Phase 3 Final Report

8th March 2022

UK Association for Science and Discovery Centres

Executive Summary

Destination Space 3 was delivered between the end of September 2021 and the end of March 2022 by 9 UK science centres. It reached over 67,000 people through direct engagements across a range of different delivery models, with approximately 93% of the recorded engagements taking place in person.

This new phase of Destination Space specifically emphasised the important role that space plays in monitoring and tackling climate change for the first time, with the inclusion of a new theme. At the same time, it allowed centres to continue to engage on the popular topics of spaceports and the James Webb Space telescope (which launched successfully about half way through the project).

Participating centres found that audiences engaging on one Destination Space 3 topic would often continue to ask more generalised space questions, and that science centre staff were able to refer back to past Destination Space topics in order to carry on these conversations.

Experience of the project for audiences were overwhelmingly positive with 98% of respondents saying they agreed or strongly agreed with the statement "We enjoyed taking part in the activities", and 82% saying they agreed or strongly agreed that space science was relevant to their own lives.

Responses from science centre staff on the experience of the project were also incredibly positive, viewing participation in ASDC-led projects like Destination Space as a "*rite of passage*" for internal staff development and drawing on 7+ years of established Destination Space expertise and support for engaging science activities (*"I tell staff 'go and look in the Destination Space box' when they want ideas"* - Calli Buchanon, Aberdeen Science Centre).

Participating centres faced significant challenges from the ongoing impact of the COVID-19 pandemic including: centre closures, staff absences, staff turnover, reduction in staffing levels, audience uncertainty about returning to in-person activities, school closures, and limits to access to schools. Despite all of this, participating centres found ways to continue to support and engage their target audiences and to adapt to alternate provision when needed.

The increased flexibility of the Destination Space 3 approach was key for centres to allow them to engage with the project over a far shorter timescale, and with smaller grants for delivery, than in previous phases. This, along with the inclusion of staff reflections as part of evaluation, contributed to a sense among centre staff of feeling recognised and valued for their expertise in engaging school, family, and community audiences with science topics at multiple different levels.

Participating centres did feel under time pressure during this project, exacerbated by the COVID-19 issues, but they felt that the topics of Destination Space 3, along with the flexibility of designing their own delivery plans, made engagement worthwhile. They all recognise that they have Destination Space content from prior phases embedded in their long-term programming, and all expressed commitment to continuing to use content developed for Destination Space 3 in their programming beyond the end of the project.

During wrap up discussions the level of confidence of the most of the participating centres in communicating about themes relating to UK space interests was attributed to Destination Space as an ongoing driver of supported programming development. This report recommends including a full review of the impact of Destination Space across all its phases as part of any future project phases, to understand the full legacy of the project on science centre expertise and confidence.

Contents

1. Introduction

"Dynamic Earth delivered out-of-this-world opportunities to connect audiences of all ages and backgrounds with topical Space science, highlighting relevance of science and engineering in everyday life to thousands of people throughout the project. Destination Space Phase 3 gave us unique opportunities to connect with existing, and attract new audiences to our centre and was a highly worthwhile and rewarding project for everyone involved." **- Conor Ellis, Dynamic Earth**

Destination Space Phase 3 is the continuation of a national science engagement programme first established in 2014, led by the UK Association for Science and Discovery Centres and funded by the UK Space Agency. Phase 1 was delivered across 20 participating centres from 2015 to 2018, focussing on the theme of human spaceflight to coincide with British ESA astronaut TIm Peake's first flight to the International Space Station. Phase 2 was delivered from 2019 – 2021 by 13 participating centres across three stages, encompassing the anniversary of the Apollo Lunar landing and themes relating to space exploration and space applications. The reports for Phase 1 and 2 and further background information can be seen on the ASDC website's Destination Space pages https://www.sciencecentres.org.uk/projects/destination-space/.

Compared with the previous phases, Destination Space 3 is smaller in scale both in terms of funding and timescale. The project ran for 8 months from the end of September 2021 until the end of March 2022, across 9 participating centres, all of which had taken part in the previous phases of Destination Space. This timeframe was not sufficient to impose a set requirement of activities for delivery as in previous phases, so a markedly more flexible approach was taken, with centres putting forward their own plans for delivery to fit in either alongside their existing programming or for stand-alone specialised delivery to specific audiences. This flexibility was also introduced in light of the ongoing impact of the COVID-19 pandemic, with uncertainty around potential future lockdowns or closures or the willingness of audiences to engage with in-person events.

Phase 3 also streamlined the specified space themes to three themes: two of these were carried forward from Phase 2 Level 2, meaning that participating centres were already trained up on related activities and had been provided with equipment for delivery during that phase. The third theme "Satellite Data for Understanding Climate Science" was chosen to coincide with current events - the UK hosting COP26 in Glasgow – as well as for its links to existing knowledge and expertise in the ASDC team/network and to other themes in Phase 2. These links were: the theme of "Satellite Applications" in Phase 2 of Destination Space, and ASDC's establishment of the Climate Hub (https://climatehub.uk/) for resources for science centres and other outreach and engagement providers through its work on various climate related projects funded externally.

Due to budget constraints, and in particular prioritising budget for grants to centres for delivery, no additional hands-on activities or kit were provided for the new theme, instead centres were supported with links to digital content including pre-existing digital resources from the National Centre for Earth Observation and ESA's Climate Change Initiative.

a. Mission, Vision

The Programme Vision:

To engage, inspire and involve families with school-age children, school groups and communities across the UK with the amazing stories, science and engineering of the UK's world leading space sector.

The Programme Mission:

To enable science centres to reach widely across the UK during 2021-2022 to deliver interactive activities with innovative approaches that bring the relevance of UK space to families, schoolchildren and communities across the UK. Destination Space 3 focussed on the space science and engineering of UK spaceports and launchers, climate and COP26, and the James Webb Space Telescope.

b. Key Content Areas

For the delivery of Destination Space 3 participating centres were asked to focus on the following areas linked to current developments for the UK in space:

1. **The Webb Telescope**: *Destination Space 3* supported participating science centres to celebrate the long-awaited launch of the James Webb Space Telescope, the largest and most powerful infrared space observatory, and the UK's involvement in the mission.
2. **Spaceports**: *Destination Space 3* allowed centres to continue telling the story of UK spaceports and how they are being developed to contribute to the UK's space capability.
3. **Climate Science & COP26:** *Destination Space 3* explored the role of space, satellites and the UK in understanding and assessing climate science and the impact of climate change. The UN's International Climate Change Conference (referred to as COP26) held in Glasgow on 1-12 November 2021 was used as a catalyst for engaging with this topic.

Strand 1 and 2 followed on directly from Destination Space Phase 2 Level 2 where they were two of four themes, the other two being Exomars and Satellite Applications.

The inclusion of a specific strand on space for climate science

The third strand marked a new approach to engaging with space and satellite applications within Destination Space, specifically emphasising and foregrounding the important and relevant role that space plays in monitoring and tackling climate change for the first time. This area had been touched on in Destination Space 2 Level 2 with the inclusion of Earth observation science under the theme of Satellite Applications, thus participating centres had some familiarity with this topic already.

2. Development

"Thank you to the UK Space Agency and everyone involved in the Destination Space 3 programme for giving Xplore! the opportunity and support to bring this to our local area." **- Dawn Pavey, Xplore!**

During initial planning for Destination Space Phase 3 a development stage was envisioned that would take place over the summer ahead of the start of the project for science centres in September, however due to delays in confirmation of budget for UK Space Agency internally the funding for the project was not agreed until the start of September 2021, effectively wiping out the timeframe for this development stage. Despite this, ASDC had begun work on development to the extent that they were able without agreed resource, to allow them to pick up the project with a greatly accelerated development stage in September, and with ongoing development taking place alongside delivery for the remainder of the project timeframe.

This was only possible due to the inclusion of established themes where ASDC and participating centres were confident in the existing science content, and the new theme being linked strongly to

existing science expertise in ASDC and its network and experience of relating this to the UK space sector.

a. Changes from the model of previous phases

Throughout the majority of its previous phases Destination Space has provided centres with grants to fund delivery, alongside equipment for delivery and a requirement for centres to deliver a minimum number of specific engagements such as scripted family shows, specific/partially scripted schools workshops, and even launch party or anniversary celebration events. Phase 3 was significantly smaller in terms of timescale and funding, and the prioritisation of providing meaningful delivery grants to centres meant that there was no equivalent budget for new equipment. This aligned with having a hugely compressed development stage with no time for procuring equipment or designing and trialling hands-on activities. It also did not make sense to create, let alone require delivery of, new specific physical in-person activities when there was such uncertainty over whether audiences would return to in-person events.

Beyond the departure from providing physical equipment, the main change from the model of previous phases was removing the strict requirements to follow particular modes of delivery, to allow participating centres far greater flexibility: applicants were asked at the application stage to outline their own recommendations for delivery in their centres, with free reign for suggestions as long as they could explain how they would build in the themes of Destination Space 3 and how their delivery would contribute to achieving the goals outlined in the project vision and mission. Further to this, centres were expected to build on their established knowledge of Destination Space from previous phases, for example through their existing activities and programmes or through existing links to space experts or space organisations.

The flexible approach was proposed by ASDC and accepted by UK Space Agency partly due to the compressed timescale of the project, but also in large part as a way for the Agency as a funder to feel secure in knowing that its funding (via the delivery grants for centres) would be supporting centres as they rebuilt their delivery and programmes more widely after the disruption and closures caused by the COVID-19 pandemic. Support for science centres in this recovery was an aim stated in the project proposal and highlighted by UK Space Agency in conversations with ASDC as a desired outcome.

It therefore can be said that the impact of the COVID-19 pandemic has accelerated two elements impacting on Destination Space 3: the development of digital, online, and remote engagement models for centres, and the flexibility for centres to design programmes around their existing expertise and their target audiences, including audiences targetted as part of centres' "recovery" from the impact of the pandemic.

In addition to the changes outlined above, internal changes at ASDC meant that a Project Manager for Destination Space 3 needed to be engaged on a short-term contract aligned with the project timeframe. Within budget constraints the Project Manager was engaged part-time for 2 days per week throughout the duration of the project. This contrasts with past phases of Destination Space, where the Project Manager has been full time working solely on Destination Space (Phase 1) or full-time working on Destination Space concurrently with other funded ASDC projects (latter stages of Phase 2). During the time when centres were up and running delivering the project this was sustainable, but during busier phases including at the start of the project and during the reporting phase a significant amount of overtime was required to manage the project.

b. Training Academies and follow up meeting

Another departure from previous phases of Destination Space was the delivery of the Training Academy events online, rather than in person. In previous phases the Training Academy was a 2-3 day event requiring representatives from participating centres to gather together at a host centre for full days of training and networking. Taking on board previous experiences within the ASDC team of delivering online training and meetings, the decision was taken to deliver the 1 day equivalent of training for Destination Space 3 across 2 afternoons online.

The first afternoon Training Academy was held on the 30th of September 2021 and covered the two topics that were continuing on from Destination Space Phase 2: UK Spaceports, and the James Webb Space Telescope (JWST). The participating centres heard from Dr Olivia Johnson, Public Engagement Projects Manager at UK Astronomy Technology Centre and Campaign Lead for JWST Public Engagement, on the timeline for launch (initially slated for late October 2021) and plans for public engagement for the James Webb Space Telescope. They also heard from Victoria Montag, General Manager and Senior Engineer, and Rosie Cane, Outreach Lead, from UK Space Launch Services Ltd, about their work with UK Spaceports including Space Hub Sutherland, Prestwick Space Port, and Machrihanish Space Port – including their plans for supporting a student rocketry event at the Machrihanish site in 2022.

The second Training Academy was held on the 1st of October 2021 and focussed on the third topic strand, the new theme of using satellite data to understand climate science. The participating centres heard from Earth observation researchers Dr Neil Humpage, and Dr Cristina Ruiz Villena, who study greenhouse gas emissions using satellites, as well as from Catherine Fitzsimons, Outreach Officer for the National Centre for Earth Observation, whose presentation took the form of a quiz using satellite imagery and data overlays. Feedback for both academies was very positive, attendees particularly enjoyed Catherine Fitzsimons presentation as it was so engaging and a completely new topic area for some centres.

A follow up Training Academy focussed on the James Webb Space Telescope was held on the 11th of February 2022, to update participating centres on the telescope's progress after its successful launch towards the end of December. Dr Ciaran Fairhurst, Webb Telescope Communications Scientist based at the Royal Observatory Edinburgh, talked centres through Webb's launch and deployment, and the very first images taken by Webb to be shared by the mission.

c. Handbook pages

The lack of time for a development stage at the start of the project meant that it was not possible to write and design handbook pages for distribution to centres ahead of the start of project delivery. To facilitate immediate dissemination of digital resources, background information, and links relating to the new theme, as well as an updates on the established themes (for example updated launch timescales for the James Webb Telescope) a Microsoft Teams group was set up, with separate channels for each theme. Recordings of the Training Academy meetings and follow up meetings, as well as any shared presentations, were shared with participating centres through this channel. The channel remained invitation-only as a space for information to be shared directly with science centre staff, not for external presentation.

The importance of the handbook in previous phases (centres self-report continued use of these handbooks by centres to train new staff or refresh staff knowledge) taken alongside the inclusion of a new theme not included in previous handbooks, meant that it was still important for handbook pages to be created corresponding to the new theme. These were collated as a "stand alone" handbook chapter 'Satellite data for understanding climate science', to be shared digitally rather

than in print. These pages now form part of the suite of handbook resources available freely online through the Destination Space website.

This chapter has been designed so that the topic could be expanded further in future phases of Destination Space, for example in any new editions of the physical handbook(s). The handbook pages from Destination Space Phase 2 Level 2 were also reviewed during the start of Phase 3 to ensure that the science referenced was up to date and that the activities were all still relevant. Scheduling for the development of spaceports, and indeed for the launch of the James Webb Space Telescope, changed during the duration of Phase 3, so a decision was taken not to re-issue any of the Phase 2 Level 2 handbook pages with updated dates. This should be reviewed in any future phases: there is no real issue for now with the handbook pages on spaceports as no timescale is given other than ambitions for the UK Space Sector by 2030. The James Webb Space Telescope pages will need to be updated or added to for any future phase to reflect the story of the successful launch and first light/first science.

d. Website

The existing Destination Space website was first set up in 2015 for the first phase of Destination Space and by the start of phase 3 was encountering multiple problems due to its age. The main issue being that it was not editable or updateable by the in-house ASDC team. When consulting with external contractors it became clear that even paying for a web developer to change the current website would not work, as the version of Wagtail (the content management system) it was built with is no longer supported.

Unfortunately this mean that the only option to improve or even update the Destination Space presence online was to create a new website. The decision was taken to keep this as simple as possible to make it updateable by the ASDC team in-house in future, and also to keep within the constraints of budget and time for this project.

Analysis of the existing website analytics highlighted how it was being used and which elements were driving the most traffic to the website. This turned up some interesting results, including that the “mission modules” and “space crew profiles” continued to be some of the most popular content. This was also highlighted during a development workshop with science centre staff, where their opinion was sought as primary users of the website. Science centre staff noted that they would often refer teachers to the website to help them engage their students in pre- or post-workshop activities, ie as follow up after, or preparation before, a science centre led workshop.

The analytics analysis also showed that the separate explainer pages on UK Spaceports and Satellite Applications were popular in search results. This is likely due to the absence of family- or school-friendly explainer websites of these topics: the majority of online content about these topics is aimed at businesses or policy level, and therefore not as accessible at a level suitable for children or perhaps even the general public. The Helen Sharman page was also noted as a popular entry point for visitors from the USA, perhaps reflecting interest in 2021 in the 30 year anniversary of her spaceflight, or even reflecting a lack of information about her online from American sources.

The new website was created during the project timeline with all external costs met before the end of the project, however some migration, proofing, and updating of content by the ASDC team had to take place after the end of March: the costs relating to this work after the end of the project were met internally by ASDC and not included in the project budget. The new website will go live in April.

The only popular element that was not carried over to the new website was the Space Crew Quiz. This was not an element that could be migrated over or incorporated in the same modular way as

the rest of the website content, and would have required more time from a developer to recreate the quiz coding from scratch. This was beyond the scope allowed by the budget for this phase of the project, but it is strongly recommended that it be revisited in any future phases of the project. An updated version of the quiz along with a new cadre of Space Crew profiles would be an excellent addition to the website in future.

e. Support from experts

In addition to the Training Academy, many centres sought support from researchers and people working the space sector in relation to the themes of Destination Space 3, including for meet the expert events. These included:

- Students from the University of Edinburgh's School of Physics and Astronomy (Drop-in activities, Dynamic Earth)
- Scientists from 20 different research groups and environmental organisations (Climate Showcase, Dynamic Earth)
- Royal Observatory Edinburgh/UK Astronomy Technology Centre (Dynamic Earth)
- University of Leicester MIRI researchers and Engineers (National Space Centre)
- Staff from Llanbedr spaceport (Xplore!)
- Staff from AAC Clydespace, Skyrora, and Ecometrica (Glasgow Science Centre online Learning Lab "Scotland in Space")
- Dr Hannah Wakeford (online JWST talk National Space Centre)
- Professor Rick Greenough, De Montfort University (COP26 event, National Space Centre)
- Dr Sandra Lee, University of Leicester (COP26 event, National Space Centre)
- Dr Neil Humpage, University of Leicester (COP26 event, National Space Centre)
- Dr Stephen Wilkins, University of Sussex (advisor on science shows Observatory Science Centre)

3. Delivery by Science Centres

"Destination Space accounts for over half the engagements between W5's Learning and Engagement Team and the public since reopening." - **Matt Craig, W5**

Delivery by science centres encompassed a wide range of different models, from stand-alone festival style events to 6-week long programmes of repeat classroom engagement. Centres faced a challenging time for face-to-face delivery with ongoing concerns about COVID-19 affecting both the public's willingness to attend events, and affecting schools including causing school closures or increasing restrictions for school visits. The pandemic also affected science centre staffing, a concern noted in the proposal for Destination Space 3:

"Covid-19 and the repeated lockdowns have had a huge impact on science centres, forcing them to close and for the majority to lose as much as a full year of income (more in some cases) from public visitors. Across the Science and Discovery Centre Network, alongside the necessary furlough of education, delivery and community engagement teams, redundancies averaged ~30% of the science centre workforce, the most significant impacts for Destination Space seen when experienced and skilled staff members, with regional knowledge and relationships have been lost

[…]

Nevertheless, despite the majority of science centres being unable to apply for culture & heritage support funds from the Government available to our museums, the whole sector has continued to show itself to be resilient, innovative and adaptable. Centres have pivoted to online and remote delivery of their schools and family programmes, as well as expanding their community programmes to help bridge the digital divide."

a. Outputs/metrics

The total number of people reached through Destination Space 3 engagements was 67,249. This compares favourably with the nominal target set at the start of the project of 70,000 engagements across 10 centres, since only 9 centres were able to take part. The achievement of this total is remarkable considering the ongoing impacts of the COVID-19 pandemic, not least the further periods of closure experienced by several centres due to restrictions in Scotland and Northern Ireland.

The table below shows a summary of the engagements delivered by the different centres:

Type of engagement	ASC	DSC	DE	GSC	NSC	OSC	WSC	W5	X!
On gallery drop-in activities	13776	880	4503		6489			5255	121
Family show	642		5387		8826	1314			3039
School workshop - primary	92	1114	225		5265		950	119	592
School workshop - secondary				1239					
Outreach activity									921
Group visit	19		30			300		32	332
Synchronous digital activity					2303			602	
Asynchronous digital activity		2678							
Careers event								158	21
Teacher CPD				25					
Total engagements	**14529**	**4672**	**10145**	**1264**	**22883**	**1614**	**950**	**6166**	**5026**

Table 1: numbers reached through different types of engagement for each science centre. Names and abbreviations: Aberdeen Science Centre (ASC), Dundee Science Centre (DSC), Dynamic Earth (DE), Glasgow Science Centre (GSC), National Space Centre (NSC), Observatory Science Centre (OSC), Winchester Science Centre (WSC), W5, Xplore! (X!)

Three centres, Observatory, Glasgow, and Winchester, kept their delivery focussed on one or two types of engagement. In particular Glasgow and Winchester focussed on schools workshops delivered online and in-person respectively. The remaining six centres split their delivery across a mixture of different types of engagement, with three (Aberdeen, Dynamic Earth and National Space Centre) delivering 4 types of engagement. Dundee delivered 3 types of engagement, whilst W5 and Xplore! Delivered 5 and 6 different types of engagements respectively.

There isn't a simple correlation between the range of engagements delivered and the total numbers achieved: whilst Winchester and Glasgow's programmes certainly achieved smaller, more highly targeted numbers, Observatory's reach is smaller due in part to the scale of the centre and also in part to lower than anticipated numbers attending their autumn/winter events (they were also impacted heavily by Storm Eunice and Storm Franklin). The highest numbers achieved were by the National Space Centre, which may be expected with their centre's focus creating lots of opportunities to build Destination Space programming in alongside their existing offer. But it is worth noting that they exceeded their target by nearly 30 times, suggesting that their initial estimate was deliberately conservative in light of uncertainty around COVID-19 – perhaps in part due to their experience of the extended lockdowns in Leicester during 2020 - 2021.

This side-by-side comparison also hints at the impact of a centre's scale of operation, either in terms of size of their whole organisation or in terms of the number of different departments or teams they are able to mobilise to deliver engagements. Observatory Science Centre for example has minimal staff and uses volunteers for some of its delivery, by contrast centres on the scale of Dynamic Earth and the National Space Centre usually have more than one delivery team, dividing their delivery across education programmes, public programming/events, and community outreach for example. Interestingly, Glasgow and Winchester could also be said to be on this scale, but both decided to the use the grants for this phase to further develop or build on one tightly focussed model of delivery.

Every centre was impacted in some way by the ongoing COVID-19 pandemic, affecting either times of access to their centre, staff availability and/or staff turnover, or audience numbers for in-person events.

b. The view from science centres

A brief summary of delivery for each centre in their own words, and with photos where provided, is given below.

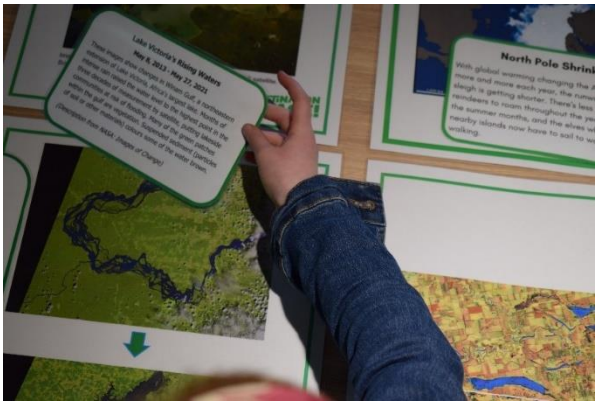
Aberdeen Science Centre

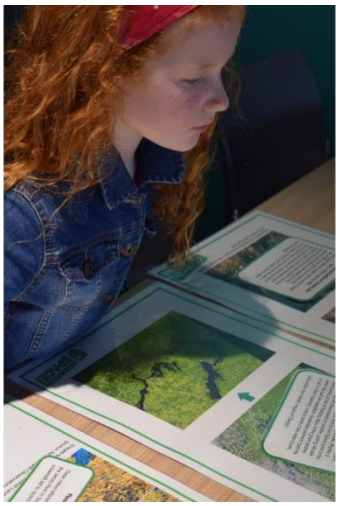
"*Through a range of hands-on workshops and activities, Aberdeen Science Centre delivered the Destination Space 3 programme from October 2021 to February 2022. Beginning in October 2021 with table-top activities on the Exhibition Floor, then expanding to a full-centre theme which included facilitated workshops, demonstration shows, storytelling sessions and building and coding challenges, our Destination Space programme inspired visitors with the science of satellites, telescopes, spaceports, rockets and beyond.*

Participants in our Destination Space: Hot Stuff Workshop explored the role satellites play in our everyday lives from providing communication to monitoring climate change, experimented with materials in relation to the development of the James Webb Space Telescope and considered the environment of space with the help of realtime satellite monitoring and infrared camera demonstrations.

Customer Experience Assistant Andrew using a thermal imaging camera while delivering a show at our James Webb Space Telescope Launch Event.

Our enthusiastic and knowledgeable staff held 'Space on the Spot' live interactive science demonstration shows highlighting topics such as the environment of space. On our Exhibition Floor, visitors were engaged with activities, games, challenges, art stations and storytelling sessions exploring topics including but not limited to space exploration, climate change, telescope mirrors, and spaceports.





A young visitor, Isla aged 8, examines satellite images showing the impacts of climate change. A young visitor to Aberdeen Science Centre tries to match satellite images showing the impacts of climate change with their descriptions.

Isla pieces together parts of a James Webb Space Telescope mirror model

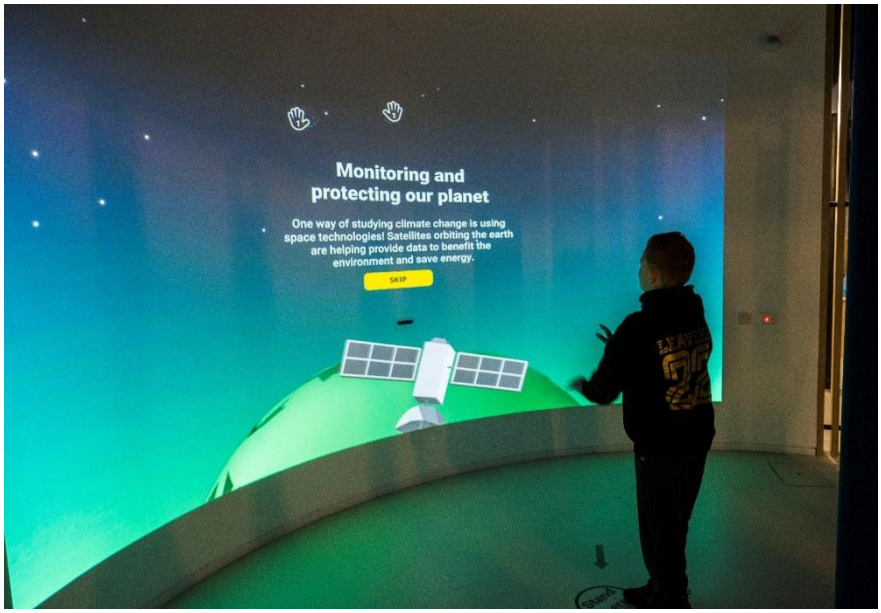
The impact of the programme on our visitors and staff was evaluated through visitor surveys, staff reflections and informal discussions. Feedback shows enjoyment of our Destination Space 3 programme was at a high level across all audiences. Children particularly enjoyed hands-on elements while adults enjoyed acquiring new space science knowledge. Both family surveys and staff reflections reveal that participants in the programme experienced an increase in their interest in space science."

Dundee Science Centre

"For schools, we have expanded upon our previous Destination Space offering by developing a new blended programme. This consists of 8-hours of digital content, composed of four main topics: UK spaceports, satellite applications, Earth's climate from space, and the James Webb Space Telescope. A live stream with one of our science communicators was offered for schools who were unable to visit the centre. In addition, the programme offered an in-person visit to our centre, with hands-on activities delivered to school groups. We ran successful COP26 themed schools events during November and December 2021, and we are set to run Spaceport themed activities for school groups through March and beyond.

October holiday STEM Club participants

Our STEM clubs ran in the October holidays in partnership with Dundee University. The primary school aged children attending were either referred by local community groups or were children of University of Dundee staff members and post-graduate researchers. These 2-week long clubs delivered a range of space-themed activities.



In centre exhibits exploring climate change and space

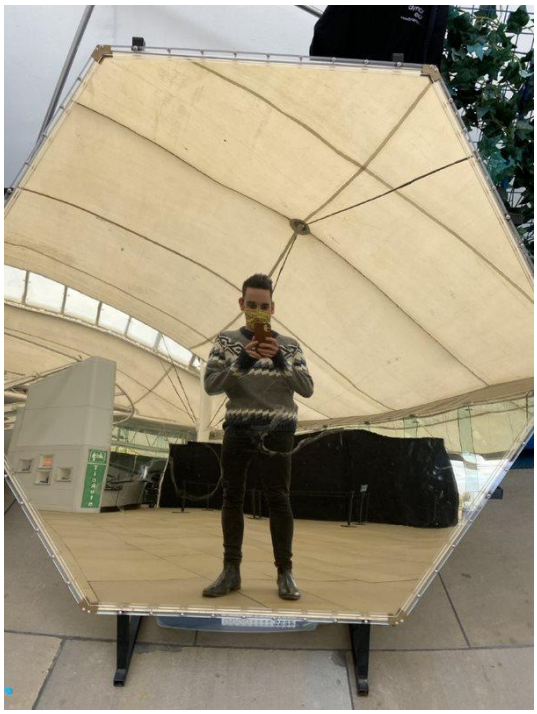
We hosted Destination Space themed weekends, engaging with members of the public around through drop-in stalls, family shows, and promotion of events such as the "Logo lift-off" competition. For our younger audience [we hosted] a space-themed Early Years take-over day, aimed at 3-5-year-olds. Finally, we hosted the Dundee Science Festival and, in conjunction with local universities and

organisations, delivered a range of digital content based around climate change and the use of space to assess its impact."

Dynamic Earth

Pupils taking part in Destination Space schools workshops

"Across our programming portfolio, we built family science capital with kit and experiences provided through the Destination Space programme and meet the scientist opportunities through our COP26 Climate Science Showcase. We were also delighted to deliver brand-new immersive engagement opportunities in our recently opened Planetarium and – through the ongoing delivery of Destination Space workshops to primary school pupils from earlier phases of Destination Space– Dynamic Earth has exceeded its delivery commitments by ***delivering more than 10,000 engagements as part of this phase of the project.***



The life-sized mirror segment on loan from Royal Observatory Edinburgh

Destination Space was a flagship element of our October half-term family programming and an exciting element of our COP26 programming. We marked the imminent launch of Webb by hosting a life-sized mirror segment of the JWST from the Royal Observatory Edinburgh and delivering make-

and-take James Webb Space Telescope activities. Rocket launching, IR camera activities and use of public engagement mats were also firm favourites with audiences. Everyone had the opportunity to meet real and aspiring space scientists as part of our family programme as we welcomed a team of students from the University of Edinburgh's School of Physics and Astronomy to co-deliver these experiences. ***3, 003 people engaged with these activities across a nine-day delivery period****.*

Destination Space activities (right) being delivered under the Gaia installation (Left) during the COP26 Climate Showcase

During COP-26 we delivered a large-scale Climate Science Showcase takeover event at the centre; ***proving opportunities for 1,500 people to meet and engage with scientists*** *from across industry and academia whilst taking part in a range of hands-on experiences under Luke Jerram's stunning Gaia installation of planet Earth as seen from Space. We welcomed 50 exhibiting researchers from 14 organisations as part of this event – with many exhibitors focussing on satellite data and its applications in climate change research. This included exhibitors from Earthwave, who used satellite data to create an immersive 4D model of the Antarctic and researchers from the University of Edinburgh who use satellites to study changes in ice cover. Dynamic Earth also ran Destination Space activities as part of this event.*

As part of our newly upgraded Planetarium, our team of in-house Astronomers developed and delivered an extra special version of our What's Up? Planetarium show. For Destination Space Phase 3, our What's Up? Show included special segments exploring the lead up to, launch and deployment of Webb. We delivered targeted community engagement for this element of the project to widen our reach and participation with underrepresented audiences. In total, ***5, 387 people took part in What's Up? shows during the project delivery period.***

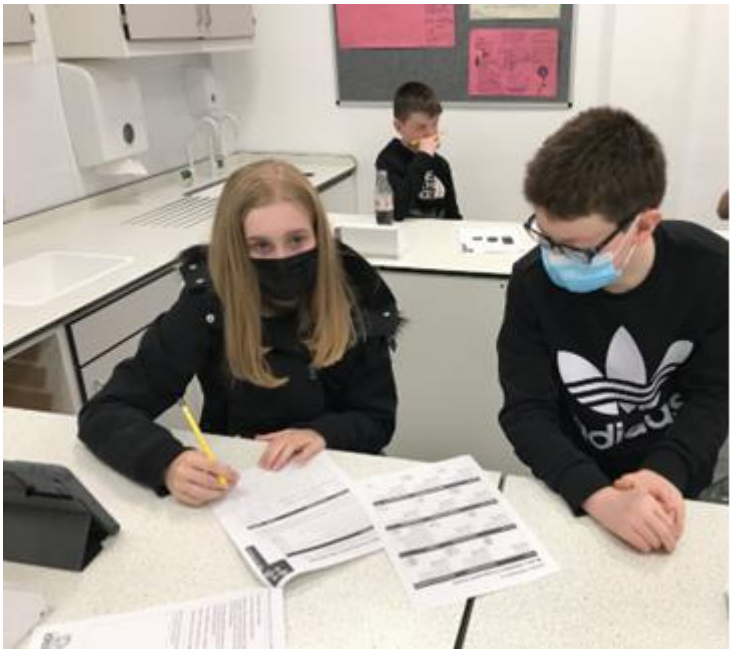
Glasgow Science Centre

"To engage and inspire young people with the amazing stories, science and engineering of the UK's space sector, we delivered 'Learning Lab: Scotland in Space' an in-depth learning programme celebrating the Scottish space sector.

Learning Lab is a unique online programme designed to inspire the next generation of scientists and engineers by bringing together real-world STEM expertise, online and classroom learning and hands-on experiences over several weeks.

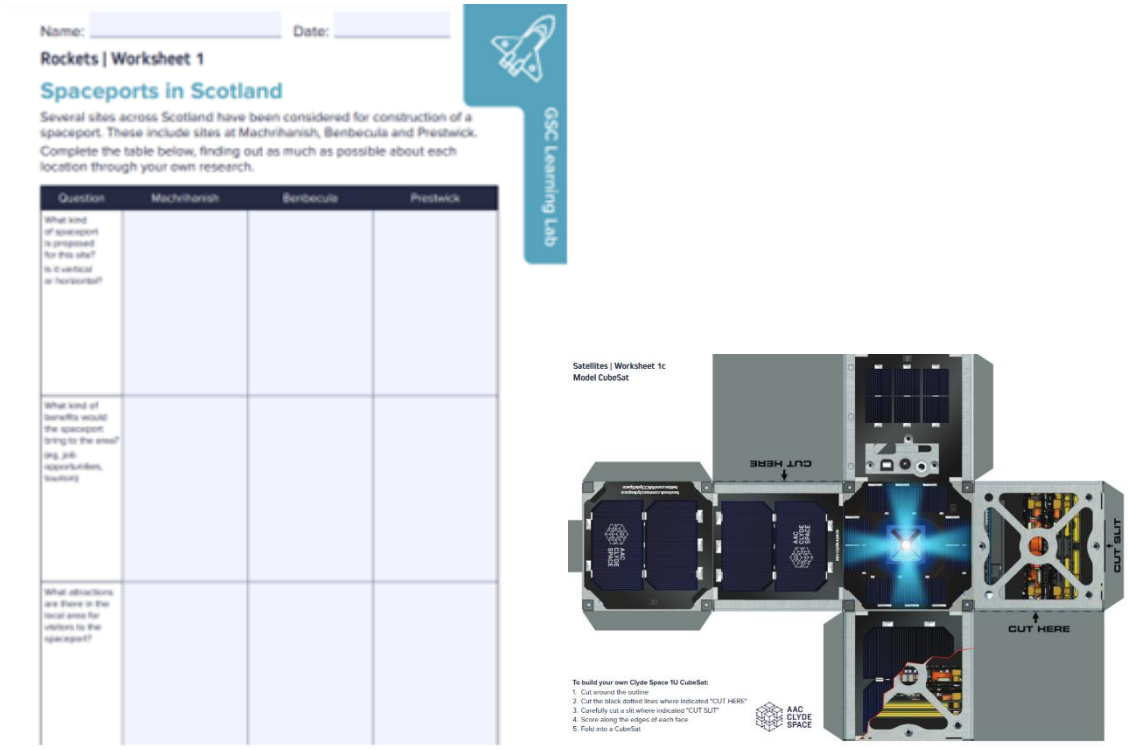
S1 pupils building rockets

Scotland in Space is a 6-week interdisciplinary Learning Lab programme that supports young people in S1 and S2 (age 11 – 13) to investigate the science behind rocket and satellite technologies, research applications of space technology, and recognise Scotland's contribution to the space industry and career opportunities in the field. Pupils use research and videos to build knowledge, and a combination of practical and discussion activities to develop skills. In relation to Destination Space 3, the key content areas covered were Spaceports (potential sites in Scotland) and Climate Science (case studies of satellite missions supporting climate research).



S2 pupils using some of the Scotland in Space worksheets

We delivered 'Learning Lab: Scotland in Space' to 23 S1/2 classes from 14 secondary schools across Scotland – engaging a total of 1,239 pupils and 25 teachers from 6 different Local Education Authorities. This included engaging teachers and pupils from diverse backgrounds. We used MS Teams to deliver teacher training and to share the resources. Activities were then completed in the classroom over a 6-week period at the beginning of 2022. Seven of the schools were then invited to come and visit Glasgow Science Centre.



Selection of Scotland in Space worksheets used in the Learning Lab classes, including Clydespace cubesat model

Evaluation information showed that:

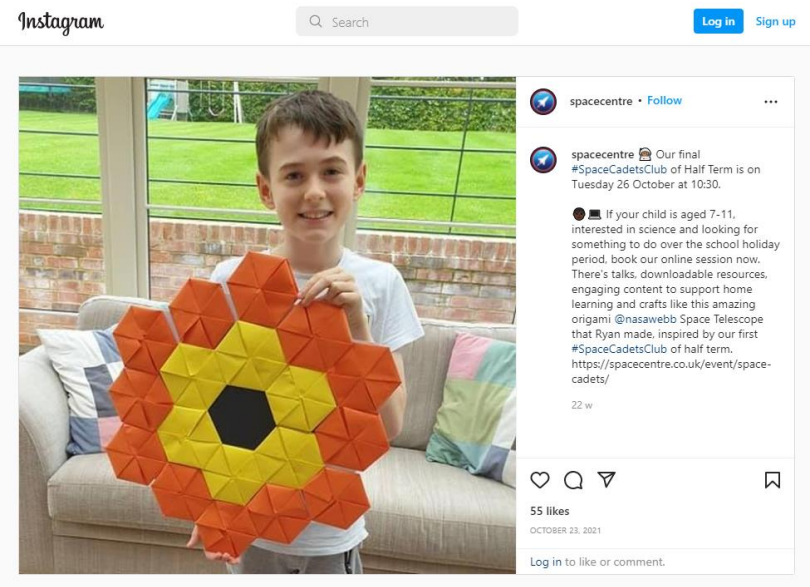
- *Pupils enjoyed learning about the rocket and satellite technologies through hands-on activities;*
- *Pupils became much more aware of the importance of the space industry in Scotland and associated careers;*
- *Teachers are more aware of the Scottish space industry and will continue to talk to colleagues and other pupils about it, cascading the learning."*

National Space Centre

"*The National Space Centre delivered the Destination Space 3 from November 2021 to the end of February 2022. In total we had over 22,000 interactions as part of the programme. These interactions were with both family and schools audiences and were a mixture of, in person at the centre, online and outreach in city schools.*

During the COP26 event we had over 1,000 interactions in just one day, at the National Space Centre. Subsequent half term programmes spanned a two block. October half term concentrated on the James Webb Space Telescope and we had over 5,000 interactions with families. During February half term, we ran events based on spaceports which had over 9,000 interactions with family audiences.

Over 5,000 students have taken part in a workshop or planetarium linked to project and we are still delivering programmes based on the themes of spaceports, sustainability and James Webb Space Telescope.



Instagram post from the National Space Centre mentioning Space Cadets Club

We also reached over 2,000 people as part of our online activities. This was through online kids clubs which we ran over the half term holidays inline with the theme also running at the centre. The most popular online activity was the JWST talk by Dr Hannah Wakeford."

Observatory Science Centre

"The Observatory Science Centre began the Destination Space 3 programme with a weekend of activities to celebrate the imminent launch of the long-awaited Webb Telescope. Initially two days and one evening were scheduled for the celebrations but because of the demand for Stargazing Evenings it was decided to add an extra evening. While visitor numbers were much lower than originally anticipated, the weekend was very successful. Families were engaged in making and launching water rockets, immersed in information about the Webb Telescope and were fascinated by infrared technology.

For the February half term 2022 the ever-popular Destination Space science shows were cherry picked to develop a new show with all the best bits! This gave the opportunity to carry on engaging families with space flight but also offered the chance to show how satellite technology is not just integral in everyday life but how important it is in tackling issues such as climate change. It also introduced space exploration in the wake of the successful launch of the Webb telescope.

The show was very well received. From evaluation data, participants particularly appreciate the interactive nature of the presentations. While dialogue is extremely important, fun experiments and demonstrations are vital for holding the attention of children of all ages especially when introducing more difficult concepts in science. Evaluation has helped to tailor the show so we have the appropriate balance of dialogue and interactive activities. This will be taken forward for the school science show which will be presented during British Science Week [during March] 2022.

When collating the evaluation it was extremely heartening to know that the majority strongly agreed that they enjoyed the show. It was also exciting to see that over 90% agreed or strongly agreed that they were more interested in space science following the show. In terms of inspiring the audience,

over 80% of those taking part in the evaluation process said they were more likely to read and/or talk to others about space. This brings science to life and is vitally important to reach a more diverse audience that may perhaps ordinarily not be interested in visiting a science centre. It also demonstrates how successfully the show presenters communicated the science in a very engaging, easy to understand and above all fun way.

The show will become firmly embedded in both the school and the family programmes giving The Centre the opportunity and confidence to present up to date science and technology."

W5

"*W5 re-opened to the public on 25th October 2021, having been closed from 23rd March 2020 due to Covid-19 restrictions. The impact of Covid-19 has been significant on our operations and ability to engage with the public, however launching with inspirational programmes such as Destination Space has ensured that we have a fantastic range of new programmes on offer. This programme also has strong links with many of our newly developed and reimagined exhibition zones, from energy and transport to climate science.*

Visitor numbers have gradually been building for W5 since reopening, and it is good that audience levels attending shows and events within the science centre are now once again similar to pre-pandemic levels. Operational models have changed, with all visitors now pre-booking online with allocated timeslots. This has resulted in a flatter operational pattern, and rather than having big events and activities for peak crowds at 2-4pm, we have delivered many more smaller scale activities to fit with this new visitation pattern. Destination Space accounts for over half the engagements between W5's Learning and Engagement Team and the public since reopening.

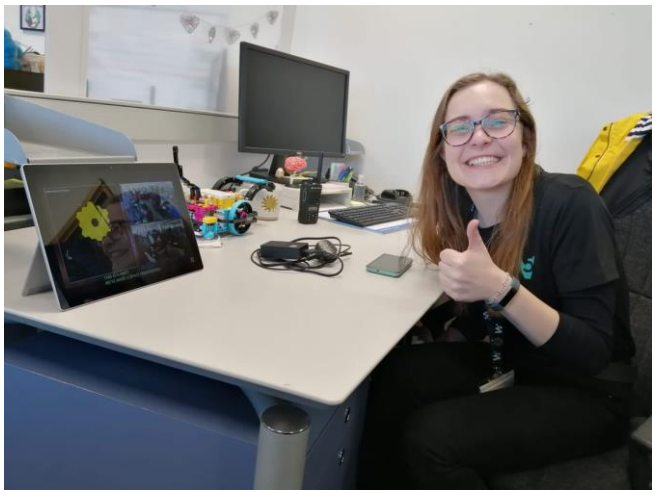
Tweet from school showing children taking part in a space and coding session

This most recent phase of Destination Space has allowed room for innovation and creativity in delivery styles, which W5 had not formally explored in such depths before. The creation of digital /

virtual back-up-plans or content delivery is not something the team had done before, and it has been very successful. It has enabled us to offer flexible options for schools over a period when Covid infection rates were rife, impacting on both students and staff levels in schools. In the case of the Coding for the Future workshop, 22 schools chose to participate in this workshop remotely with only 1 school choosing to participate on-site. This change in mind-set and approach is something which we will continue to explore and embed with our core operations moving forward.

Image from Holy Child school workshop showing Matt on screen delivering

The self-reflection journals were a popular choice of evaluation tool with the staff within W5. By the end of the programme most of the engagements took place in less formal, conversational contexts, which were variable in length and a quantitative survey may have detracted from the experience itself.



The practitioner view of an online workshop

Destination Space will continue to form part of the core programming of education within W5 as it covers subjects that capture the imagination of both schools and public alike, helping to inform and

encourage the population to engage with the science and engineering of the UK's world-leading space sector."

Winchester Science Centre

"We used our previous experience of Destination Space 1 and 2 to create fun, inspiring science experiences for young children to build science confidence, with a particular focus on creating opportunities for children from local, underserved communities who are unlikely to visit Winchester Science Centre and have limited opportunities to experience science in their communities. On the Isle of Wight (IoW) the children have low aspirations and poor social mobility – made worse by Covid-19, exacerbated by stretched school funding and the challenge of transport to the mainland.

As a legacy of our successful delivery of Destination Space phases 1 and 2 we have regular space engagement with schools who visit our Science Centre, through our highly successful in-house school offer. Every visiting school gets an awe-inspiring planetarium show and many take part in a fun, interactive space-based workshop. We wanted children who couldn't visit us in Winchester to get the same exciting experience. We deployed our mobile dome to 5 of our priority primary schools on the IoW with the highest levels of pupils with free school meals (over 40% compared to the national average of 23%). We intended to do 6 by adding a special school, but Covid has delayed this until the summer (this visit will still be going ahead).

We did a day with each school where we engaged their pupils in a space experience, exploring themes such as satellites and their role with climate change (linking to our more specific climate and ocean health themed outreach offer), as well as UK's spaceports as an ongoing current news piece.

Pupils at a school getting their "pre-boarding briefing" ahead of a mobile dome planetarium show

Alongside this we offered schools free access to space careers videos we developed with Airbus, focussing on women in the sector (videos include an early career, mid-career and late career woman from the sector) as well as a "meet the scientist" video in which children interviewed a person in STEM. This was bundled with a free teacher CPD pack focussed on the scientific method to help build STEM confidence with all teachers at each school. As the regional STEM Ambassador hub, we will be able to continue to engage with these schools into the future, Identifying STEM Ambassadors to support their pupils with targeted events.

The delivery model has proven to be an effective way of engaging with schools and communities to showcase the importance of STEM in all of our lives, to build science confidence and raise aspirations and we will us this as the basis for our ongoing community outreach work.

Some feedback about the wide reach and impact of the project from a teacher was: "It was a good experience, the dome was really exciting for adults as well, teachers were talking about it at break time. Children loved it and talked to parents about it."

In the longer term we are looking at empowering young people to be advocates for STEM, this kind of activity may not only help this but may be a vehicle for them to become passionate advocates for space based STEM."

Xplore!

"*Over 2,400 visitors to Xplore! experienced the Destination Space family show and 121 people attended our astronomy evenings. Evaluation data shows the families picked up on how space science plays a part in our everyday lives; "Helps us to understand our world and have an insight into the universe", and "Teaches us how to take more care of our planet".*

For schools, Xplore! focussed on offering sessions to schools remote from STEM or schools in areas of high deprivation. However, many other schools contacted Xplore! directly to book space related activities, and these participants have been included in our delivery numbers. Over 1,200 learners have taken part in a Destination Space 3 workshops either at Xplore! or in their school during the programme.

For youth groups, Xplore! took the Satellites and Spaceports themed show out to their venues and offered a special week for in-centre engagements in January 2022. In total, 496 participated in the activities, with the horizontal rocket launch demonstration always a firm favourite.

Lastly, Xplore! made up 1,500 resource packs with follow-on activities to inspire the wider family at home, after school-aged children had taken part in the Destination Space programme. So far, 680 have been distributed to families living remote from STEM or in areas of high deprivation, with the remainder to be distributed soon.

Thank you to the UK Space Agency and everyone involved in the Destination Space 3 programme for giving Xplore! the opportunity and support to bring this to our local area."

c. Legacy

"*many visitors hadn't even heard of the James Webb telescope until visiting the Centre*" – **staff reflection, Aberdeen Science Centre**

In the short term, all the centres noted that they would be continuing with Destination Space 3 activities beyond their final report date into the month of March, or even April. In particular, the following elements were expected to continue in this timeframe or just beyond:

- Dundee Science Centre's online Destination Space learning resources (8 hours of content to supplement teachers' materials with Curriculum for Excellence linked activities) being shared with schools
- Dynamic Earth's "What's Up?" shows with Destination Space 3 themes continuing throughout March

- Glasgow Science Centre's "Scotland in Space" online learning lab programme will continue to be offered to the centre's Local Education Authority partner schools, and they are hosting a teacher CLPL session in late April to promote awareness of the programme.
- The National Space Centre's Space Lates event planned to take place in March had a UK Spaceports theme, featuring speakers from industry and hands on activities in the centre after normal opening hours.
- The National Space Centre's home education day in May will also be themed around UK spaceports, and is building on past successes for the centre in engaging with home educators
- Observatory Science Centre continued to deliver their new family show developed for the February half term in an adapted version for schools during British Science Week in March. The two show versions (families/schools) will continue to be delivered as part of their programming after March.
- W5 forecast an additional 33 planned engagements with Destination Space 3 themes to be delivered between March and June 2022, reaching an additional 1300 young people through school workshops and shows.
- Winchester Science Centre have committed to rebooking the space/STEM day at the SEND school on the Isle of Wight that had to be cancelled due to the impact of covid on the school.

When outlining the longer term legacy they expected Destination Space 3 to have, many centres highlighted the ongoing legacy of previous phases, including the ongoing use of kit (eg thermal imaging camera, robot arm, Moon fragment, rocket launcher) and activities received during these phases and the use of Destination Space content/activities as a training tool for new staff to increase their space knowledge and experience working with science centre audiences. Centres noted that content from this phase included in their work with particular audiences, such as schools programmes or home learning programmes, would remain as part of those programmes in the medium to long term.

Centres with planetaria also noted that their guided shows are updated on a regular basis and depending on what is current or topical they will return to Destination Space themes when they are highlighted by current space missions or events.

Dynamic Earth said that they now always include Space and Earth observation role models and meet the scientist opportunities as part of their School Career programmes continuing throughout 2022 and 2023.

The National Space Centre's solar circuit workshop developed as part of the eco-schools roadshow is continuing to be refined with a roll out to schools planned in the summer term. Developments at the end of the Destination Space 3 project included the building of a prototype large-scale model of a circuit to explore energy generation and sustainable energy, linking both to themes of energy generation in space (satellites) and climate science.

W5 explained that Destination Space 3 themes along with content from previous phases has been incorporated into "everything from signage about the building, to dedicating a full day of our week-long summer camps to space".

4. Evaluation

"Rockets. Audiences love rockets. If only one piece of advice could be passed on from this whole project, it is that large crowds form quickly when rockets are involved. They are a great hook and provide plenty of time to have conversations while they are being built." **- Matt Craig, W5**

Ondata Research Ltd were engaged at the start of the project, firstly to support centres in planning their evaluation and secondly to act as independent evaluators of this phase of the project as a whole. They employed mixed quantitative and qualitative methods for evaluation combining participant survey data, participant (teacher) interviews, science centre staff reflections, and interviews with science centre staff. The data was gathered partly by participating centres directly, and partly by Ondata Research Ltd. The findings are shared in detail in the evaluation report which will be shared alongside this report. From the executive summary:

"It is clear that the learning and experience from previous phases of Destination Space have been built-on and embedded within programmes and practice in the participating science centres. Audience groups have had a very positive experience of the activities and have been inspired to learn more about space science and have been able to identify connections with their own lives. The flexibility of the grant has ensured science centres have been supported through this challenging time and the activities have formed an essential part of programming. Staff have continued to build their knowledge, confidence and skills with this being cascaded across several staff members within each science centre.

Centres continue to see the potential and the place of Destination Space within their programming and this extends to being able to deliver more activities and reach a wider audience if funding allows. The prestige of being involved in a high-quality project, both in terms of the resources and information provided and the support received, is a strong motivation for continued collaboration with ASDC and the UK Space Agency."

The recommendations in the report were as follows:

"The following points are based on feedback and observations of the Phase 3 activities and are intended to support the further development of an already very successful project.

1. Continue the flexibility of funding for centres, allowing them to integrate it with existing programmes and organisational priorities.

2. Review the visual branding and marketing materials provided to centres.

3. Build-in meetings for centres to share best practice and ask for advice and guidance from colleagues in other centres.

4. Undertake a dedicated study into the impact of participation in multiple phases of Destination Space, building on the points highlighted in recent evaluation reports.

5. Review the evaluation and reporting requirements to ensure they are balanced with respect to the level of grant funding and continue to develop and enhance the evaluation capacity within centres."

In addition to the work of Ondata Research, participating centres were invited to feedback to each other and to the Project Manager at a "wrap up" meeting at the end of March, or directly to the Project Manager in a one-on-one meeting. Feedback recorded during these discussions underlined many of the points made in the evaluation report. Noteworthy feedback that may be useful for scoping any future phases of Destination Space included the following:

- Knowledge of Destination Space topics and related resources/activities is embedded in the Destination Space 3 participating centres, going all the way back to content shared in Destination Space Phase 1. The handbooks are used as a reference for existing staff, and also for training new staff members.
- Discussion with audiences of any one Destination Space theme can often lead on to questions about other space topics, and the breadth of space topics that have been included throughout the different phases of Destination Space has allowed science centre staff to feel more confident to engage across wider space topics, as well as relating these to people's lives and to the UK space sector.
- The flexible approach of Destination Space 3 was essential to allow some centres to participate, who would not have been able to commit to adding an additional programme of top-down mandated delivery with the constraints of the project notice period, timescale, or budget.
- There is a balance to be struck between financial support of the grants on offer for Destination Space and the workload or staffing requirements associated with delivery. The Destination Space 3 delivery grant of £3,500 per centre was viewed by most centres as the minimum grant for delivering an ongoing programme, with any smaller amount more likely to run into issues with covering staffing costs. A smaller grant may be better to suited to supporting one-off events than rolling programmes. However, increasing the grant amount available without a longer timescale would bring its own challenges, centres may struggle to use larger grants meaningfully without more time to deliver.
- Centres do have some limiting factors for scaling up delivery that it is worth keeping in mind for future phases, especially visitor numbers which for many remain capped to maintain the quality of visitor experience and allow for some distancing between visitors even as restrictions are officially lifted.
- The timing of ASDC funded project offers came up, with some centres feeling torn between wanting to engage with every opportunity, but needing to be realistic about how much programming they could deliver concurrently within the limits of their staff capacity.One centre also described themselves as being wary of "saturating their audiences" with multiple projects when planning their programming. This is something for ASDC to consider when scoping projects with funders, as is the possibility of staggering reporting phases so that centres aren't required to return reports for multiple projects at once, as a handful were during this phase of Destination Space.
- The flexibility of this phase was praised for allowing centres to:
    - build Destination Space 3 in alongside their existing programming
    - trial new models of delivery using themes they knew would be popular, with resources they trusted
    - target specific audiences or develop specific programmes that stand-alone from their regular programming and would not be possible to deliver without external funding

  The flexibility of this phase was also viewed by centres as recognition of their expertise in scoping and designing high quality programming for their target audiences that incorporates science themes with rigorous accuracy and the support of external experts. The inclusion of staff reflections and staff interviews as integral parts of the evaluation also supported this feeling of recognition, and of feeling valued in this respect by ASDC and UK Space Agency.
- The inclusion of the content relating to climate was useful for most centres in providing a new angle of approach for talking both about space and about climate. This is an interesting

observation as some centres stayed away from this topic as it didn't fit with their existing offer (Observatory Science Centre is a key example) and the James Webb Space Telescope was the most popular topic by number of engagements. However, centres did find that audiences want to talk about climate, and that the topic links naturally to other Destination Space themes including wider satellite applications and also spaceports.