00023% of US Internet users.

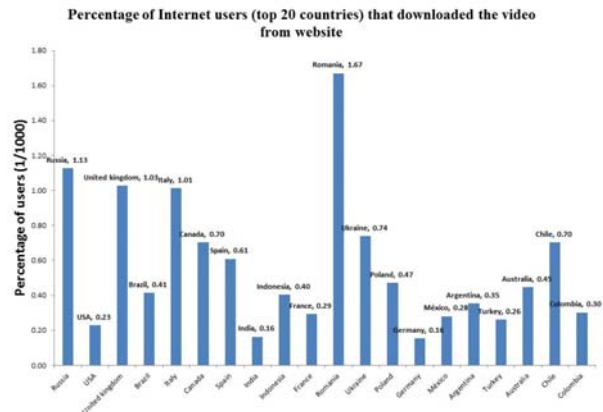


Fig 11c. Interest in downloading First Orbit by nation, expressed as a proportion of total broadband internet users in that country.

Approved Applications

Not all applications to download advance copies of the film were approved. The film was available for anyone to watch on YouTube, and a condition of this partnership with Google was that the *First Orbit* download service was restricted to people organising public screenings.

Of the over 5500 applications, more than 2200 submitted no information about their event, or just entered random keystrokes to skip registration. They received standard email replies pointing them to YouTube. A further 1100 were requests for personal copies of the film, or for family viewings, and a standard reply was also sent to direct them to the YouTube channel.

Only individuals and groups who described the nature of their screening event adequately were sent an email with a unique login and password combination which was generated at the time when they registered. Applications were received in over ten different languages and Google Translate was employed to translate everything to English for a proper assessment

to be made. Such a manual filtering process was just manageable in the run up to the 12 April, but in the days after the anniversary it became impossible to keep up with the volume of requests. It took Riley over four weeks to work through the backlog, but he eventually replied personally to everyone who was organising a public screening event. Applications for events during 2011 continue to be received and processed through www.firstorbit.org in this way.

Public Screening Events

In the run up to the 12 April, a total of 1646 requests were approved to download the film in advance for anniversary screening events around the world.

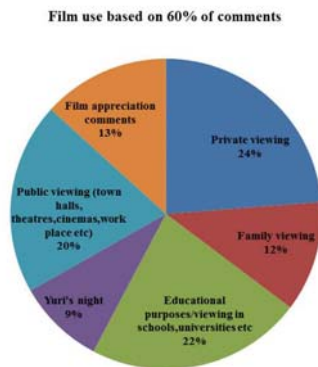


Figure 12: Categories of requests to download the film for advance screenings. *Personal*: Indication that the user is going to view it alone. *Family*: Direct mention of kids, parents, grand-children, etc. *Yuri's Night*: Direct mention of Yuri's night. *Educational*: Mention of school, pupils, students, universities, churches, etc. *Public*: Work and public venues such as cinemas theatres, etc. Includes mentioning of viewing by a large group of people such as friends, club members, company members etc. *Appreciation*: 423 applications were simply to submit appreciation for the film.

As noted in Figure 12 above, over 700 of these were for school and university celebrations. A further 290 requests were for Yuri's night party premieres and another 639 were for public premiere events in an assortment of venues; from theatres to cinemas, town halls, workplaces and open air locations. Notable premieres included the BBC breakfast premieres on their giant screens in 20 city centres around the United Kingdom (see Figure 13 above right).

Across New Zealand, planetariums screened the film at large open air venues, and in Lincoln Cathedral, again in the UK, the film premiered in the Longland Chantry – an 800 year old side chapel to the Cathedral, where it

played on a loop for visitors to watch throughout the day (Figure 14, below). In the United States a chain of DIY stores screened it on their in-store TVs, and a number of TV channels in Central and Eastern Europe also requested to transmit the film.



Figures 13a-d: BBC Big Screen breakfast premieres. Clockwise from top left BBC Big Screens showing First Orbit in 20 city centres around the UK; Bristol, Birmingham, Swansea and Edinburgh.



Fig. 14: First Orbit screening in the Longland Chantry, in Lincoln Cathedral, (Courtesy Geoff Thompson).

In total, the film premiered 'offline' in more than 130 countries around the world, playing to an estimated 200,000 people.

Educational Screenings

In Russia, schools were encouraged to hold a special lesson to celebrate the anniversary, and with the help of the British Council and Roscosmos, the film was promoted for use in this anniversary lesson. Because of bandwidth restrictions, in some Russian schools, teachers were encouraged to download the film in

advance from the firstorbit.org site. As noted above over 700 requests came in to the *First Orbit* web site from schools, and included in this figure are some of the Russian schools, which took part. Many of them organised screenings for the entire school in their main assembly halls (Figure 15, below).



Figure 15. First Orbit screening in one of 700 educational venues around the world on the 12th April, seen here in a school hall in Moscow school no 1414, as part of their special anniversary lesson. (Courtesy of Marina Pavolva).

The YouTube *First Orbit* Premiere

In the build up to the film's global YouTube release on the 12 April, the film's trailers had together attracted over 800,000 views, generated by the press coverage noted above. The finished Quicktime HD file (1920 x 1080) of the main film had been delivered to Google HQ in London on a hard disc four weeks before and uploaded to the YouTube servers from there, where it sat without public access until the anniversary release date.

At 00:00 UTC (01:00 BST) on 12 April, the file was switched to live, and *First Orbit* became visible to the global Internet population. Within the first six hours YouTube registered only 300 total viewings of the film. Then, at 06:07 UTC, the project's campaign to watch the film together at exactly the same time as Yuri's flight 50 years before kicked off, and 24,000 people across the World watched *First Orbit* on YouTube simultaneously.

Correspondence about *First Orbit* on YouTube rose steadily throughout the day, quickly making it one of the most talked about subjects on the web site. Over fifteen thousand people subscribed to the channel and left almost 5000 comments, the vast majority of which were positive and celebratory. As the day passed the main feature film attracted 24,752 likes, 609 dislikes, and 4445 friends.

Google/YouTube helped to drive substantial traffic to the channel by linking to it from their 'doodle' of the day, which depicted Yuri's achievement (Figure 16, below).



Fig. 16: Google/YouTube's Gagarin Doodle which replaced their logo on the 12th April world wide, linking directly to the First Orbit YouTube channel.

By 18:00 UTC the viewing count for *First Orbit* had reached 600,000 people, and by 23:59 UTC it was over 1.2 million. Within 48 hours of release, *First Orbit* had received just over 2 million viewings, making it the most watched long-form film release in YouTube history. At the time of writing this paper, less than six months later, the count online has reached over 3.2 million viewings, with the *First Orbit* YouTube channel as a whole receiving almost 4.3 million upload views for the trailers, making of video and the main film combined.

According to the statistics on the YouTube channel, the film was most popular with men aged 45-54, but interest from both sexes in the age range 13-17 was also noted. Globally it was most popular in Russia, with Taiwan, India, North America, the UK, Canada, Brazil and Australia ranking next. According to YouTube it was watched in every country on Earth except five on the African continent and one in Eastern Europe (Figure 17).

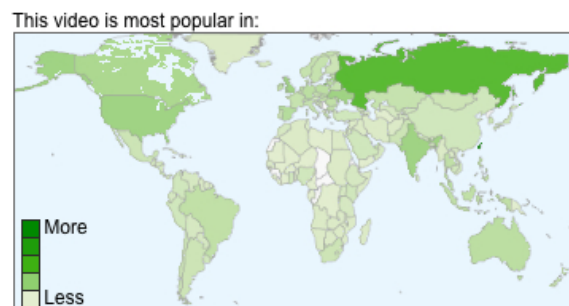


Fig. 17: Geographical distribution of interest in viewing *First Orbit* on YouTube.

The demographic of viewers of the film’s trailers on YouTube was slightly different, with all three proving more popular in Russian and Eastern Europe than elsewhere. Trailer III proved most popular in Spain. Trailer II was universally the most popular, being viewed over 850,000 within the first six months.

VI. SOCIAL AND ORCHESTRATED MEDIA

A number of supporting social and orchestrated media campaigns were carried out as part of the *First Orbit* project, including the establishment of a Twitter channel, a Facebook page and the creation of both Android and Apple Apps designed to interact with Gagarin’s orbital path whilst watching the film. An analysis of these extra elements is presented below.

Twitter & Blog interest

Browser window captures for Twitter searches for the hashtag ‘firstorbit’ were carried out between the 12 and 14 April, for later analysis. Subsequently, in preparing this paper, a retrospective analysis of the Twitter data relating to *First Orbit* was also carried out using 10 different applications, including topsy.com and peoplebrowsr.com, the latter which claims to access all tweets from the last 1000 days.

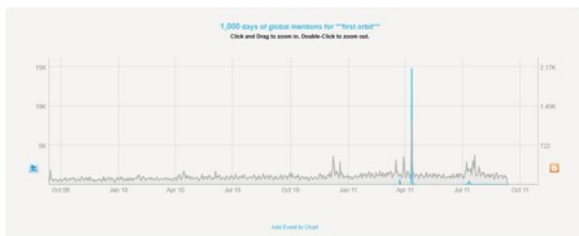
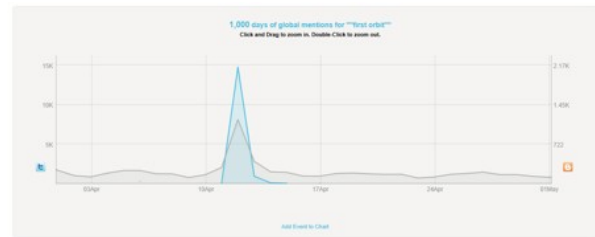
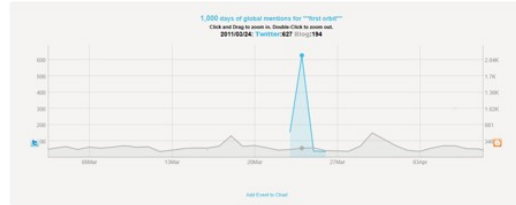


Fig. 18: Social Media interest in First Orbit.
 The grey line records numbers of blog mentions while the blue line records twitter feeds.

Analysis of these results shows three peaks relating to *First Orbit*. The grey line in Figure 18 above is the number of blog mentions, whilst the blue line records twitter references. The first peak occurred on March 24, the day after the *First Orbit* web site went live and the day Jonathan Amos broke the story on BBC News Online. This single story resulted in 627 tweets and 194 blog posts. The second social media peak (Figures 19a and 19b, above right) occurred on 12 April, the day the film premiered and the news media coverage peaked, resulting in almost 15,000 tweets and 1175 blog posts in a single day.



Figures 19a and 19b: Social Media interest in *First Orbit* around the Anniversary.

The third peak for *First Orbit* occurred in July (437 tweets and 265 blog posts) and relates not to the film, but to the first orbit made by Neptune about the Sun since its discovery in 1846.

A similar search was done for ‘firstorbit’ resulting in 870 tweets and 128 blog posts on the 12 April.

To compliment a campaign encouraging people to watch the film at exactly the same time as Gagarin’s flight – starting at 07:07 BST, an orchestrated media live tweet was planned, broadcasting the entire mission audio translation into short ‘tweet-length’ English phrases (see Figure 6 on page 6). These micro-blog friendly transcripts were prepared by Vix Southgate from YuriGagarin50 and Scott Andrews at the British Council. Tweetdeck was employed to queue their transmission in advance, with plans to start the live tweet with the hashtag ‘orbit1’ a couple of hours before 07:07 BST. This ran well until just after ‘lift-off’, when Twitter’s automated systems mistook the *First Orbit* feed as a spam attack and locked the account, bringing the stream to a halt. Before this happened, though, 353 tweets were sent out. The twitter feed still retains more than 870 followers and is listed over 60 times.

Facebook

Facebook proved to be the least useful channel of communication for this project. A basic page (www.facebook.com/firstorbitfilm), was created which attracted 420 likes without any promotion. However,

Riley failed to interest Facebook in the project despite repeated calls to their UK and Ireland HQs. Problems with the Facebook user interface and a lack of support from the company meant that the team had to abandon further plans for promotion of *First Orbit* through this route.

The Wikipedia entry on the film which was auto-listed on Facebook attracted a further 246 likes. <http://www.facebook.com/pages/First-Orbit/215819291767403>

Android and Apple Apps

Sales of the Apps were low, with only around 680 on the Apple market (Figure 20, below) and fewer on the Android platform. The poor take-up on these, compared to the reception for the main film, is attributed to a shift in the apps market place away from paid apps to free or freemium ones supported by embedded adverts.

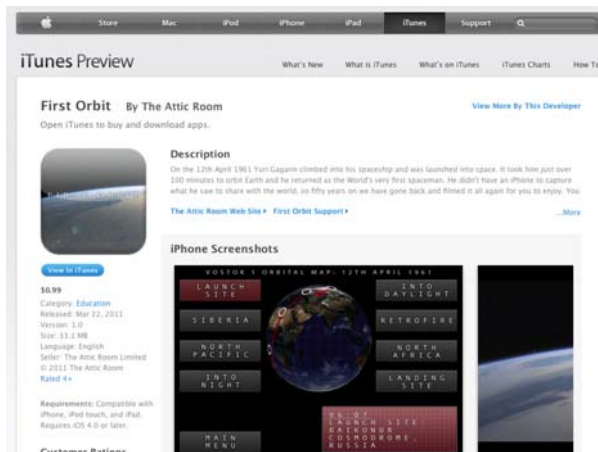


Figure 20 – App Market First Orbit App.

VII. CONCLUSIONS

Fifty years after his Vostok-1 flight, details of Gagarin's story have been reconstructed in a compelling and original way through the creation of *First Orbit*. ESA's enthusiastic support for the project and Paolo Nespoli's work on board the International Space Station to bring it to fruition brought significant attention to the ISS during this major anniversary year.

The value of combining the archive mission audio of Gagarin's flight with new high definition colour footage of the same route he flew has been demonstrated; bringing new life to a previously inaccessible oral

record of Vostok-1 and making it more accessible to today's visually driven generation.

The film's release attracted a great deal of interest around the world and amassed a significant community of fans and followers through a number of channels, notable: YouTube/firstorbit, firstorbit.org and twitter/firstorbit. Analysis of the demographic of this community suggests that it is broader in terms of gender and age than normal for this subject matter, particularly considering the historic, Cold War era of the anniversary being marked.

The story of humanity's first spaceflight appears to have as much worldwide appeal today as it first had fifty years ago. The capacity for human spaceflight to capture interest and to intrigue audiences around the world prevails, and the combination of beautiful views of the Earth from space set to music resonates as deeply with us today as it did when human kind first set eyes upon Earth from above.

The global reach of YouTube and Google's willingness to work creatively with content producers in this way makes their platform an unparalleled tool for releasing long-form experimental video content which is unsuitable for broadcast on conventional TV channels.

Unsurprisingly, countries with deep historical connections to the former Soviet Union, or their own well-promoted space programs, have populations that are more interested in the subject than those of other nations. However, fifty years after Gagarin's pioneering mission, the courage and spirit of adventure which human spaceflight epitomises still appeal to the people who live today on the planet he first orbited.

VIII. FURTHER WORK

Riley had intended to create an augmented version of the film with geographical place names and features tagged on a second version of the YouTube film. Time ran out for this part of the project, but it is hoped to return to this idea in time for subsequent Vostok-1 anniversaries, following feedback from viewers interested in trying to identify things on the ground below.

Work is already underway on a DVD/Blu Ray release of *First Orbit* with subtitles in multiple languages to make the story of Gagarin's flight even more accessible. If any readers might be interested in helping, with

translations for the subtitles, please visit www.firstorbit.org/join-us or contact the authors directly through the email addresses at the top of this paper.

Finally, a sequel to *First Orbit* – about the 550 human beings who followed Gagarin into space is also in the pipeline, with plans to crowd fund its production through the community which First Orbit has generated. For more information, or to support this next film please visit www.firstorbit.org/orbit

REFERENCES

- ¹In the Shadow of the Moon, Wikipedia:
http://en.wikipedia.org/wiki/In_the_Shadow_of_the_Moon. Retrieved 21-09-2011.
- ²Moonwalk One, <http://www.moonwalkone.com>. Retrieved 21-09-2011.
- ³Apollo Raw and Uncut
<http://www.chris-riley.com/apollo-raw-and-uncut-2009.html>. Retrieved 22-09-2011.
- ⁴Grahn, S. TV from Vostok
<http://www.svengrahn.pp.se/trackind/TVostok/TVostok.htm>. Retrieved 12-03-2010.
- ⁵Grahn, S. An analysis of the flight of Vostok
<http://www.svengrahn.pp.se/histind/Vostok1/Vostok1X.htm>. Retrieved 12-03-2010.
- ⁶Yuri Gagarin, et al, 1961. Man's First Space Flight – A TASS Report, pg 9. Soviet Man in Space, 2001, University Press of the Pacific. Reprinted from the original edition.
- ⁷Gagarin, Y. 1961. Pg 153. Road to the Stars. Notes by Soviet Cosmonaut No. 1. 2002, University Press of the Pacific, Reprinted from the original 2002.
- ⁸Amos, J. 2011, Movie recreates Gagarin's Space Flight,
<http://www.bbc.co.uk/news/science-environment-12808771>. Retrieved 23-09-2011.
- ⁹Global Internet Usage 2011,
http://en.wikipedia.org/wiki/Global_Internet_usage. Retrieved 24-09-2011.