



HISTORIC SCOTLAND  
ALBA AOSMIHOR

What We Do

- 3D Survey & Imaging
- Digital Documentation
- Heritage Visualisation
- Condition Monitoring
- High Resolution Collections Documentation
- Local, National & International Collaboration
- Education & Outreach
- Community Engagement
- Applied Scientific Research
- Building Information Modelling
- Digital Documentation & Data Management Guidance
- Ministerial Support & Briefings

What's in our Toolkit

- Mid-Range Laser Scanners
- Close-Range Laser Scanner
- Close-Range Structured Light Scanner
- GNSS Global Positioning Equipment
- Gigapixel Imaging Systems
- High-Resolution DSLR Cameras
- High-Specification Workstations
- 2D & 3D Softwares
- Thermal Imaging Cameras
- 3D Moisture Meters

What is 3D Laser Scanning?

- Non-contact, rapid, accurate and objective method of documentation/recording of as-built architectural heritage and ancient monuments in their environmental setting.
- Laser beam scans surfaces.
- The returning, reflected laser light is used to compute distance to surface.
- This happens up to 1,000,000 times every second.
- The millions of points computed are used to produce a 3D 'point cloud' which defines the surface geometry.
- 3D 'Cloud of Points' - XYZ coordinates in 3D space, together with RGB data and intensity value.
- Point clouds are acquired from several points of view and joined together to produce a 3D image with accurate dimensions.

C D D V

Advantages of Terrestrial Laser Scanning

3D snapshot of the as-built environment.

Able to digitally survey up to 200 meters with a data resolution of 6 mm.

Speed of data capture as compared to conventional methods.

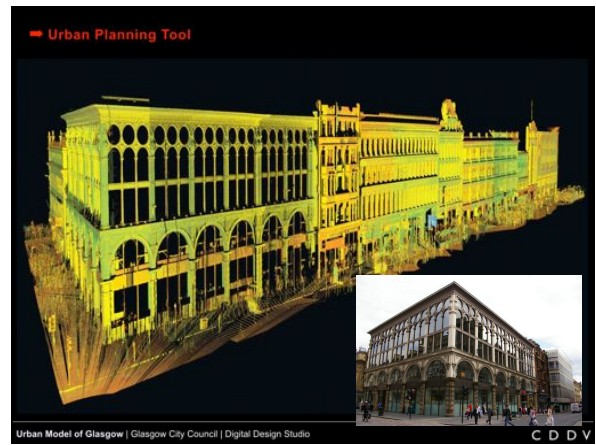
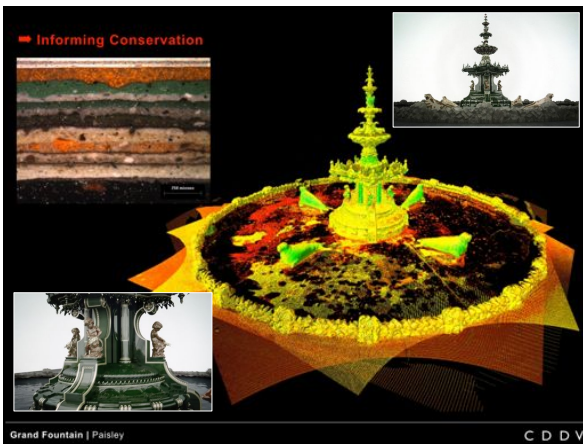
Point clouds can be integrated with/into other datasets.

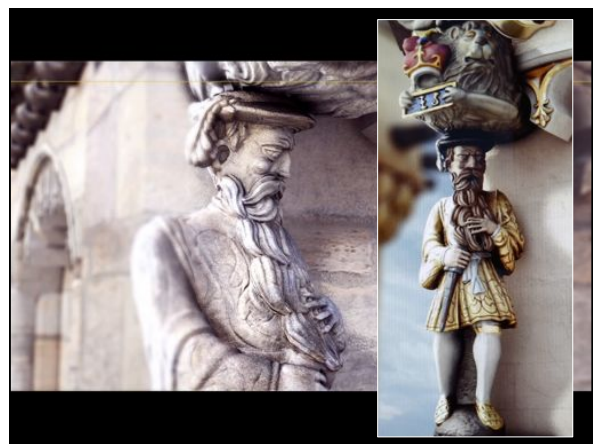
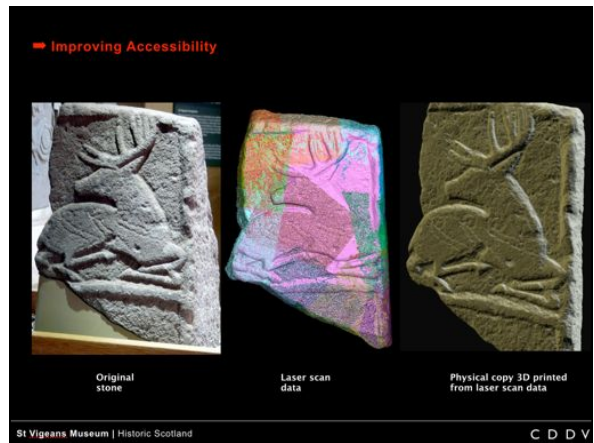
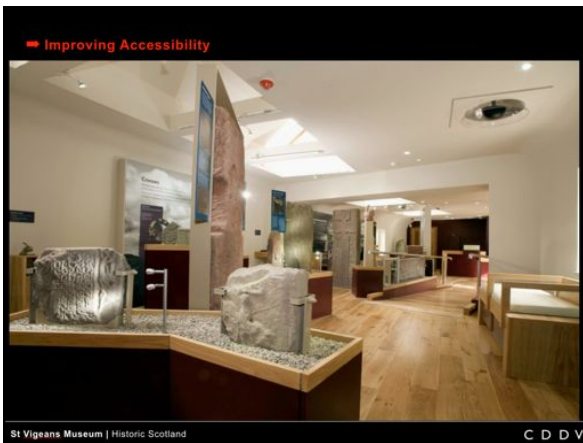
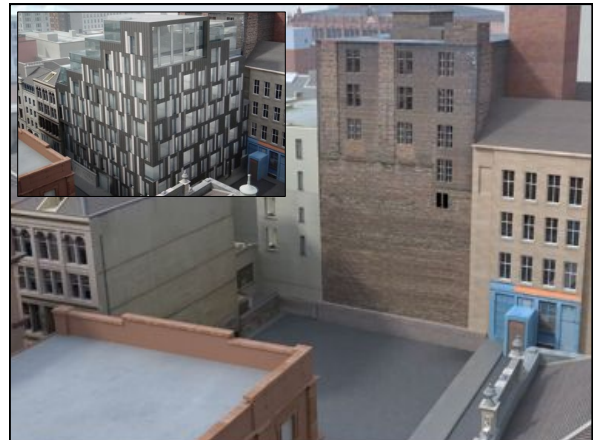
Multiple use of the point cloud data - 2D CAD, 3D prints, 3D visualisations.

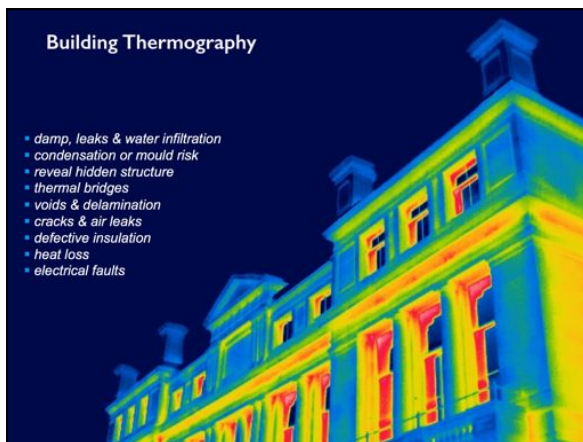
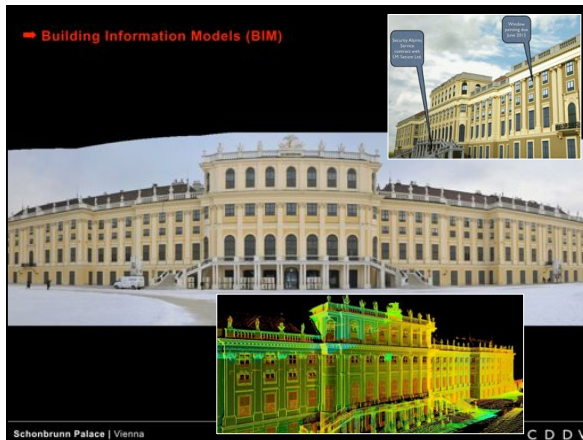
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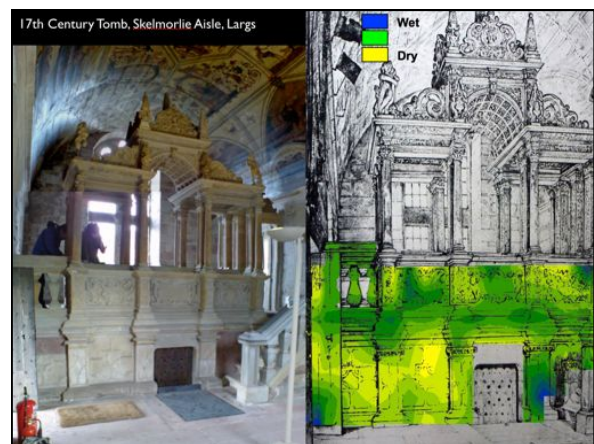
Why is Digital Documentation Important for Cultural Heritage?

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**Rosslyn Chapel**  
Roslin, Scotland  
Built 15th Century

**Reason for Survey**  
Extensive restoration scheme  
Assist conservation programme  
Education and interpretation

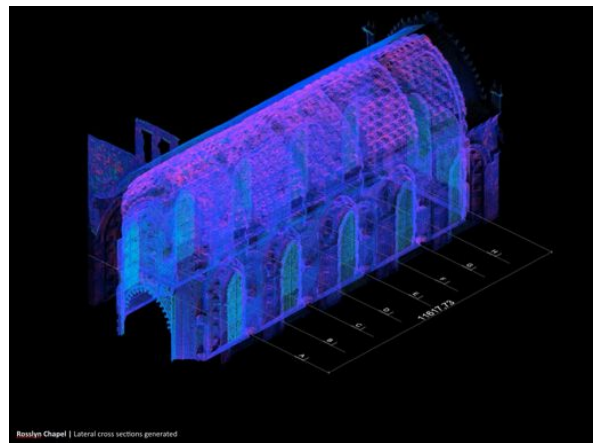
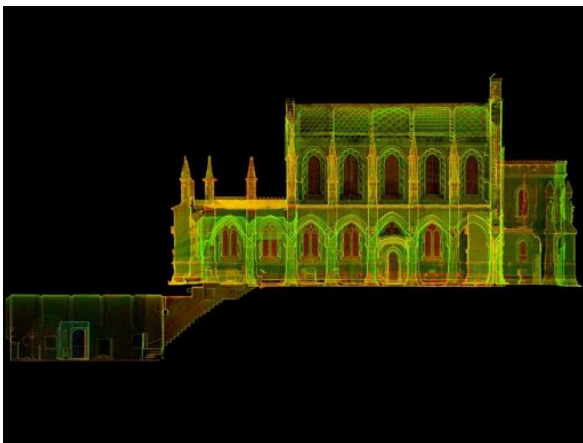
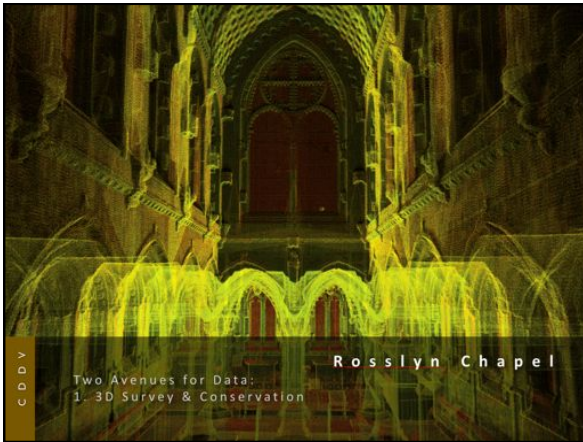
**Metrics**  
Survey Stations: 142  
62 interior  
80 exterior

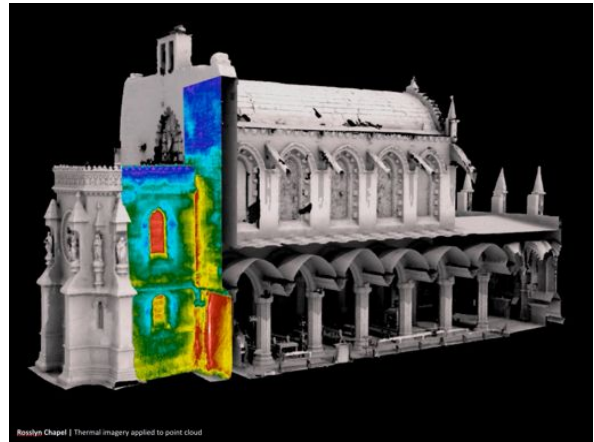
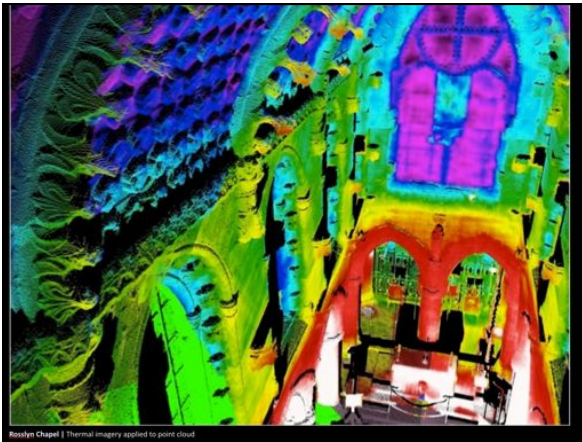
**Hardware:** Leica Scan Station 2  
Leica HDS 6100  
Hexagon Perception Bomer v5  
Konica-Minolta Vivid 9j  
Artec MHT  
Nikon D3X

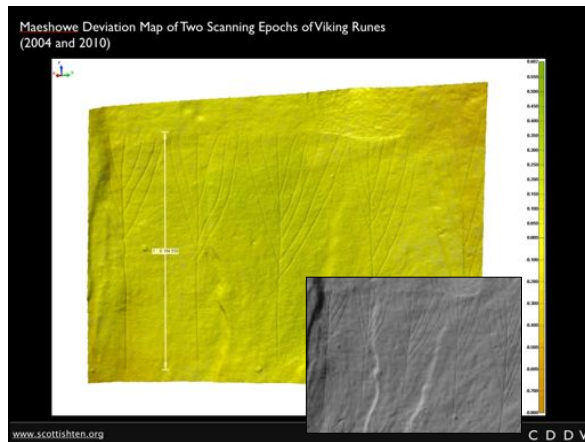
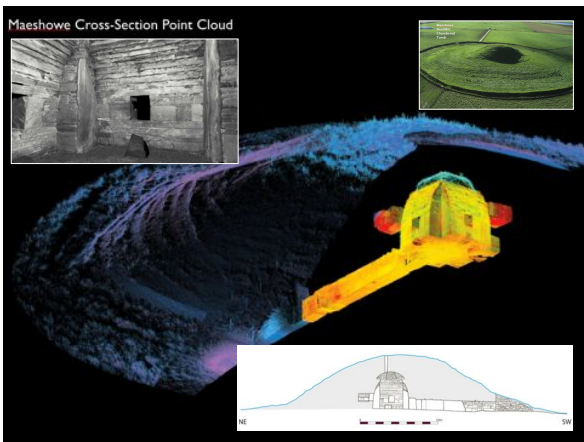
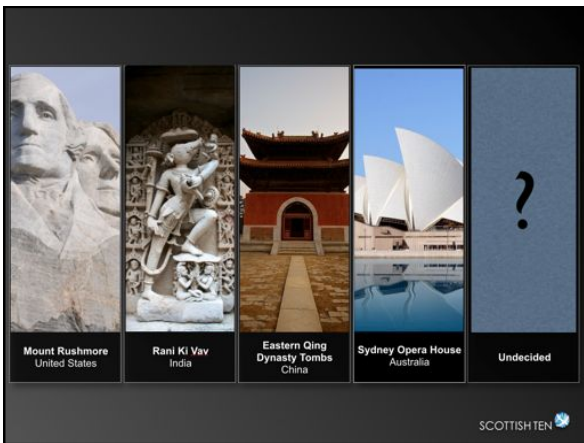
TLS Registration: target and cloud-to-cloud  
Total TLS Points: 4,123,304,000  
Mean TLS registration error: 8mm

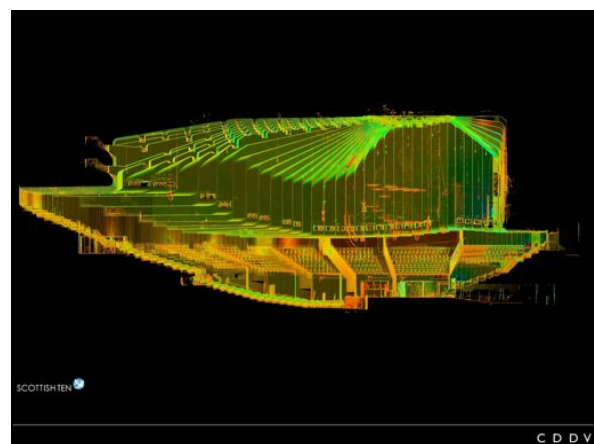
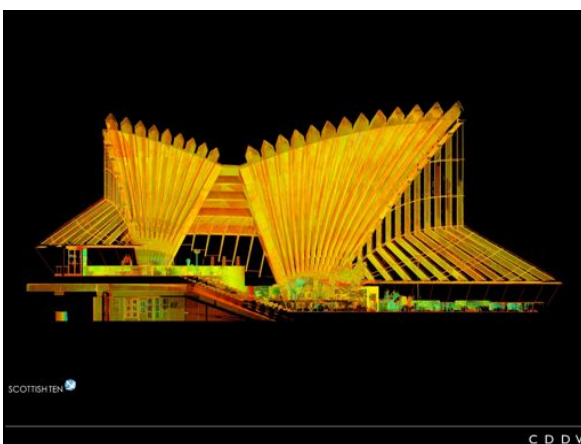
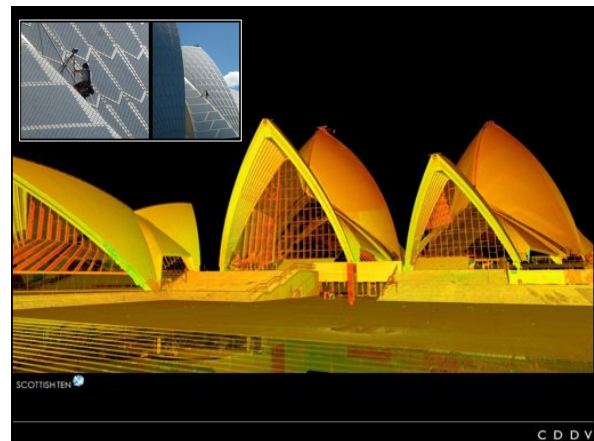
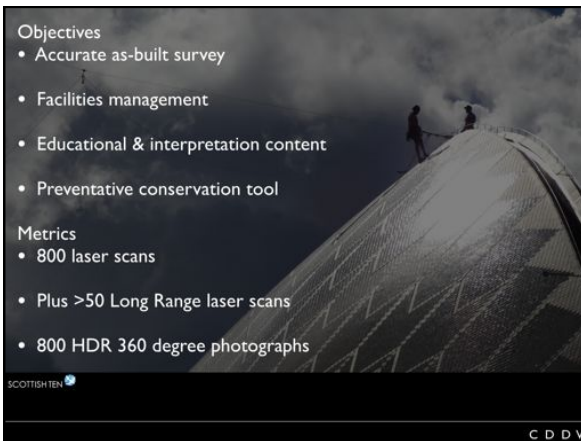
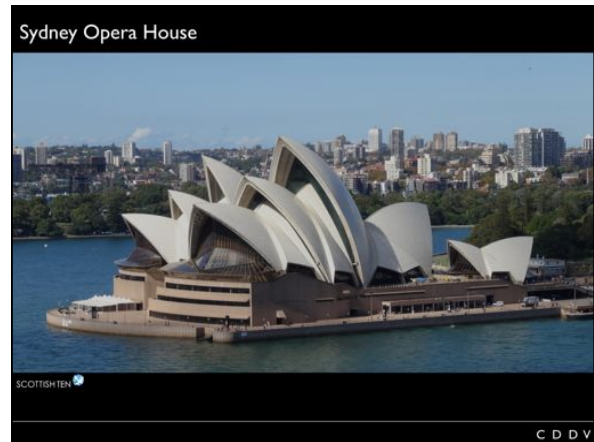
**Deliverables**  
Registered Point cloud  
3D Models (interior & exterior)  
3D Animations

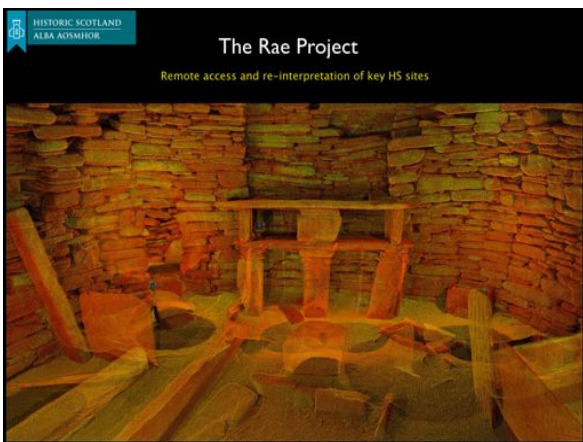
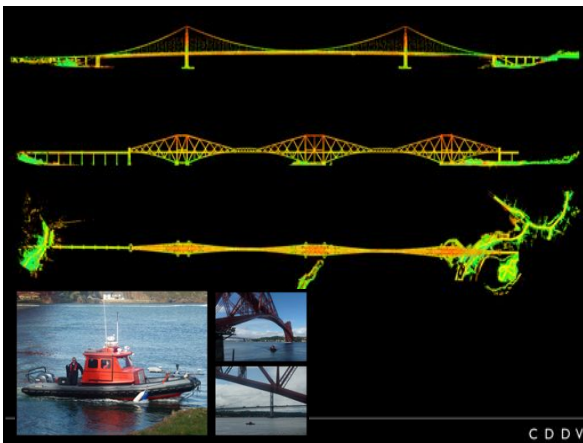
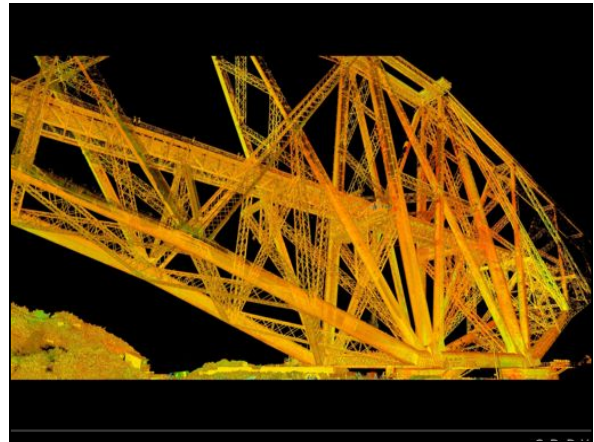












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### Sharing our Knowledge and Vision

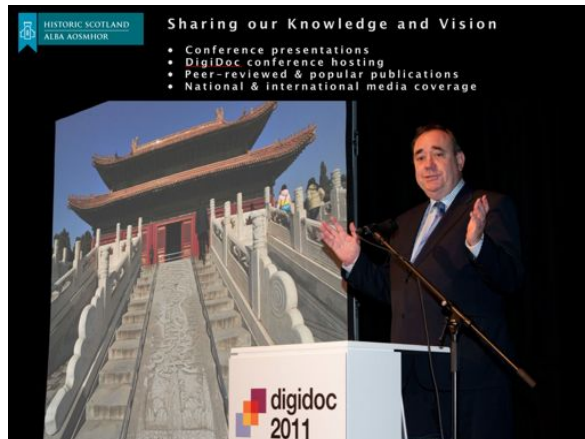
- Public events, demos & talks
- Schools workshops & GLOW Meets
- Community engagement



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### Sharing our Knowledge and Vision

- Conference presentations
- DigiDoc conference hosting
- Peer-reviewed & popular publications
- National & international media coverage



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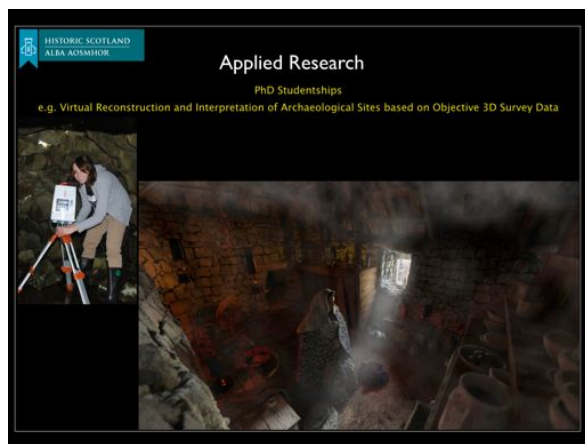
- Social media
- Scottish Ten website
- CyArk website



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### Applied Research

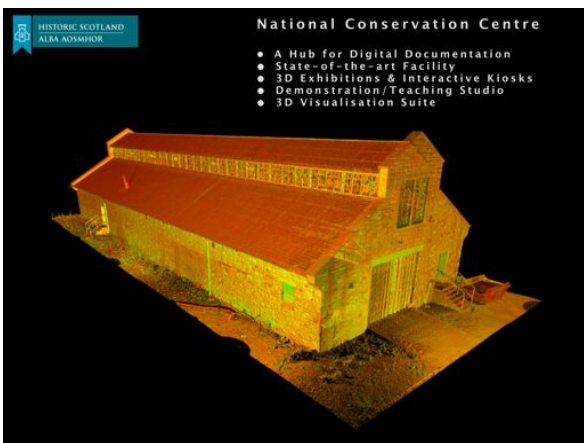
PhD Studentships  
e.g. Virtual Reconstruction and Interpretation of Archaeological Sites based on Objective 3D Survey Data



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### National Conservation Centre

- A Hub for Digital Documentation
- State-of-the-art Facility
- 3D Exhibitions & Interactive Kiosks
- Demonstration/Teaching Studio
- 3D Visualisation Suite



Thank you