Title of Project:

Editable Artefact: Stonehenge Megalithic Puzzle

Background

The project

3D modelling and Virtual Reality in the context of heritage sites and archaeology is a very active field. Photogrammetric and Geomatic data gathering mean that 3D modelling can provide a high degree of fidelity, which the additional benefit of generating data sources which can be used for a variety of modelling purposes including lighting, animating, non destructive testing.

There is a great deal of interest in 3D VR of archaeological sites for education and promotion. In simple ways it allows the public who pay for the archaeology to experience the heritage sites without the erosive effects of visitor footfall. The intention is to draw attention to the capabilities of digital 3D tools to extract multiple products through adaptive reuses of a single data source. Thus giving several opportunities to learn about the capabilities of software and 3D methodologies. The vehicle for this process is the workflow of design and the production of a scale model puzzle of Stonehenge.

The model is intended to be accurate enough to be archaeologically interesting and useful. (e.g. for trialing theories.)

Background

Stonehenge is a Stone Age megalithic construction that evokes wonder and curiosity in all who come to know it. Built on a site that has signs of use from over 10,000 years, this Stone Age monument was begun around 5000 years ago with a circular ditch and earthen embankment. Initially 56 wooden posts were erected. Within the ditch enclosure are remains of cremations and burials.

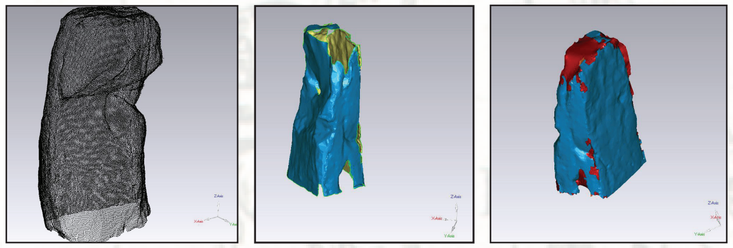
The linteled sarsen stones were built 1000 years later at the same time as the inner horseshoe shaped megaliths. The largest stones are in the horseshoe and stand nearly 7 meters tall. The builders had stone tools, water, levers, wood, bone, rope, and ingenuity. Most impressive is the installation of the lintels.

The circles were further reconfigured during this phase so the site axis was aligned to the east. The avenue is oriented towards sunrise on the summer solstice. The Heel Stone was once part of a pair forming a gateway, from the centre of the circle you could look through the entrance and see the sunrise framed.

The real puzzle is what was it built for?
An astronomical instrument? A temple? A festival site? There are many theories. The monument represents an incomplete proposition, We are compelled to try and complete it's embodied narrative. The puzzle designed aims to engage this compulsion as a way of focusing attention onto the monument's significance in the landscape.

The design focus was to make an object that doesn't necessarily spell out the answers, but, which leaves room for the mind to experiment and speculate. In this way one of the main outcomes of the project is to connect to the primal curiosity that the monument inspires.

Process



The Geomatic scan data (Laser scans) of the stones came from a recent survey by English Heritage and hand drawn images of 1920's and sourced from the English Heritage archive. The Scans are point clouds which have no surface or volume data. Each stone has up to 4 clouds associated with it. The clouds are registered, merged and wrapped. Areas without data are filled. The products of the wrapping process are files containing surface patches and .STL meshes. The Meshes were imported into Maya (3DSMAX would also be usable) for layout and design. Meshes we re reduced in polygon count for handleability. These scaled .STL meshes were Output from Maya using a script and tested by using solidworks diagnostics.
A solid modelling package was used to make various parts of the puzzle. The dimension driven nature of the software made it useful for scale registration.

Elements were exported to polygon modellers and vector drawing software for design purposes.

Conclusions

Drawing on a broad skill set and experience in including Product design, Sculpture, Fashion, 3D digital modelling and more, the puzzle of Stonehenge acted as a vehicle to explore the potential usages of 3D digital design and prototyping tools.
Within this exploratory process some of the practices adopted were experimental and there was a deliberate use of software in ways that it wasn't intended for. The problems generated by this, or rather the solutions developed have greatly extended understanding of the relationship of 3D modeling methodologies and the manufacturing output devices.

The sophisticated puzzle based on the stonehenge data with a high degree of fidelity to the "original' stone forms has been designed and produced. Scale model. The 3D model components and the 2D graphical components produced by the process were then translated to real world objects using a variety of software, to produce 3D Renders, 3D printing and laser cutter technologies. A number of file types were used and considerable attention was given to working around the inconsistencies in file standards.

The 3D modelling process is a labour intensive process, but it produces an editable artefact. The 3d files are editable at multiple levels. This makes the uniqueness of a finished form a casual matter almost a snapshot of the much more involved creative process.
Instances of the various file types uses were created at each level of design translation, each with their own history. This means that the process by which the various outputs are made is traceable and editable and can be revisited for further exploration.

References
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