

Maximum Intervention: Renewal of a Māori *Waka* by George Nuku and National Museums Scotland

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National Museums Scotland (NMS) has in its collections a Māori war canoe (A.UC.767) or *Waka Taua* from New Zealand. The *Waka* had been held in the Museum stores for many years and due to its incompleteness and poor state of repair had not been on public display. It was proposed that the *Waka* be restored with the intention of it being a focal point of a new permanent gallery in the Royal Museum in Edinburgh dedicated to South Pacific cultures and communities. The gallery was being developed as one part of a £44 million redevelopment of Royal Museum building. Due to its poor condition assistance was sought to help in the restoration, reconstruction and visual interpretation of the *Waka*. NMS commissioned George Nuku, a Māori carver, to remake missing parts. Nuku uses a variety of mediums to carve including Polymethyl Methacrylate (PMMA). This made a clear distinction between new and original material that could be easily read by the public and reflected Nuku's conceptual vision of creating physical 'ghosts' influenced by the original carvings. Due to the composite construction and condition of the canoe the project became more complex and involved. This paper describes how the renewal was done and the relationships that developed between artist, curator and conservator.

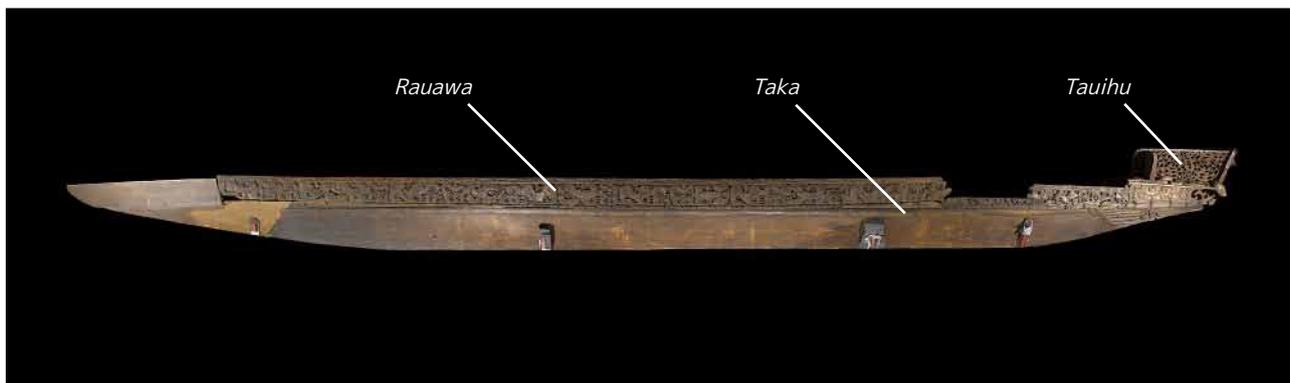


Fig. 1: A.UC.767 prior to renewal.

Introduction

National Museums Scotland (NMS) has in its collections a Māori War canoe or *Waka Taua* from New Zealand. The *Waka* had been held in the Museum stores for many years and due to its incompleteness and poor state of repair had not been on public display. The curator of Oceania, Americas and Africa at NMS proposed that the *Waka* be restored with the intention of it being a focal point of a new permanent gallery in the Royal Museum in Edinburgh dedicated to South Pacific cultures and communities. The gallery was being developed as part of a £44 million redevelopment of the Royal Museum building.

Due to its poor condition the curator proposed that assistance be sought from the source community to help in the restoration, reconstruction and visual interpretation of the *Waka*. The curator made contact with George Nuku, a Māori carver who had recently exhibited his work

in the UK. Nuku uses a variety of mediums to carve in, ranging from wood and stone to more unorthodox materials such as polystyrene and cast sheets of Polymethyl Methacrylate (PMMA). The curator invited Nuku to look at the NMS *Waka*, with a view to commissioning him to remake missing elements in clear PMMA. This would make a clear distinction between new and original material that could be easily read by the public and reflected Nuku's conceptual vision of creating physical 'ghosts' influenced by the original carvings (Knowles pers. comm.)

Nuku accepted the commission but due to the composite construction and condition of the canoe the project became more complex and involved. This paper describes how the new commissions were integrated with the original material, and in doing so how the relationship between Nuku and the museum staff developed.

Background and Condition of the NMS *Waka*

The *Waka* was acquired by the museum in the 1850s after ownership was transferred from the University of Edinburgh collections. Records indicate that the *Waka* arrived

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Fig. 2: Detail of *Tauihu* prior to renewal showing missing arms and feet.

in Edinburgh in 1827 after previously residing in the Scottish Borders town of Kelso. It is speculated that the *Waka* was brought to Scotland by Sir Thomas Makdougall Brisbane, former Governor of New South Wales (1821-25) (Knowles pers. comm.)

The NMS *Waka* possesses physical particularities. It is six metres in length with a beam of less than 50 cm, significantly shorter and narrower than true Māori *Waka*, which can be 18 to 24 m in length and have the capacity to carry up to 100 warriors. It is comprised of three original elements: the hull which has been shaped and formed with adzes from a single piece of wood, a pair of top strakes or *Rauawa* (figure 1) which possess highly detailed relief carving; and a *Tauihu* (prow figurehead), again highly carved but missing the arms and feet (figure 2).

Significantly the *Waka* is missing its *Taurapa* (sternpost), and inexplicably the original stern of the hull had been cutaway to be replaced by poorly executed carpentry (figure 3). Similar carpentry is evident on the prow of the *Waka* hull (figure 4). Thwarts are also absent from the canoe. However original shallow mortice cuts appear on the inner face of the *Rauawa* indicating the locations for thwarts (figure 5).

Traditionally the individual components of the *Waka* would be secured purely by binding using cord normally derived from New Zealand Flax (*Phormium tenax* and *cooki-anum*). The NMS *Waka* was secured using a variety of different fixing techniques including iron screws and nails, non-traditional binding cord and animal glue. Records suggest that these interventions were undertaken whilst in the stewardship of Edinburgh University (University of Edinburgh Natural History Museum 1827a and b). A split in the *Tauihu* had been repaired by binding with processed vegetable fibre cord. The material and technique used in this repair was so markedly different from the other interventions that it was assumed to be a traditional Māori repair.



Fig. 3: Detail of stern showing museum replacements prior to renewal.

The hull of the *Waka* had been identified by visiting researchers (Knowles 2008) to be that of a small river canoe. The prow and strakes originally belonged to a full size war canoe, the carving of which was identified to originate from the Bay of Plenty region of New Zealand. The provenance could not be attributed to one specific Māori tribal group or *Iwi*. The researchers also suggested that



Fig. 4: Detail showing underside of the prow with old museum replacements and binding.



Fig. 5: Detail of *Rauawa* showing original mortise joint for thwarts.

the river craft had been converted to create a model of a war canoe albeit a large one, in comparison to other canoe models documented in museums collections. The gunwales of the river canoe hull had been deliberately cut to allow the *Rauawa* to be fitted (figure 6). The *Rauawa* were incomplete and both had complete breaks. Half-round battens known as *Taka*, conventionally bound with the *Rauawa* to support them, had been nailed and screwed to the exterior of the hull. In addition the original wood had been damaged by wood boring insects (figure 7).

Conservation and Reconstruction

Through discussions with George Nuku an outline plan for the restoration was put in place. Nuku was commissioned to carve a new *Taurapa* in clear PMMA and also to create new limbs for the *Tauihu*. A team was established consisting of Nuku, the curator and two conservators, an artefact conservator and a specialist in wood and furniture objects. The team arranged to have regular weekly meetings to discuss the restoration, look at issues that arose from the examination of the object, assess the timetable and set objectives for each week. At the very start of the project Nuku performed a naming ceremony involving all of the team, where he addressed the *Waka* and acknowledged the inherent *Mana* (power or prestige) of the component parts and their long histories. The *Waka* was named *Te Tuhono* - which means to join, a name that recognised and gave consequence to the existing and future composite nature of the vessel.

At the start of the project, the team compared the construction of *Te Tuhono* with other examples of models in NMS collections, literature and online resources of other collections. This gave the whole team a better understanding and appreciation of methods of traditional construction. This exercise highlighted that the construction and binding of *Te Tuhono* was incorrect and the *Rauawa* were out of alignment. This was significant for Nuku as he believed that this would have a critical effect on the visual interpretation of the whole canoe particularly when the *Taurapa* was added.

This critical examination steered the team towards the decision that the whole canoe had to be completely disassembled. All the non-traditional repairs were removed, then reconstructed and rebound with traditional Māori techniques, i.e. pure cord binding. Following this method also had the advantage of being not only faithful to the originally intended construction but also readily reversible. Due to the great amount of tension this would place on the original parts, elements like the half-round batons would have to be remade in order to be adequately strong.

Nuku progressed with carving the *Taurapa* and the arms for the *Tauihu*. A prototype was created in polystyrene to gauge the scale of the piece and allow us to immediately visualise the overall appearance. Nuku then started to carve out the PMMA and the sternpost was carved from a 30mm PMMA cast sheet. The design was drawn out on the protective peel-away sheet supplied. First the pierced work was drilled out using an electric drill and High Speed Steel drill bits. The relief carving was then detailed using a die grinder with a variety of steel burr heads. For the final finish a fine high speed rotary tool was used attached to fine grade silicon carbide finishing papers that polish the surface (figure 8). Due to the tendency of the PMMA to become opaque when carved in fine detail, Nuku applied a varnish layer of Paraloid B72 (ethyl methacrylate and methyl acrylate copolymer) in Xylene to return the PMMA to a highly transparent and glossy finish. The *Taurapa* was carved in separate sections, comprising the post, a deck plate and smaller individual figures and adornments that would all be assembled mainly by binding and inserting M10 countersunk set screws.



Fig. 6: Detail of stern after partial disassembly showing cuts made in the hull keel and also centre top edge of hull.



Fig. 7: Detail showing incomplete starboard *Rauawa* and *Taka* nailed to hull, with insect damage.

Due to the thickness and complex shape of the cuts to the stern of the hull it was felt that PMMA was not suitable for replicating this area. It was proposed though that the hull should visually follow the appearance of the sternpost and be of a transparent material. The conservation team investigated suitable materials to cast this missing section. The primary selection criterion was to find a clear casting resin that would allow the hull to be cast in a single pour. Crystal Clear 204 Smooth-On™ was selected for this reason. Crystal Clear 204 is a rigid water white polyurethane casting resin, which permits castings of up to 150 mm thick in a single pour. It was therefore suitable for the cast that would be approximately 600 mm long, 300 mm wide and up to 100 mm thick.



Fig. 8: George Nuku carving the new *Taurapa* at NMS.



Fig. 9: Crystal Clear 204 cast of new stern section removed from its mould.

Polyurethanes, like PMMA, are prone to degradation particularly through exposure to Ultra-Violet light (UV), which calls into question its long-term stability and suitability as restoration material. According to the manufacturers, Crystal Clear has a high degree of resistance to degradation by UV and conforms to other standards (i.e. ASTM G154-06), claiming that after accelerated ageing there is no degradation of the material surface or loss of clarity. There is some yellowing but not to a measurable degree (Smooth-On Inc. 2012).

Templates were taken from Nuku's work and jigs were placed to temporarily hold the *Ruawa* in the correct position on the hull and a pattern was created that fitted the profiles of the cut edges and would set the sternpost in the correct position. The pattern was roughed out from polystyrene and finished with Jesmonite AC100 (an acrylic based plaster substitute). The interior of the pattern was also scooped out to mirror the interior profile of the original.

A glove mould (a one piece mould) was taken of this pattern using Mold Max 30 Stroke, a brushable silicone rubber. Five coats of silicone were applied to completely encapsulate the pattern. A thixotropic additive was added to the final two layers to give the mould extra strength and

rigidity. To prevent the mould from collapsing and distorting, a rigid mother mould was created. The mother mould was made in four parts from Jesmonite AC100 reinforced with glass fibre. Metal tie cables were applied to the exterior of the silicone skin and tied through to the exterior mother mould. The pattern was released from the glove mould by cutting a zigzag slit across the top of the mould. Flexibility and elasticity allowed the rubber to be peeled away. The glove mould was resealed with more silicone rubber and tied back into the mother mould. Approximately 15 kg of resin was poured into the mould. This was done in small batches with each batch degassed in a vacuum chamber to eliminate the risk of air bubbles being created in the final cast. The resin was allowed to cure for 48 hours before releasing it from the mould (figure 9).

Upon seeing the finished clear resin cast, Nuku was inspired to add additional carving to this piece to extend and complete the broken pattern of carving that appeared on the underside of the original hull. The casting was coated with a Paraloid B72 varnish layer to create a highly transparent finish to match that of the PMMA carvings.

In addition to the hull cast, the close working relationship between artist and conservators on this project was demonstrated in the reproduction of the feet of the *Tauihu*. Due to the irregularity of the broken edges of the wood, it was more logical to make castings of new feet. The conservators prepared two blank feet forms made of Phillyseal R epoxy putty. These were roughly finished to an outline shape prepared by Nuku. The *Tauihu* was protected with cling-film and the new feet were placed in relative position to the original material. Additional putty was introduced between the new and the original material to take the impression of the wooden surface. This putty was allowed to bond directly to the new feet. Once cured, Nuku carved in the new foot relief decoration to match the existing patterning. One piece silicone moulds were taken of the new feet and a Crystal Clear 204 cast was made, varnished with Paraloid B72.

The feet were secured to the *Tauihu* with Araldite 2011 epoxy adhesive and a barrier varnish layer was applied to the wooden surface to enable this fixing to be easily reversed. *Te Tuhono* was to be displayed suspended in a first floor atrium space in the Royal Museum gallery. A strong structural adhesive capable of bonding dissimilar materials was therefore selected to minimise the risk of adhesion failure and of the feet falling on a member of the public (figure 10). The carved PMMA arms were friction mounted from brass armatures which were in turn suspended from the pierced work of the *Tauihu*.

Concurrent to the creation of the new parts and of the commissioned art, the conservation of the *Rauawa* progressed. Insect bore holes were consolidated, filled with Paraloid B67 (isobutyl methacrylate polymer) and cellulose powder and tinted with acrylic colours. Broken fragments and splits were stabilised with hot rabbit glue. Larger missing fragments were replaced with softwood, stained with pigments and stuck using Araldite AV1253 epoxy adhesive. New binding holes had to be cut into these additions (Gerish 2010). Missing shell inlays were also replaced, the new



Fig. 10: Detail of renewed *Tuihu* with new works by Nuku attached.

pieces being sourced and cut by Nuku. New sets of *Taka* and *Paewai* (which are bound on the inside of the hull) made from softwood were also sourced and tinted with pigments to match the hull colour.

With all components completed, reassembly of *Te Tuhono* began, with additional help from Tahiariri Yoram Pariente, an expert Polynesian canoe builder. The *Tuihu* was rebound to the hull. A polyester cord was used as an alternative to traditional flax. It was plaited and repeatedly looped through the original binding holes in the hull and *Tuihu* to form a band (figure 11). Modern white goose feathers were inserted under all the exterior binding. This was repeated several times on both sides. As the binding exerted considerable force on the wood, the location of the bindings was dictated primarily by the physical

condition of the wood around each hole. Pariente looped excess cord onto a piece of long dowel to strengthen the grip of the cord.

The next step was to put the *Rauawa*, *Taka* and *Paewai* onto the hull. The pieces were temporarily placed in position and secured using plastic cable ties and ratchet straps. Nuku and Pariente then bound the pieces in at strategic points, starting at the prow and working along to the stern. These initial bindings exerted great force on the *Rauawa* and so again holes were selected based on condition. The cast hull section was then fitted into place resting on temporary chocks. The *Taka* and *Paewai* were then drawn in to the stern section with further binding and parallel saw cuts were made on the internal face of the battens so that they could be comfortably bent to the



Fig. 11: Nuku with Tahiarrii Yoram Pariente rebinding the *Rauawa* with new *Taka* and *Paewai*.

curvature of the hull without putting further strain on the *Rauawa*. Once these structural bindings had been done, the conservation team continued with lashings.

The *Taurapa* was constructed as a separate assemblage. It was decided that this would be fitted to the stern using discrete screws rather than binding. This allowed for more manageable and safer handling and transportation of *Te Tuhono*. A new steel mount was designed to cradle and support *Te Tuhono* to allow it to be suspended. Particular attention was paid to supporting the increased weight of the resin hull (figures 12 and 13).

Preserving Nuku's Artistic Intent

Nuku's PMMA carvings have been created as additions to complete and allow better visual interpretation of *Te Tuhono*. The meaning and intent of the commissioned pieces are symbiotically linked to the original wooden carvings and components. Nuku's work reflects the influence of the original carving he observed, and also of the museum environment and locale he was working in (figure 14). In this project however, the conservators were faced with another preservation challenge. PMMA has limited longevity and its deterioration and preservation have been observed and resolved in other contemporary artworks (Willcocks 2002). Dependent on environmental conditions the PMMA carvings could be expected to show evidence of deterioration within 30-40 years. Conservators alerted both the curator and the artist to this fact, not with the intention to influence the artist's choice of materials (as this would redefine the artistic intent) but to put in place protocols and methods to allow future preservation of these unique commissions. It was proposed that

3D laser scanning be used to accurately record the original material and the commissioned work. Data acquired in this manner could, with Nuku's permission, be used to create a copy via a 3D printing technique involving CNC routing. Scanning was achieved with the assistance of the Digital Design Studio, part of Glasgow School of Art (Glasgow School of Art 2012). More immediately the data could be used to disseminate the project and make *Te Tuhono* more accessible to international audiences through the Internet and other new media (figure 15).

Discussion

The decision to renew *Te Tuhono* in the manner described above was one that was not taken lightly. The composite nature of *Te Tuhono* and the fact that its provenance could not be attributed definitively to one specific Māori community was the main contributing factor in the decision to commission Nuku. If *Te Tuhono* could be attributed to a specific source, then the appropriate community would have been approached and restoration or renewal would have had entirely different outcomes. The crude interventions undertaken by the University of Edinburgh were another contributing factor to renewing *Te Tuhono*. The curator insisted that component parts should remain as a whole, but that University interventions should be removed, as they disfigured the original material and confused the visual interpretation of *Te Tuhono* as a *Waka*. The alternative was that the hull, *Rauawa* and *Tauihu* be disassembled and exhibited separately. The curator argued that renewing and displaying *Te Tuhono* would allow proper public engagement with the object and guarantee its long-term preservation.

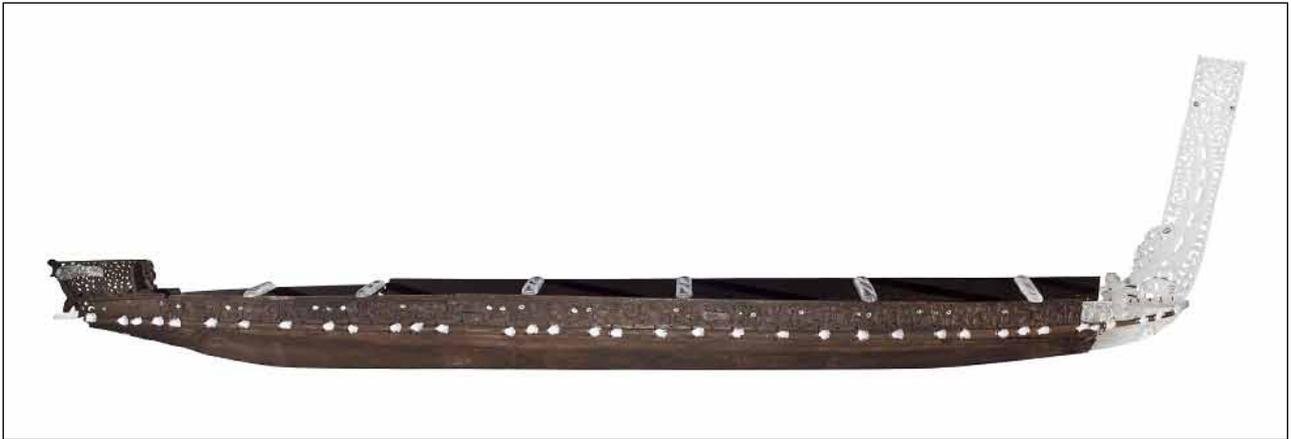


Fig. 12: *Te Tuhono* after renewal.



Fig. 13: Detail of stern and *Taurapa* after renewal.

It is acknowledged that the curator, the artist and the conservator were out of their comfort zones, and the ethical considerations and viewpoints of other parties challenged each profession equally. Although the team had an outline plan of how the project was going to work, we had to continually reflect, reassess our ideas and take a flexible approach as new aspects and views about the renewal of *Te Tuhono* emerged, developed and asserted themselves.

For Nuku, completeness of *Te Tuhono* and faithfulness to the original construction techniques became an important part of the project. For the most part the conservators were comfortable with these techniques as they fitted well with our ethical codes, particularly with a view to reversibility. Nuku and Pariente were sensitive to the physical limitations of this historic canoe and respected and paid careful consideration to this in the binding.

Subtle differences were noted in view of the aesthetic appearance of *Te Tuhono*. Here the conservators had to appreciate the spiritual and intangible power that was inherent in the carvings and take into account that these carvings produced a strong emotional resonance with the Māori, which had to be acknowledged and respected.

In the progression of the project the dynamics of the team also developed, particularly the relationship between the conservators and Nuku. The respective skills of the different conservators came to the fore and they became direct participants in creative aspects of the renewal and of Nuku's artistic intent. The issue of the longevity of PMMA was positively addressed without unduly influencing the creative process. It can be argued that wood would have been the most appropriate material to renew the missing components. However the use of PMMA acknowl-



Fig. 14: Detail of *Taurapa* by Nuku, the thistle was influenced by the banner head of *The Scotsman* Edinburgh based broadsheet national newspaper.

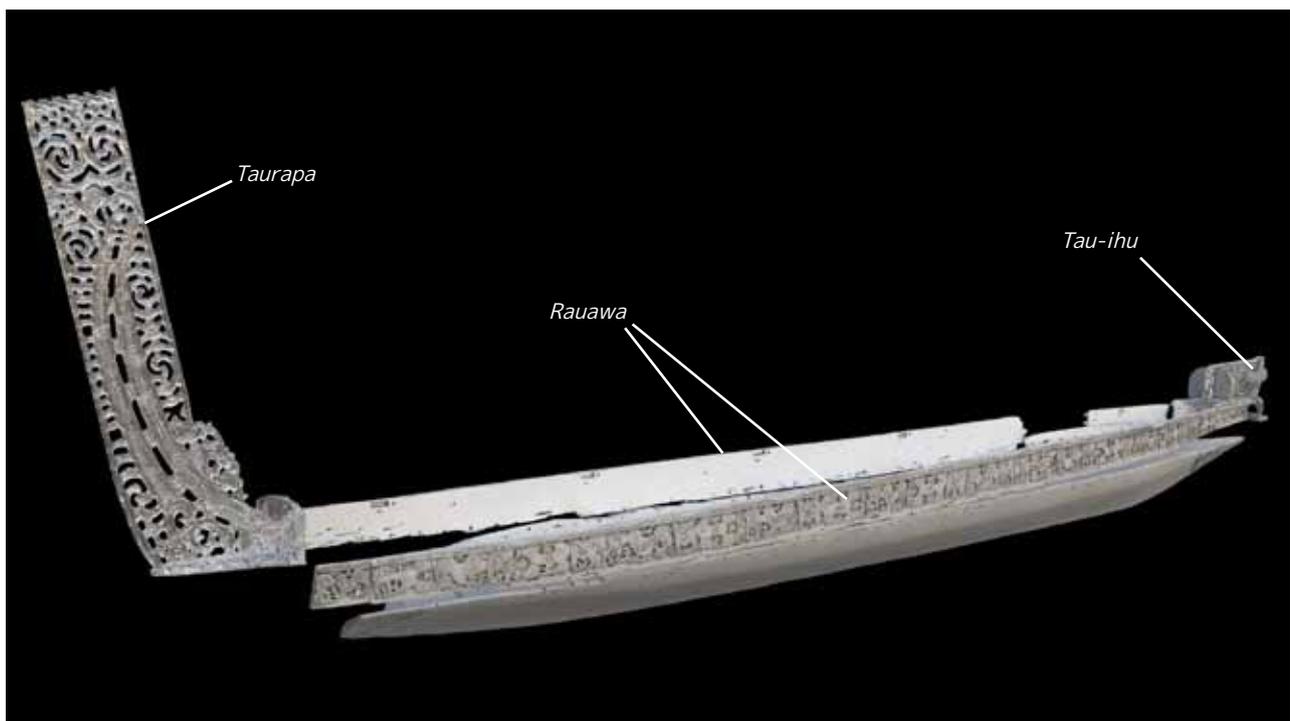


Fig. 15: 3D model of *Te Tuhono* created by Digital Design Studio Glasgow.

edges the current vibrancy and diversity of contemporary Māori culture and reflects the views posited by Schuster and Whiting (2007: 76) who state that in the context of Māori built heritage:

The conservation of an existing structure or retention of a particular architectural feature of the building must be seen in relation to the main considerations of the development. Otherwise, preservation/conservation may be seen as a device to suppress the experimentation with new materials, a limit to the innovation in the expression of new art forms, and a hindrance to the vitality of contemporary Māori culture.

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Glossary of *Waka* Terms (after Hamilton 1896)

Ihu- Bow of a canoe

Paewai- A batten between the *Rauawa* of a canoe and the hull on the inside

Rauawa- Movable top strakes of a canoe

Taka- The batten which covers the outside joint of the *Rauawa* of a canoe with the hull

Tau-ihu- Carved figurehead on the prow

Taurapa- Stern ornament of a canoe

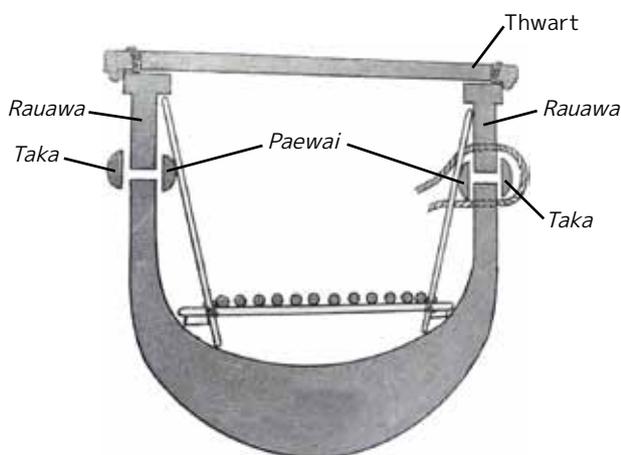


Fig. 16: Cross-section of *Waka* construction (after Hamilton 1896) with some Māori terms.

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Materials and Suppliers

Araldite 2011, Araldite AV1253 (discontinued)

Huntsman Advanced Materials (UK) Ltd
Ickleton Road
Cambridge CB2 4QA
United Kingdom
Tel.: +44 (0) 122 383 2121
Fax: +44 (0) 122 349 3322
http://www.huntsman.com/advanced_materials/

Crystal Clear 204 Polyurethane resin Mold max 30 Stroke – brushable silicone rubber Thi-Vex silicone thickener thixotropic agent

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Pennsylvania,
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<http://www.westfieldfasteners.co.uk>

PMMA

Easter Road Plastics Ltd.
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 Fax: +44 (0) 131 669 4930

3d Laser Scanning

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<http://www.gsa.ac.uk/research/research-centres/digital-design-studio/>

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