

TAKING 3D RESEARCH INTO 3D PRODUCTION AT ORDNANCE SURVEY, GB

Dr. David Holland, January 2025

Once upon a time...

A “3D LOD2” map – made over 200 years before Ordnance Survey was established. Produced by Robert Johnson in 1587, it contains the survey of the Manors of Crickhowell and Tretower.



Once upon a time...

The same area on an OS map. Somewhat flattened.

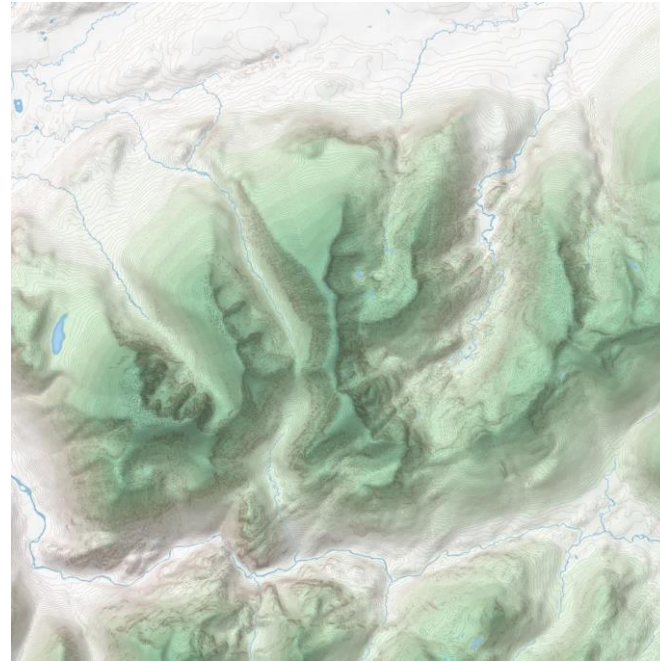


Current “3D” products at OS

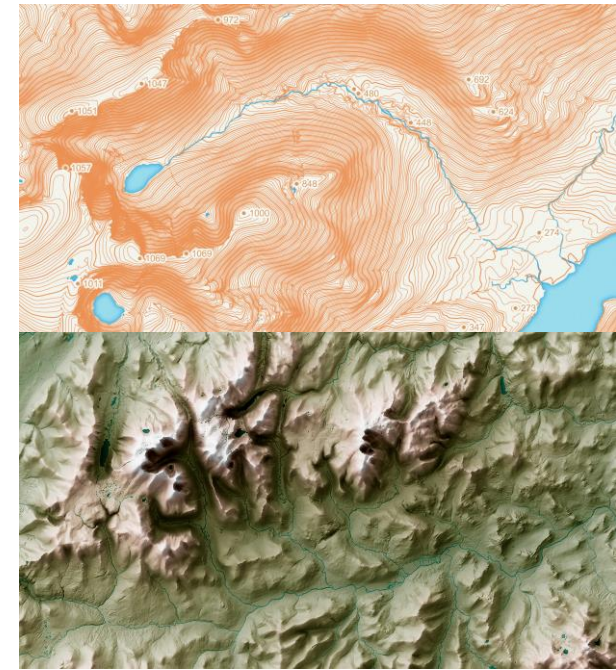
Building height attributes



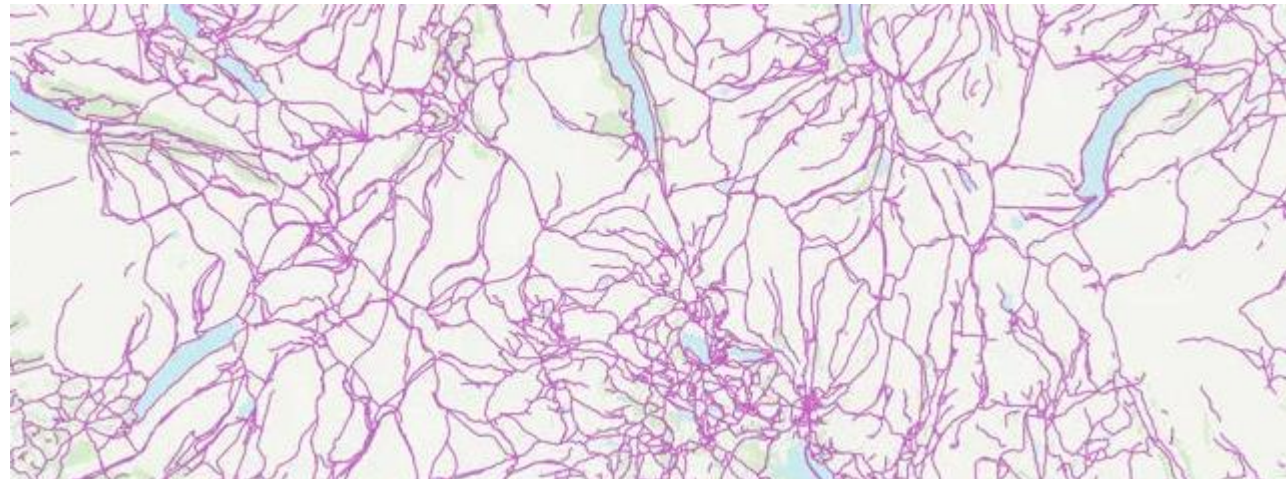
OS Terrain 50 contours and DTM



OS Terrain 5 contours and DTM



OS Detailed path network



Current “3D” products at OS

- Mostly long-standing “heritage” products
- Most have origins in cartography and ground survey
- Sometimes we have to remind the organization that the Earth is not flat
- The research team wanted to create a 3D product that is both feasible for us to produce and viable in the market

Point cloud



3D object model



3D mesh

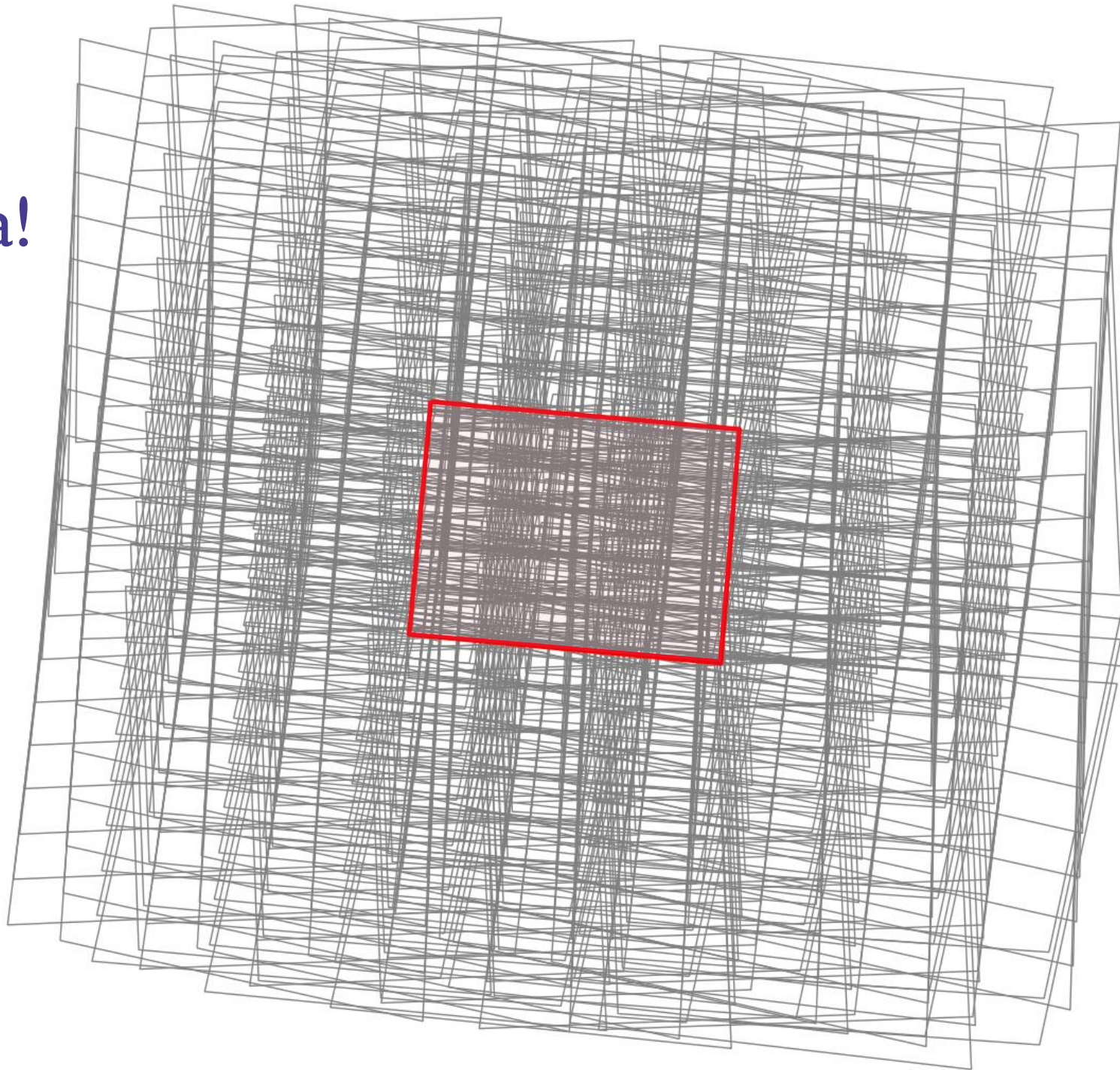


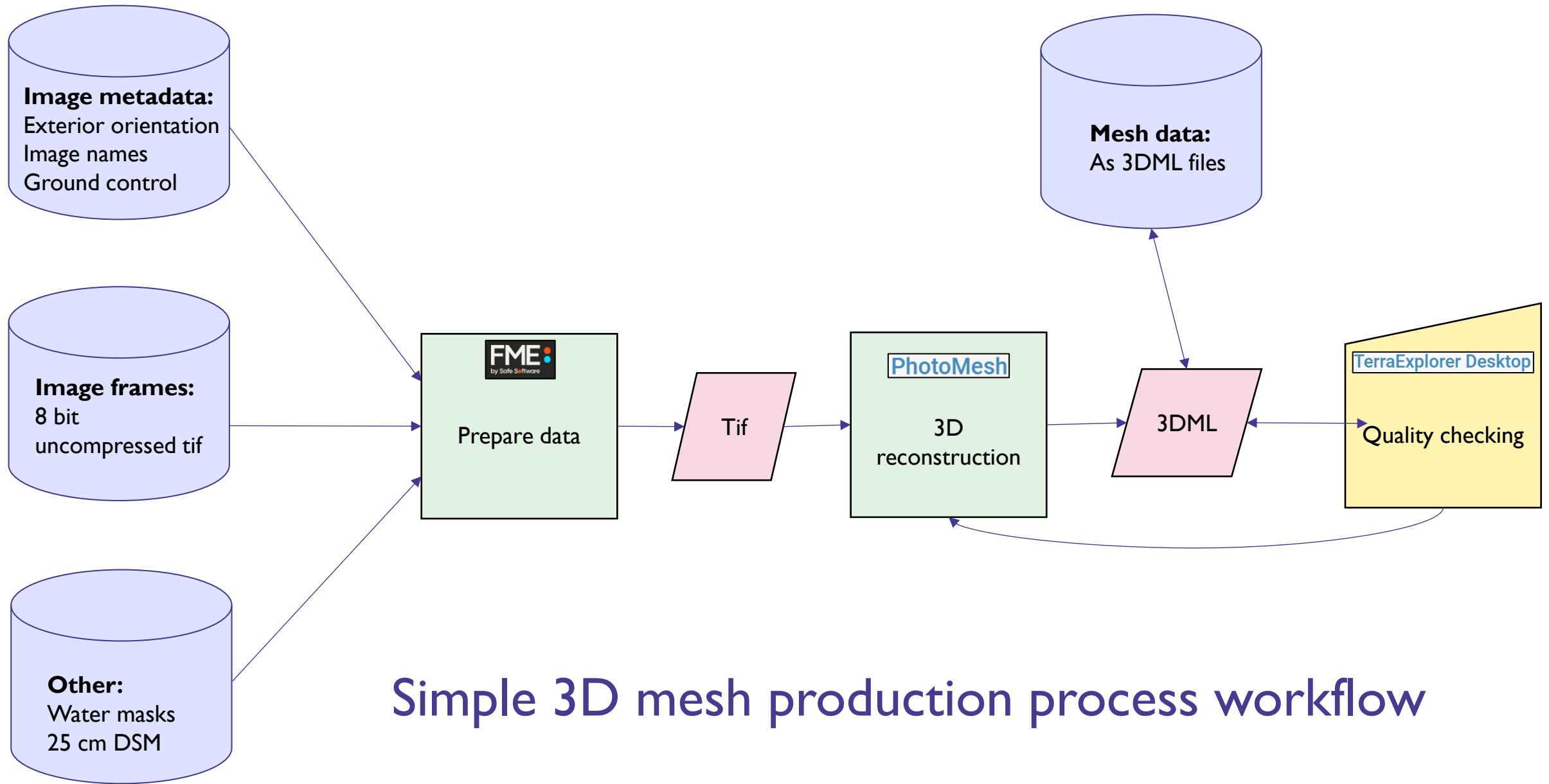
Our first area of interest – testing at scale



- Exeter ✓
- Redruth-
Cambourne ✓
- Plymouth
- Newquay ✓
- Paignton –
Torquay ✓
- Bournemouth,
Christchurch,
Poole ✓
- Falmouth-
Penryn ✓
- Torbay ✓

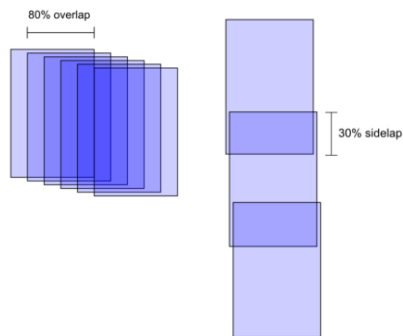
There's a
lot of data!



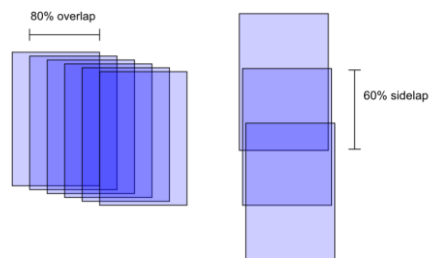


Simple 3D mesh production process workflow

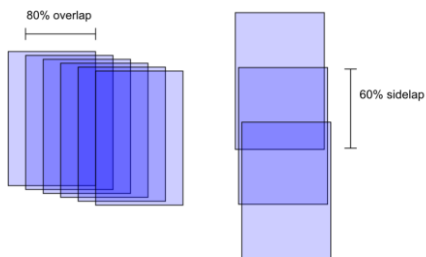
What we
can do
with
existing
data...
“a bit
meshy”



Fly a bit lower...



High res oblique



4.66 Meters

Buffering 50.72341 N -3.53100 W MGRS: 30UVB6251819202 Alt: 62.21 Meter

Buffering 50.72341 N -3.53100 W MGRS: 30UVB6251819202 Alt: 61.17 Meter

3D Mesh Product Development





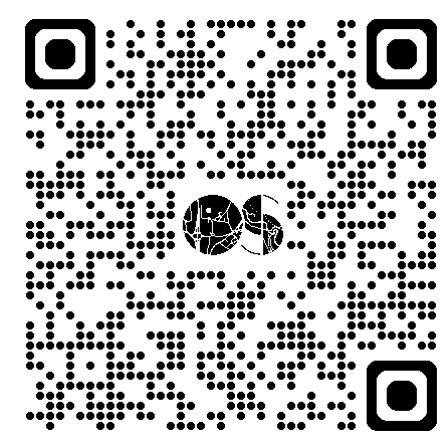
Background



- The 3D squad (3D Product Team) worked on a 3D mesh for about 18 months
- During our research we made 3D meshes from various different resolutions of imagery
- We engaged with many potential customers to find out whether our proposed product was viable
- We received enough evidence from users of the sample data to proceed to the next stage
- This stage is MVP = Minimum Viable Product



Web app showcasing the 3D meshes



Navigation

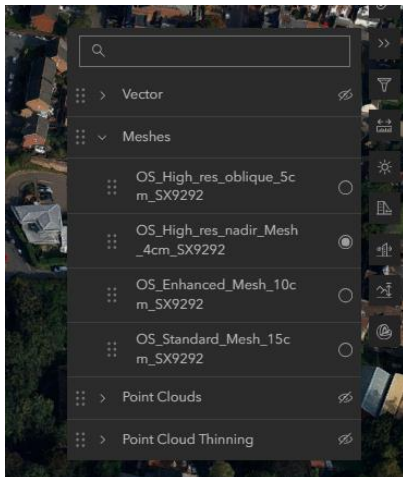


Layers

Slides

Measure

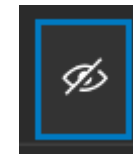
Line of sight



The layers are grouped, so please ensure that the group is visible before selecting the layer you would like to view.



Group visibility on



Group visibility off



Product proposition

- OS 3D Mesh is a data product built using imagery from the OS flying program.
- It can be used for large scale visualisation and integration of other 3D datasets such as city models or drone data.
- OS 3D mesh can be used in GIS applications and is interoperable with other OS datasets, such as buildings or highways.
- The 3D mesh provides a geospatial view of the world similar to what can be seen with the human eye, making interpreting maps highly accessible to a wide range of stakeholders.



What are we trying to achieve in a Minimum Viable Product?

- Testing customer demand for a 3D mesh product.
- Validating use cases a customer will **pay** to address
- Looking to establish how the product fits into the market, including any additional necessary features to deliver value.
- Testing what customers **will** pay versus what they suggested they **might** pay during discovery.
- To understand service and support requirements
- To be able to more accurately forecast product revenues for an in life product.

This will help us to calibrate the price point, specification and features for a future in-life product.

Major event planning

“What Ordnance Survey gave me was I had total confidence,...if I was at that location, this is exactly what I could see”

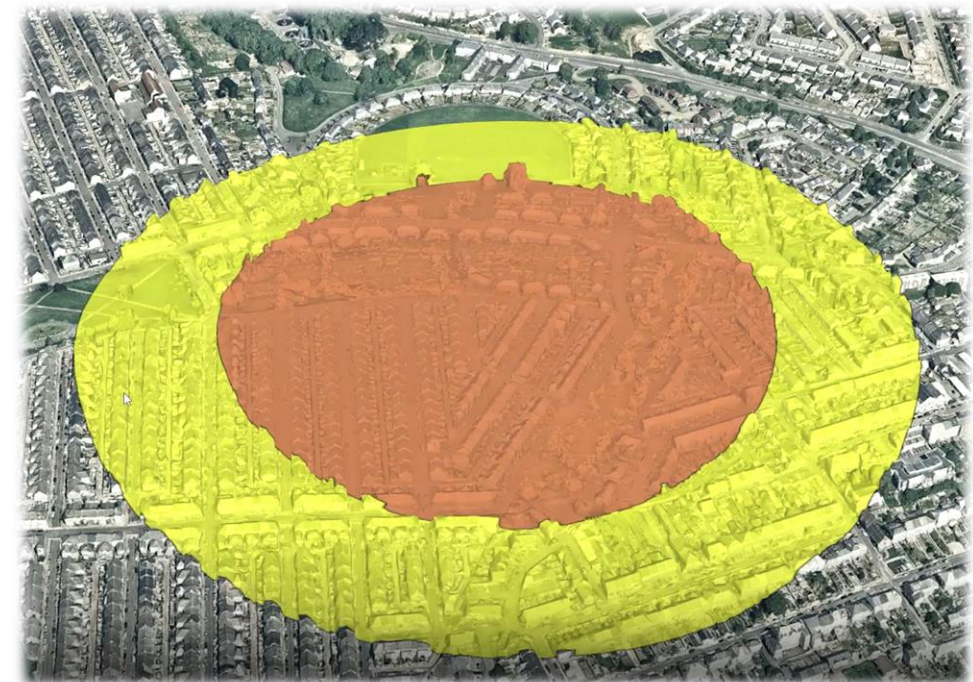
- Used by police and security services
- E.g. UK G7 summit in 2021, Commonwealth Games 2022
- Line of sight analysis shows potential sniper positions (Trump security detail, please note)
- Viewsheds from CCTV cameras highlights blind-spots
- Helps train police brought into the area from other forces



Emergencies

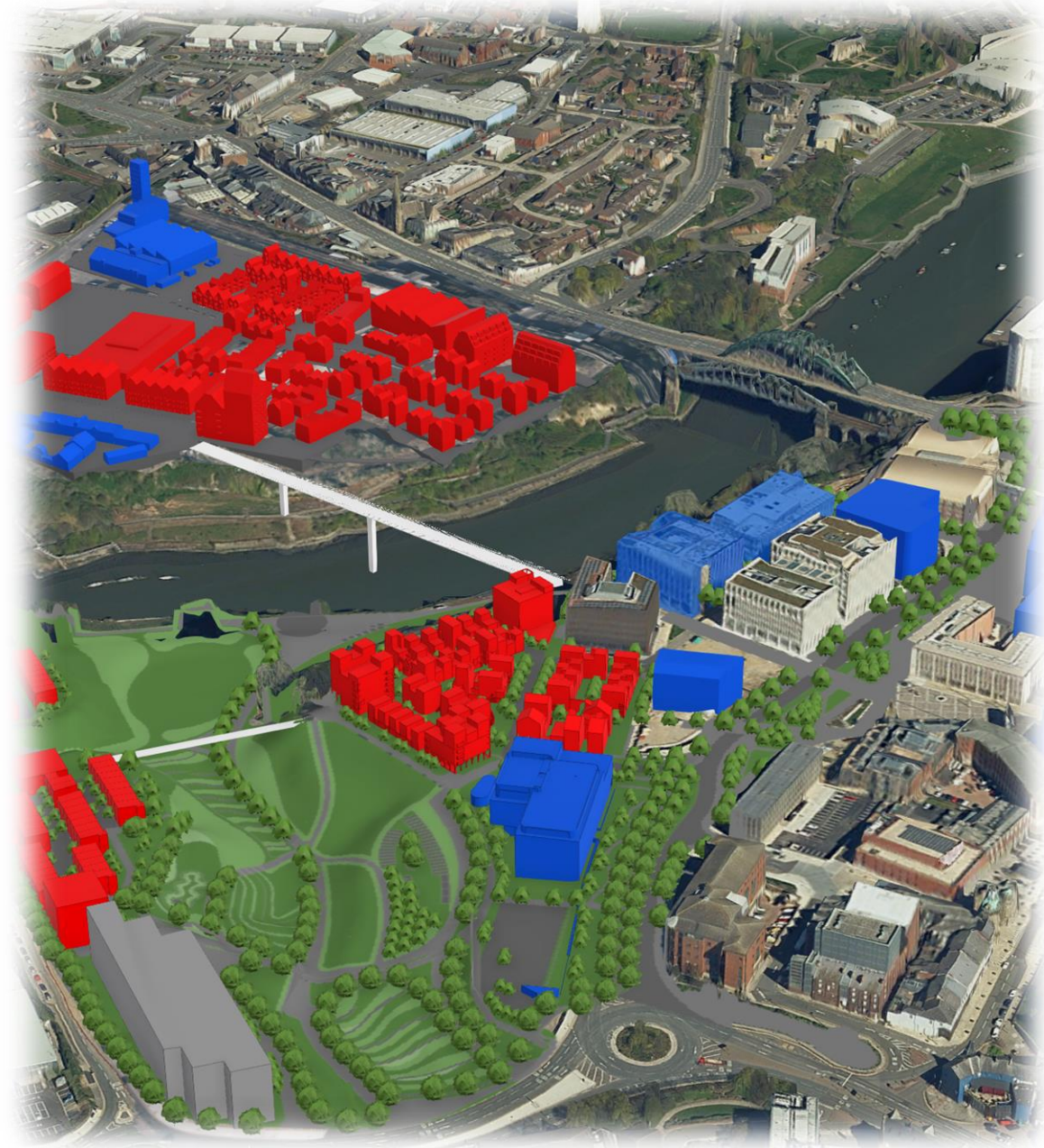
“[With] 3D models they can really understand that area and it makes it a hell of a lot safer for everybody involved”

- A 3D mesh was used to help with the safe disposal of a WWII bomb in Plymouth
- The data were used to:
 - Estimate the blast zone if the bomb were to explode
 - Plan the evacuation of residents
 - Plan the best route from the bomb location to the disposal area off the coast
- The OS 3D mesh was used in conjunction with UAV data captured on site
 - Data was available to forces on the ground via a mobile app



Housing estate planning

- Homes England – Government housing and regeneration agency
- Plan new residential developments with affordable, quality housing
- Create their own data for the actual development site
- Wanted a 3D mesh of the surrounding areas to put the development in context
- Used to present the plans to stakeholders and local citizens



Digital Twins



- We seem to have a **hot/cold** approach to digital twins
- We have sponsored some research into digital twins and we are still interested in them
- We work with the National Digital Twin Programme, which uses our topographic data (but only in 2D)
- There is a test project on the Isle of Wight which OS is involved with.

Pains and challenges

- Convincing colleagues that 3D products are viable (Moving on from 234 years of cartography)
- Transferring Research findings into production systems
- Processing huge datasets (without destroying the planet)
- Linking 3D data to inherently 2D attributes
- Linking 3D data to heritage 2D data (or not)

The future



- The one thing I can say about the future is that it won't be what we expect it to be!
- I would like OS to continue to research into 3D, especially:
 - creation of classified point clouds
 - 3D object models, linked with attribution from multiple sources
 - Further automation of 3D data processing
- We hope the 3D mesh product will prove viable and will spark future research into 3D



Thank you