


**‘3D Printing: The Good, The Bad, and The Beautiful’ exhibition
The National Centre for Craft & Design (NCCD), Sleaford
(27 January – 24 April 2017)**

Stage 1 research: An inclusively designed and curated exhibition focusing on visitors with sight loss. The exhibition was developed using a co-production meta-methodology, collaborating with NCCD staff, Sense members, Midlands Royal National Institute for Blind People (RNIB), as well as local blind and partially sighted participants.



63% of the National Centre for Craft & Design visitors are over 65 years old. Most people with a visual impairment are in this age group.



BBC 'Look North (Yorkshire & Lincolnshire)' news story on research taking place into the '3D Printing: The Good, The Bad, and The Beautiful' exhibition. Broadcast on 14th February 2017.

'3D Printing: The Good, The Bad, and The Beautiful' exhibition

Stage 1 research: Completed exhibition



Tactile floor tiles were laid to aid a blind visitor find each multi-sensory desk. Bright yellow is the colour partially sighted people can see against dark colours.



Working 3D printers are exhibited partly to provide visually impaired visitors with the opportunity to experience the sound and vibration of the printers.



The plinths and desks in this Stage 1 exhibition are painted white and light grey to contrast with the dark grey gallery floor. The tops of the plinths and desks were painted a different colour to the sides to indicate the height.



Ample space is provided on at least three sides of each plinth to aid visually impaired visitors, and those in a wheelchair, to get close enough to the exhibits to use magnifiers.

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Stage 1 research: Multi-sensory exhibition desks



The example multi-sensory desk is placed on the left-hand side of the exhibition entrance. As visitors enter the exhibition a gallery assistant explains the function of the desk.



In front of the example multi-sensory desk are two different textured floor tiles to demonstrate how the textured exhibition pathway works.



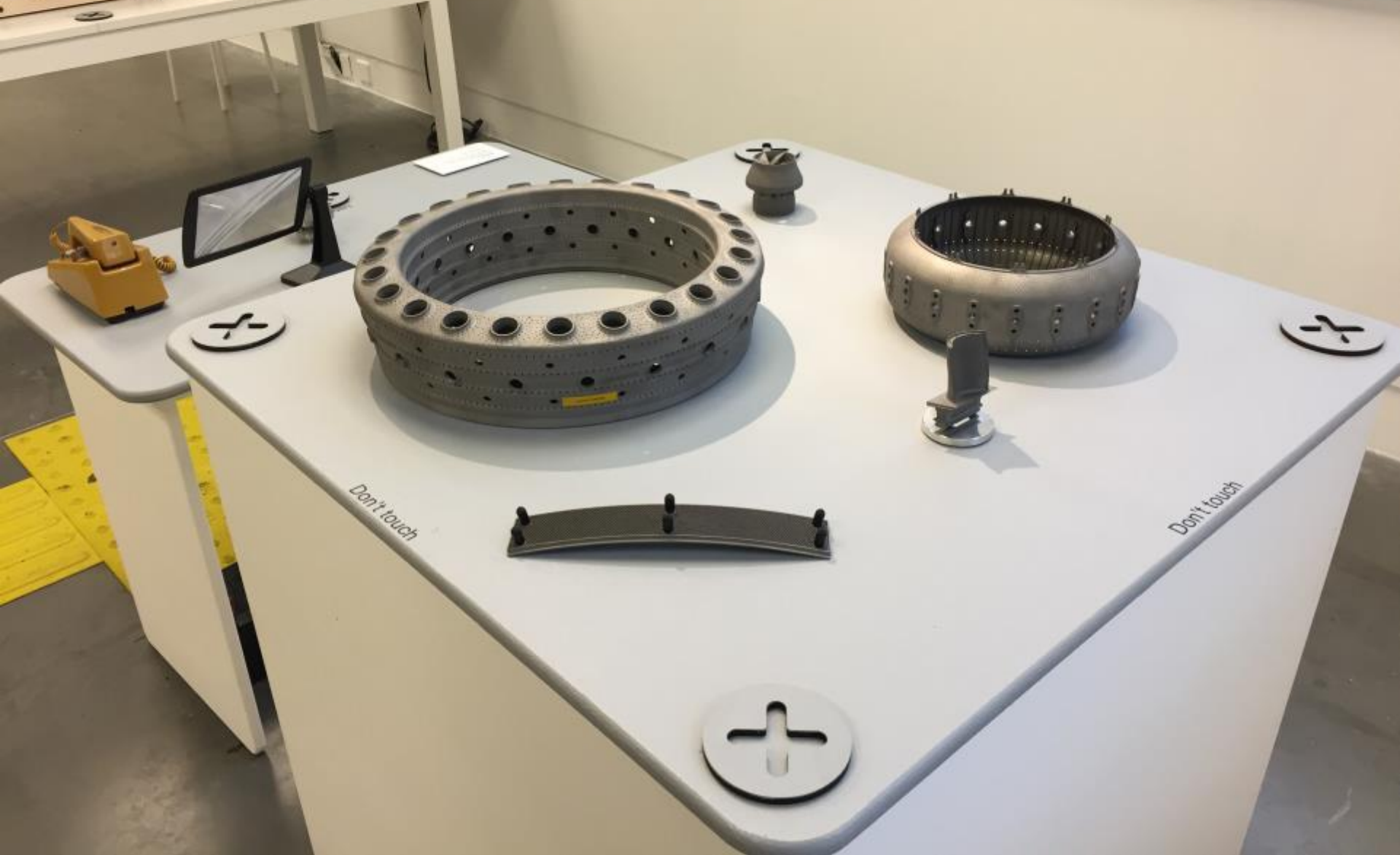
There are 20 multi-sensory desks in the exhibition. The desk were designed to aid accessibility for visitors in wheelchairs.



Tactile disks have been placed at the edges each desk, plinth and table to indicate (through touch or sight) whether an exhibit can be handled or not, and if audio description is available.



The tactile disk containing a flat hand symbol denotes that the objects nearby can be touched and handled.



The tactile disk containing the 'X' symbol denotes the objects nearby can not be touched and handled.



Listen

Touch



The tactile disk containing the 'sound waves' symbol denotes there is a trim-phone at the bottom right-hand corner of the desk with audio description.



There are 8 multi-sensory desks with a trim-phone containing a location specific audio description about an exhibit. Each audio description explains the object in front of the visitor, as well as its context within the exhibition themes.

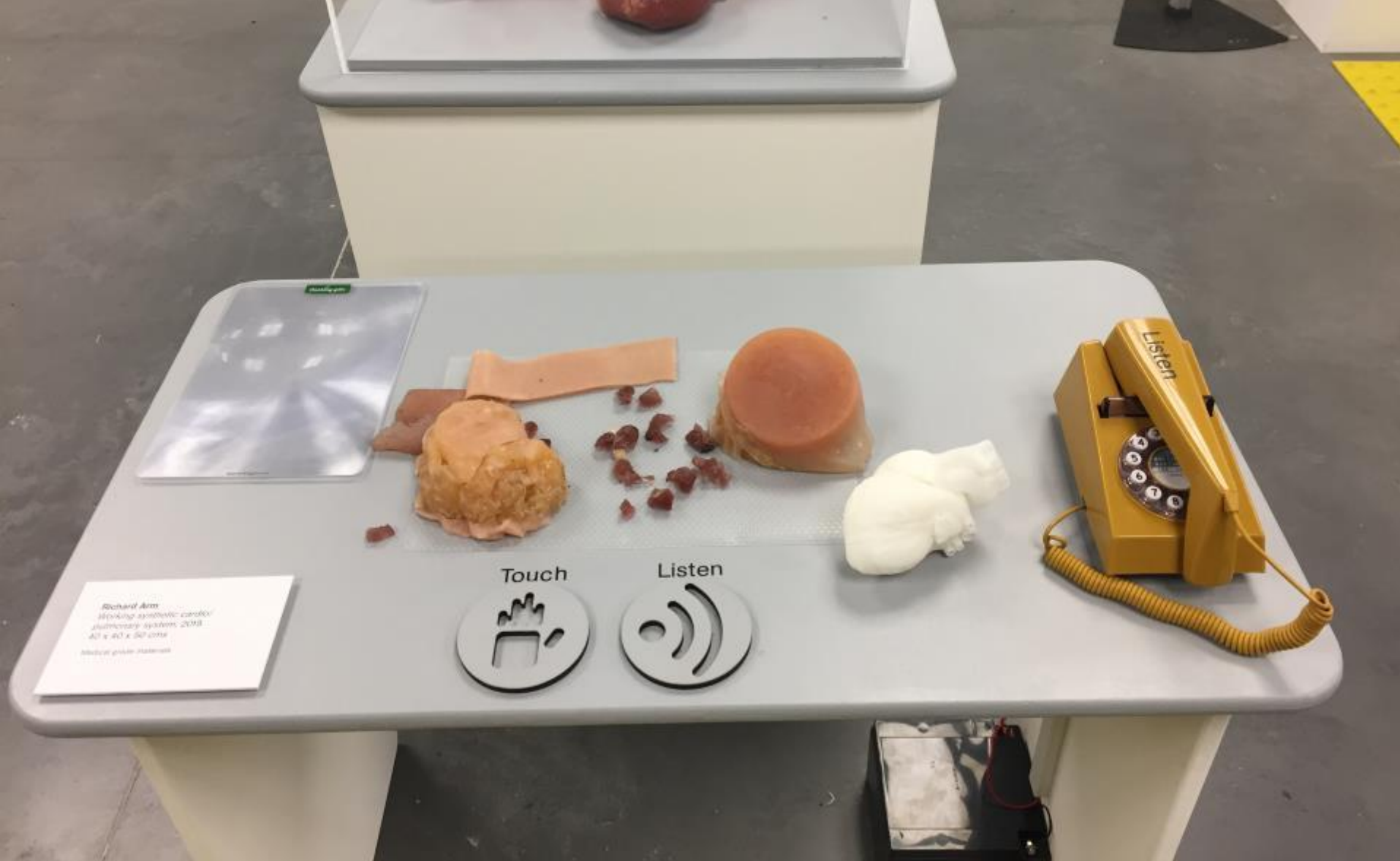
Audio Descriptor "Welcome"

Audio descriptor example:

The 'welcome to the exhibition' audio description.



A trim-phone was used because the handset and cord allowed a visitor to hold the receiver in one hand and have the other free to hold a blind stick or dog. A wheelchair visitor also has access to the audio due to the cord length.



A significant sense for visually impaired visitors is haptics, so a variety of textures and materials to touch were provided to aid intellectual access to the exhibits. The desk above has latex objects.



An exhibit demonstrating the 3D printed of sweets provided an opportunity for visitors to handle, smell and eat sweets.



3D printed objects were created for an exhibit desk to demonstrate the design concept and aesthetics of the exhibit, which could not be touched.



-U-S System
Dress 11, 2016

erlocking panels that
a single computationally
netic fastenings are
e print.
c fastenings

Touch

Listen

3D printed textile samples of the 3D printed dress exhibits were produced for the multi-sensory desks to aid intellectual understanding because the dresses could not be touched.



Replica exhibits at different scales were produced to assist blind visitors understand the larger exhibits that could not be touched.



3D printed objects were created for the multi-sensory desks which simulated exhibits that could not be touched. Different approaches were developed which will be tested in the Stage 2 research. The above touching objects imitate Michael Eden's two exhibited vessels.

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Availability of magnifiers



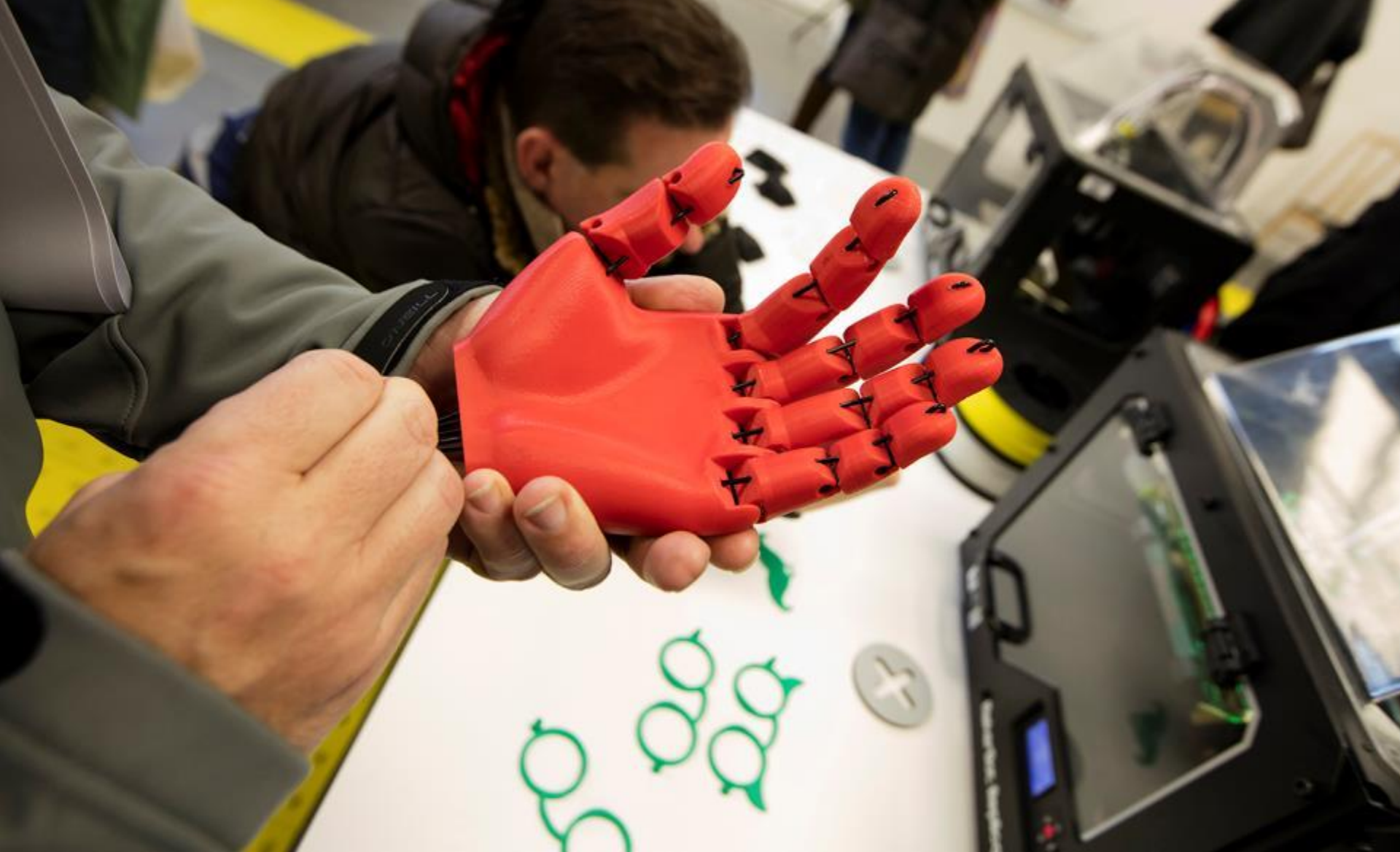
Different magnification products were available on the multi-sensory desks and throughout the exhibition for visitors to use freely.



The exhibition design enabled visitors to get close to objects to view them with a magnifier.



The accessibility of the multi-sensory desks and the exhibits on plinths also enabled the effective use of magnification on smart phones and tablets.



The working 3D printers produced components for handling objects.

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Exhibition graphics

3D Printing:

The
Good
The
Bad and
The
Beautiful

Welcome to 3D Printing:
The Good, The Bad
and The Beautiful

The entrance panel to the exhibition was designed for maximum legibility for visually impaired visitors. The highest contrast between the text colour and the background was a key objective.

What is 3D Printing?

Three-dimensional (3D) printing is a manufacturing method in which objects are made by fusing or building up layers of materials such as plastic, metal, ceramics, liquids, and even living cells to produce a three dimensional object.

Recent developments allow for different materials to be used at the same time – imagine a normal printer with several individual cartridges, printing simultaneously, but instead of ink there are different materials in each cartridge.

Simple, well-spaced paragraphs and layout, with a clear hierarchy of title and main message aids readability for visually impaired visitors.

Bioprinting ethics and regulation

Conversations about the moral, ethical, and legal issues surrounding bioprinting have started, but they will inevitably cause a lot more controversy as it becomes more commonplace.

Where and how should bioprinting be internationally discussed, debated and argued to establish a framework that allows concerns to be raised and addressed? Who should do this?

The wall panels text was written for a broad audience with a wide range of literacy skills. Plain English was used as an effective way of making our message widely understood.



Steam Wolf (online seller)
*Glow in the dark
beast horn (sample), 2017*
22 cms

Nylon

Carry the What (Designer)
3D Central (Maker)

*Zelda inspired Hookshot
Ocarina of Time, 2017*
26.5 x 11.5 cms

Nylon and hand painted

Kingstons Crafts (online seller)
*Durotan's Axe from
Warhammer, 2017*
32 cms

*Bought as a plain kit, or as a hand
finished item*

Nylon and hand painted

Disposed Assassin 3D
(online seller)

Thor Helmet, 2017

*This Thor Helmet comes in 6 separated
pieces so that it can be constructed
or modified.*

Nylon

Touch

Each object label was design to be placed in close proximity to the object. 18pt san serif black text was used on a contrasting background. The white background space around the text was also generous to aid legibility.



Photographs on the gallery walls showed enlarged images of nearby exhibits. Visitors could extremely close to these photographs with a magnifier providing additional intellectual access.

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The mannequins



Stage 2 research: The exhibition is being continued improved based on visitor feedback and re-design workshops with VIP. An example of an iterative change that has been made and then tested is the white mannequins have been replaced with black, so the texture of the white dresses is more visible.



White mannequins were ordered for the exhibition as the curators were expecting red dresses that contrasted well with white. Additional checks are required leading up to the exhibition to ensure accessibility can be maintained.

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Literature and posters



A number of posters were designed to promote the exhibition and the accompanying activities.



The '3D Printing: The Good, The Bad, and The Beautiful' exhibition has an extensive learning programme.