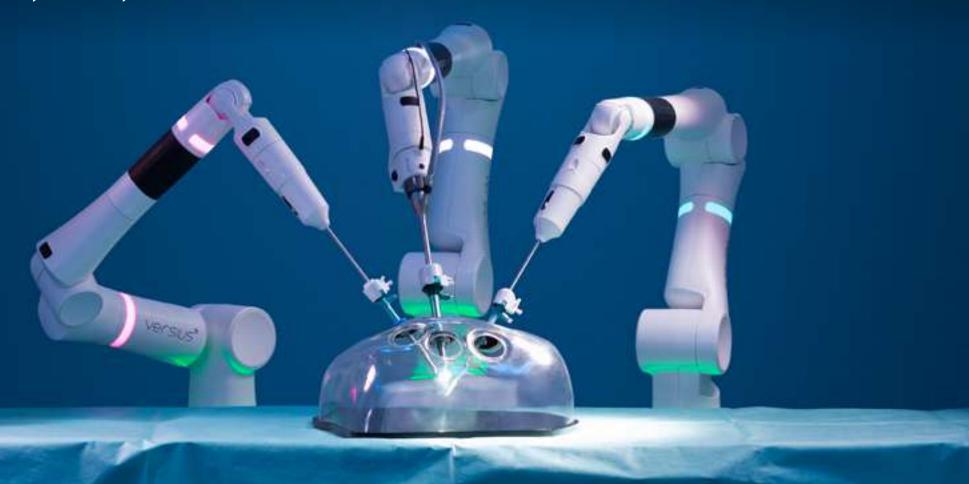
# **UK Design for Healthcare** One-Stop-Shop







# Compelling reasons to choose the UK to develop your healthcare products and services

The UK has the largest integrated health system in the world with its expertise in demand globally.

The global market for healthcare services is growing as governments deliver more healthcare capacity and quality to their populations.

#### The UK:

- is at the forefront of research and innovation across life sciences, healthcare, medical devices and digital technologies
- through the NHS has clear strategies to improve prevention, diagnosis, treatment and care until the end of life
- has many world famous hospitals and universities and a thriving private sector for healthcare, technology, training and infrastructure
- has had 70 years of an integrated, comprehensive healthcare system, rated the best in the world for patients, population and taxpayers (Commonwealth Fund, 2017)
- boasts the most productive research base in Europe our top ranked universities and forward thinking Research Councils conduct high quality science that feeds the innovation pipeline

- has continuous innovation, for example new models of care, pioneer sites, accountable care systems
- is the top destination for inward investment in R&D in Europe. UK Research activities across the whole of the healthcare spectrum provide the platform for healthcare organisations, business and designers to innovate and convert areas of research into successful applications
- home to the world's leading design and creative consultancies. UK design consultants work globally. Routed in a world class education system and working within a vibrant R&D ecosystem, the UK's design approach produces new products and services, reduces risk, increases efficiency and delivers better business outcomes

#### Flexible financing solutions

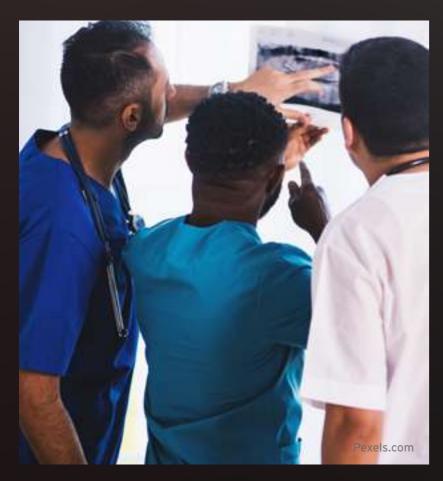
UK Export Finance makes buying from the UK easier and more attractive for customers

#### Commercial advice and support

DIT has commercial officers in more than 100 countries who can connect you to UK capability across the healthcare supply chain.



#### Introduction



## The Patient Journey

Research, innovation, design, and technology, when properly harnessed, improve outcomes for patients, practitioners and providers alike.

This book highlights the outcomes achieved by UK designers and their clients in three broad categories: diagnosis, treatment and care.

By putting the patient at the heart of any experience, we get to fully understand all the patient touchpoints from first experiencing symptoms, being diagnosed, receiving treatment and then the care which may follow.

# It's all about the design

Design is integral to every aspect of a successful product, service or brand

UK design capability in healthcare is all about making the complex simple, accessible and effective whilst delivering innovative, outcome focussed solutions.

# Coloplast Native Design

Design
interventions
have significant
business impact

Coloplast has been working with design consultants, Native, over a seven year collaboration. Design has made a significant contribution to Coloplast's impressive commercial results. It has:

- Reduced cost of R&D while increasing top line contribution from new products.
- EBIT margin increased from 12% to +30%.
- Coloplast has the best worldwide patient reputation among 28 leading medical companies for the third year running.
- 500% share price increase from 2008 to 2015.
- By 2017 it was outselling its competitors by 4 1 and was ranked as one of the world's most innovative companies by Forbes and Harvard Business Review.

"What a difference a revolutionary business design strategy and seven years can make. In 2010, Coloplast felt like three different companies delivering compromised experiences. By 2017, its share price had soared by over 400%, it was outselling its competitors by 4-to-1 and was ranked as one of the world's most innovative companies. . . . together, we have transformed a company, an industry, and the lives of millions."

Morton Warren CEO Native



# Diagnostics

The impact of design is present at every level of diagnosis. Speed, accuracy and comfort are the design drivers for both the patient and the clinician.





**1**5

In England, direct healthcare costs of poor continence exceed £1bn and it is forecast that up to 50% of residential care admissions fail to cope with this condition. In an ageing population, poor continence is a significant driver of frailty and dependency.

Anisys helps patients experiencing symptoms of constipation and bowel incontinence to access better informed diagnosis and care. University of Manchester based Consultant Neurogastroentrologist Professor Shaheen Hamdy saw his patients facing real barriers engaging in pathways.

Anisys worked with Lucid Group who following intense research, redesigned the patient journey around devices that enable continence specialists and physiotherapists to deliver high quality diagnosis and therapy locally to people in need.

Improved presentation, adherence rates and outcomes to preclude 10% of English social and nursing care admissions will save £0.75bn annually.







## ELGA Labwater London Associates

PURELAB Flex is based on providing individual 'intelligent' workstations to dispense ultra –pure water, essential for most scientific work. In the twelve months after launch, market growth was 31.25% against an industry average of 1.3% with a sales conversion rate in excess of 90%

ELGA Labwater provides water purification products for laboratories. As major competitors began to respond to the growing requirement for flexibility within laboratory environments, ELGA decided to invest in a research and development project to increase its market share.

London Associates were asked to contribute to the project design strategy, user research, product proposition and realisation. The end result, the PURELAB flex, has enabled ELGA to rationalise their offer and product range. The new product has led to penetration in new markets, and uplift in ELGA sales attributed to 'flex' is already more than 100% higher than forecast. As a result, ELGA is now a recognised 'centre of excellence' for the Veolia Water group.

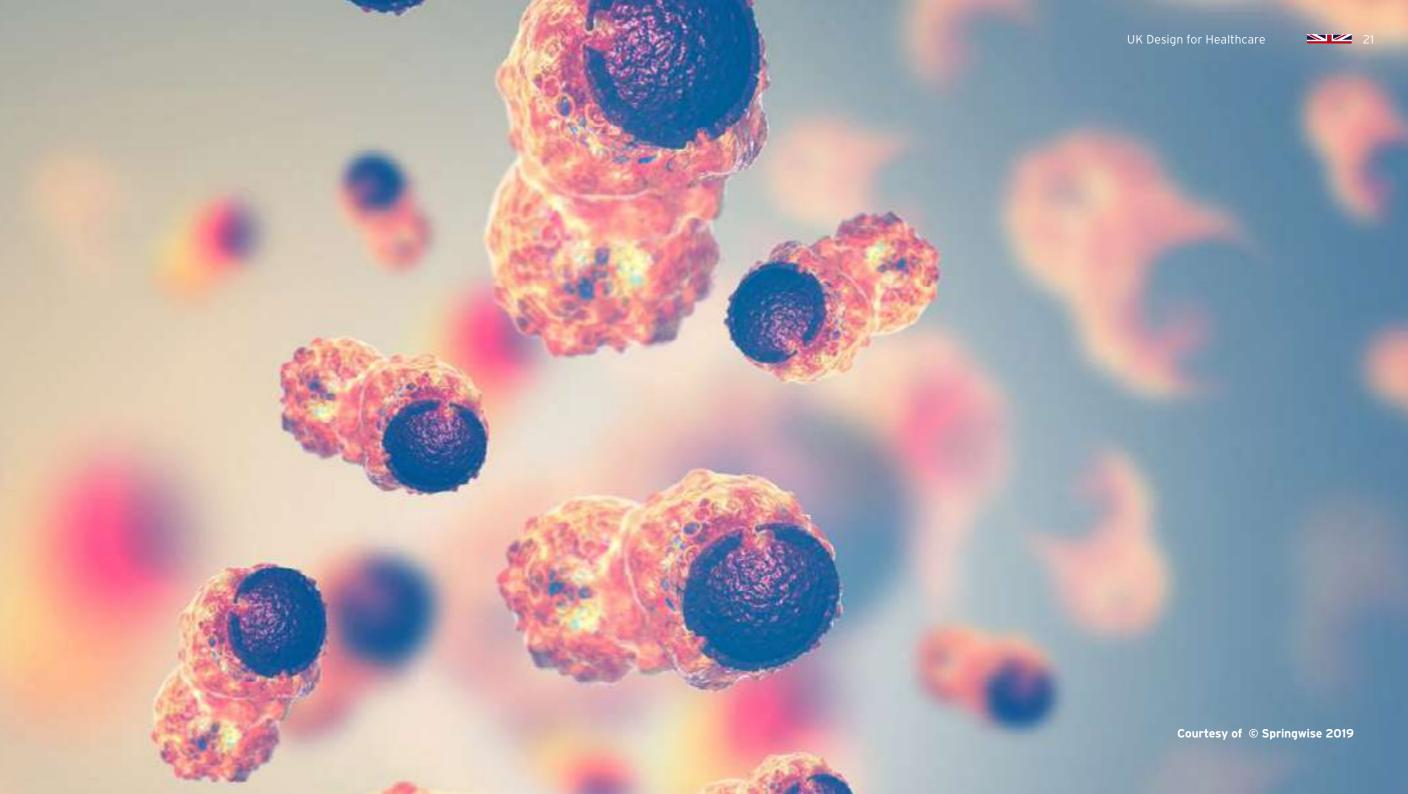
# Cancer Research UK Cambridge Institute

Tumours are varied and complex, and a cure for cancer remains elusive. However, technology is already having a major impact on medicine and research.

The next generation of biomedical research will be forwarded by collaboration with experts in software and new technologies. Scientists at Cancer Research UK Cambridge Institute are taking VR technology and applying it to cancer research. Within the system the scientists can generate avatars that can fly around the 3D map, functioning much like Google Earth VR, allowing them to hone in on specific areas.

This is a breakthrough in how tumours are studied.

Additionally, the digital VR tumour maps can be shared with other groups, enabling a greater level of collaboration and teaching opportunities. Machine learning algorithms and automation will lead to faster breakthroughs and AR and VR will enable greater, 3D visualisation.



# **Treatment**

#### Good design has a positive impact on patient care

Treatment ranges from taking a tablet through to major surgery.

Successful self medication regimes depend on clear communication, enabling patient confidence coupled with good ergonomics to ensure easy and safe dispensing. All of which design can deliver.

At the other end of the treatment spectrum, surgical procedures in an operating theatre utilise a wide variety of products: surgical instruments, lighting, anaesthetic equipment, sterilisation, waste management. The design of this category of products is usually driven by precise performance requirements as well as being governed by tight regulations. Here the role of design is to maximise both patient and surgeon comfort without compromising performance or hygiene often using specialist materials.

New procedures like 'keyhole' surgery have reduced patient internment with better outcomes. This is progressively morphing into robotic surgery for certain classifications of operations. Reducing procedure time, reducing patient recovery time and minimising post operative care all contribute to better patient outcomes.

Designers play an important role in helping manufacturers recognise these changes and visualising future possibilities.



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The world's first portable skin cancer treatment

Ambicare had identified an opportunity based on a clinical need for an ambulatory device for the administration of local photodynamic therapy (PDT) for non melanoma skin cancers.

Ambicare asked UK designers Kinneir Dufort to lead a device development program from concept creation through to manufacture of devices for clinical trials.

The result is a device that is simple and intuitive to use, delivers more efficiency thereby increasing patient throughput and the adaptation of the technology to an acne treatment system provides additional product line and revenue streams

A portable, wirelessly connected sensor and app system gives better incontinence diagnosis

Treatment

## **CMR Surgical**

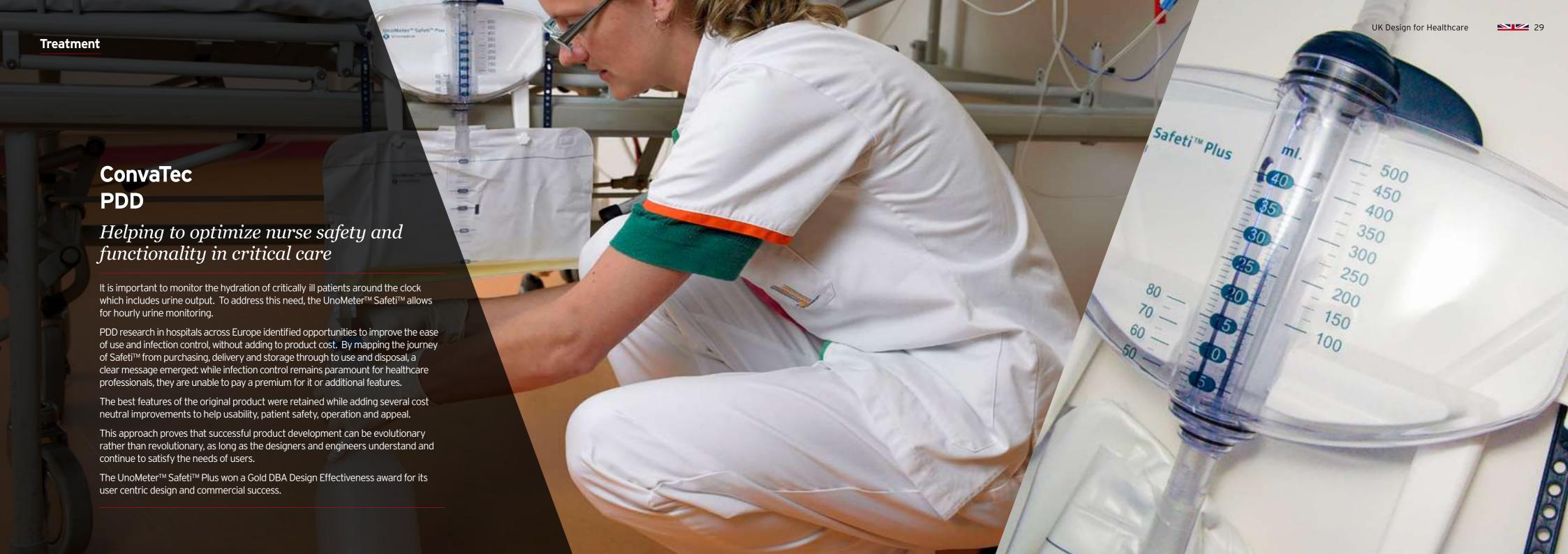
Making minimal access surgery available to all

CMR Surgical is a British company developing the next generation surgical robot, Versius®. Versius has been designed to fit seamlessly into today's operating rooms, work in harmony with the surgeon to improve patient outcomes and deliver value for healthcare providers.

Versius is designed to meet the complex requirements of laparoscopic surgery and is intended to be used across a range of surgical specialities. A combination of adaptability and portability allows hospital administrators to drive up utilisation of their robotics programme; improving hospital efficiency and clinical outcomes.

Versius mimics the dexterity and range of movement in the surgeon's own hand and wrist, and is designed to be flexible enough to handle the majority of laparoscopic procedures. With 3D HD vision, easy to adopt instrument control and a choice of ergonomic working positions, the open surgeon console has been designed to reduce stress and fatigue; offering the potential to prolong a surgeon's career.





#### Treatment





#### The Hamlyn Centre for Robotic Surgery Smallfry

#### *Revolutionising microsurgical procedures*

The Hamlyn Centre for Robotic Surgery established at Imperial College London (ICL), pushes forward the integration of robotics into medicine and patient care, with the aim of developing advanced robotic technologies that will transform conventional keyhole surgery, develop new ways of empowering robots with human intelligence, and create revolutionary miniature microbots that have integrated sensing and imaging for cancer surgery and treatment.

Most recently they worked with designers Smallfry to create an articulated mounting arm for use in endoscopic microsurgery. The aim was to drastically reduce set up time in accurately positioning & orienting an endoscopic head in preparation for trans anal surgery.

Working closely with ICL's team, Smallfry developed the arm geometry and defined and sourced all mechanical components. A key requirement was to select appropriate manufacturing techniques that offered a high quality appearance, whilst being suitable for low volumes.

The arm has become Imperial College London's first fully CE marked product and forms part of a larger development programme that is set to revolutionise endoscopic microsurgical procedures.

#### **Touch Bionics**

Improving the lives of people with upper limb deficiencies across the world.

Touch Bionics™, developer of the world's first multi articulating bionic hand, understands the needs of patients with upper limb loss and deficiency. Touch Bionics is one of the few companies worldwide that solely manufacturers upper limb prosthetic devices and is committed to providing the most innovative technologies.

It manufacturers active and passive functional prostheses while offering premier product and patient support programs. It has one goal in mind - to partner with clinicians to provide patients with a solution that will help increase their function and independence in their daily lives.

Founded in Scotland, and now proudly part of Össur, Touch Bionics continues to innovate and lead the world in the development of upper limb prosthetic technologies.

UK Design for Healthcare

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# "We reviewed a number of proposals from top-tier product development consultancies for this project and concluded that Team had a unique combination of world-class expertise in design, human factors and engineering." "They also excel at the essential 'softer' skills, such as being supportive, accommodating and flexible. We had an ambitious vision with this project, and our decision to work with Team has resulted in a highly effective collaborative effort. We couldn't be happier with the end result."

Jonathan Rigby, President & CEO, SteadyMed Ltd.

**Treatment** 

## SteadyMed Team Consulting

# Accurately and continuously delivering drugs with a wearable injector

SteadyMed's single use Trevyent<sup>™</sup> product is designed to accurately and continuously deliver a subcutaneous or intravenous infusion of the drug treprostinil 24 hours a day, every day, with each Trevyent<sup>™</sup> unit lasting 48 hours.

Team Consulting were commissioned to look at the architecture and structure of the proof of principle PatchPump® device and propose alternative construction, sensor type and electronics architecture. As well as full development, Team also undertook formative usability testing in the UK and US to better understand the needs of PAH sufferers. From the outset, it was important to ensure that the pre filled, pre programmed Trevyent™ drug product was easy to use. This has made the process of drug administration from Trevyent™ very simple, with patients just having three steps to operate.

In a recent market research study commissioned by SteadyMed, 90% of PAH treating clinicians and specialty nurses interviewed indicated a strong preference for Trevyent over existing treatment options.

# Mundipharma International Precipice Design

An intuitive, more effective breathactivated inhaler

Improving the handling and performance of an established, functional design icon like an inhaler is a complex challenge.

Precipice Design worked with Mundipharma International's R&D and marketing teams to develop an intuitive, more effective breath activated inhaler. Once primed, simply inhaling on the device automatically releases the drug, improving efficacy and deposition. The k haler™ device is similar in size to a traditional inhaler. It's also packed full of features, like a best in class dose counter, which counts down individual doses. It also flags up when you're getting close to running out.

The innovative tethered mouthpiece cover ensures that the protective guard remains in place and isn't lost. Ingeniously, flipping it back is also used to prime the device.

"We focused our work on the multifaceted design components, developing the device design, brand, associated packaging and training materials." says Chief Design Officer, Miles Hawley. "It all needed to be brought together as a holistic proposition and tested."





# Raumedic AG Cambridge Design Partnership

**Treatment** 

Using design to retrofit existing devices to comply with new regulations

The EU Needle Safety Directive and USA Needlestick Act both came into force in order to protect healthcare workers from needlestick injury. Many existing drugs, particularly vaccines, had been supplied in staked needle prefilled glass syringes. But as these did not meet the new needle safety legislation, pharmaceutical companies faced lengthy and costly processes to revalidate their drugs in new needle safe primary pack delivery devices.Raumedic AG and Cambridge Design Partnership recognised the need for a needle safety device that could be retro fitted to existing primary packs, avoiding the need for revalidation and allowing pharma companies to avoid a costly gap in supply and revenues.

"We were very impressed that together with Cambridge Design Partnership we could deliver such a neat and manufacturable solution so quickly, in time for the new regulations. Highly recommended."

Dr Thomas Jakob, Director, Moulding / Pharma Solutions, Raumedic AG

# NHS Innovation East Midlands Warwick Design

Punch Capsulorhexis – Cataract Surgical Instrument

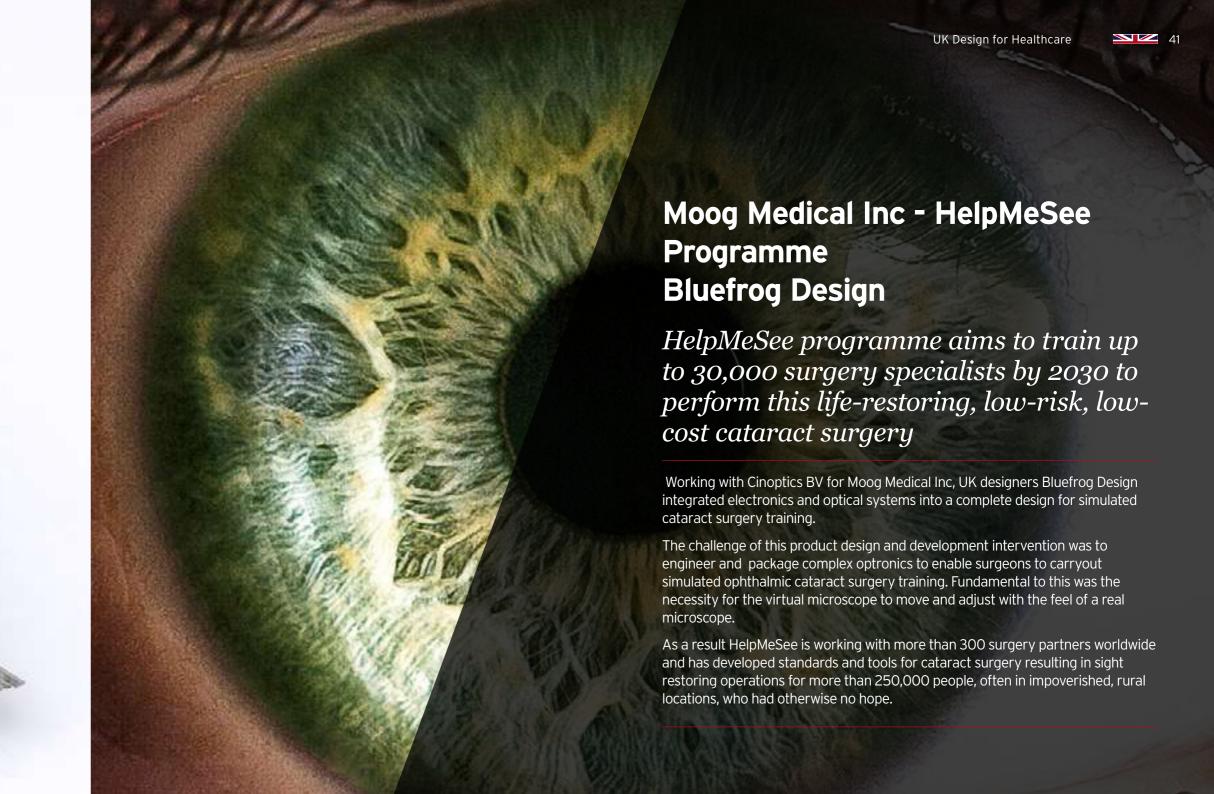
The task of removing cataracts and replacing them with artificial lenses is one of the most common operations carried out world wide. Nevertheless, it requires a very high level of skill from the surgeon to make the opening (capsularhexis) in the anterior capsule that holds the lens. This is particularly difficult in paediatric patients.

A top UK eye surgeon at a leading teaching hospital had an idea for a device to reduce the failure rate of this procedure. The NHS Innovation East Midlands approached Warwick Design with the challenge of turning the germ of an idea into a practical tool

Warwick Design developed all aspects of the device using nitinol for the super flexible special blade, commissioning mould tools and testing the procedure during the two year development programme.

This ophthalmic device creates an unrivalled precise and predictable capsulorhexis, making the procedure quicker and reducing the considerable skill and experience necessary in its performance.

Both the patient and the surgical team benefit from reduced exposure to the potential for harmful and expensive complications.



## Saving lives and opening markets

Working alongside anaesthetists, IDC delivered the complete design, electronics and manufacturing development of a world-leading video laryngoscope for the Venner Group.

The device, which is used during anaesthesia to introduce an endotracheal tube, is the first of its kind to offer both standard, Mac3 and Mac4, as well as the Difficult Airway Blades (DAB).

The laryngoscope can be used as a traditional, stand alone laryngoscope, or as a video laryngoscope, with the addition of the video viewer, which connects to the handle. The high image quality camera chip and high intensity white LED light source provide a clear image of the laryngeal structures.

The system is extremely intuitive and has received outstanding feedback from medical staff.



# Care

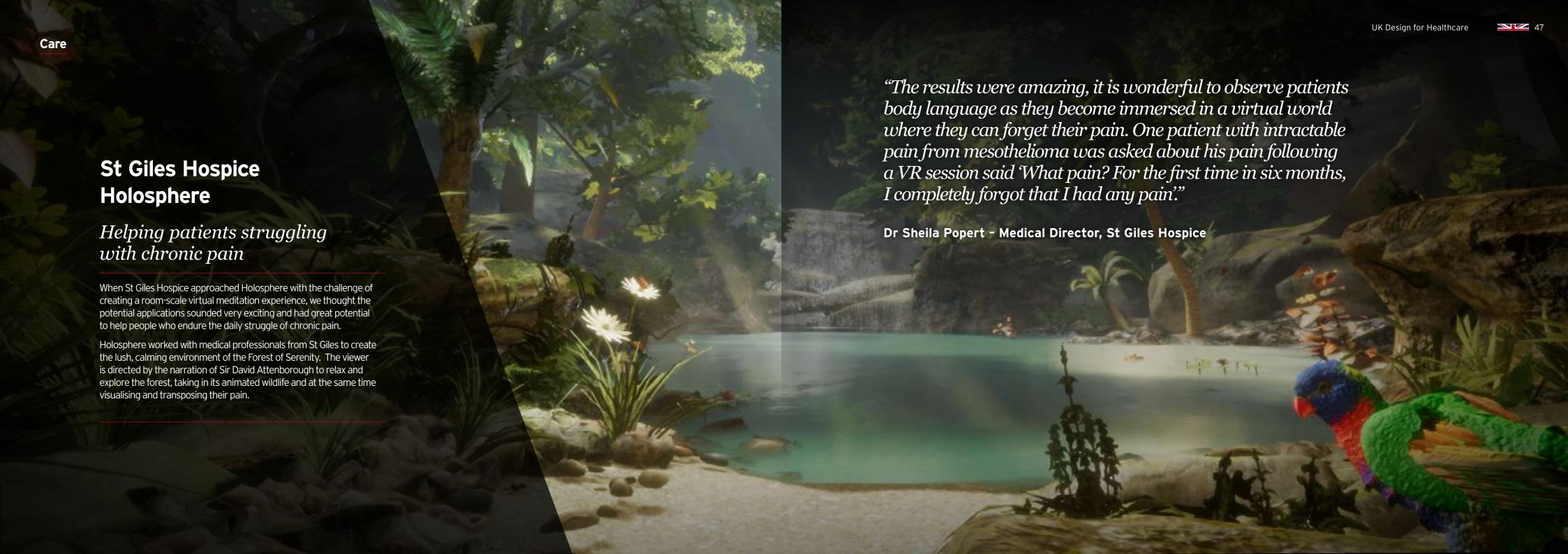
Care can take the form of managing a patient back to full recovery or dealing with a permanent condition which requires regular and repeatable actions by either the patient or a carer.

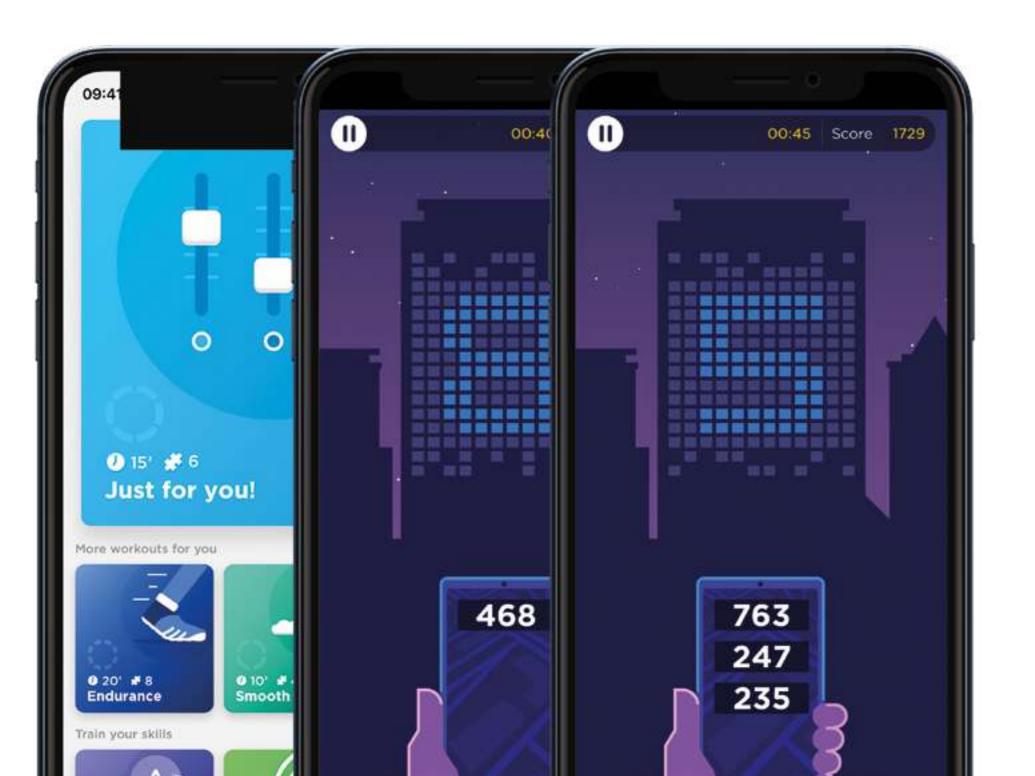
Care can be interpreted in many ways: keeping fit and looking after yourself, managing long term conditions, post operative care, disability, ageing.

It calls for a deep understanding of longer term situations and preserving or improving the quality of life for those affected. Here, the services provided are as critical as the products which might be used. Again the patient experience is at the heart of successful care plans.

Designers are great listeners with enhanced observational skills, seeing things that others may miss. These skills produce insights and a springboard for innovative solutions.







# Cambridge University Decoder

#### Concentrating on Attention Deficit Hyperactivity Disorder (ADHD)

Researchers at Cambridge University's **Behavioural and Clinical Neuroscience Institute** have developed an app that could help sufferers of Attention Deficit Hyperactivity Disorder (ADHD). The app, called Decoder, aims to help users improve concentration. The game sends users on virtual "missions" to foil an international criminal organisation. Users must remember and identify different sequences of numbers while being distracted. Every time the user successfully remembers a sequence, the app unlocks clues to the location of the "mission".

**Barbara Sahakian** and **George Savulich**, co inventors of the app, found that users who played Decoder saw improvements to concentration, with effects similar to those when taking stimulants such as methylphenidate (Ritalin) or nicotine. The team's research was published in the January 2019 edition of **Frontiers in Behavioural Neuroscience**.

Drugs to treat ADHD make up a booming industry, with as many as 1 million people in the UK taking Ritalin alone. Pharmaceuticals can have potentially serious side effects. The Decoder app could offer a safer alternative. The researchers suggest the app may also help improve attention impairment associated with schizophrenia and brain injury.

Source: Courtesy © Springwise 2019

# Alder Hey Children's NHS Foundation Trust Ustwo

Helping young people through the patient journey

The United Kingdom's Alder Hey Children's NHS Foundation Trust recently introduced its Alder Play app. Designed to help children understand and manage their hospital stay, the app uses augmented reality. Before arriving at the hospital, each patient names a personalized avatar that then follows the child throughout his or her stay.

The interface is designed to be as friendly and intuitive as possible, and children can use the app to learn more about their surroundings and their medical procedure. As each patient moves along their clinical pathway, they earn rewards that unlock additional content. Parents can use the chatbot to "Ask Oli" questions about their child's procedure and stay in hospital.

The app was designed by global digital product studio Ustwo and is available for both iOS and Android devices.





# **Brunel University**

## Detecting food allergens early

Designed by Imogen Adams of Brunel University, Ally was conceived as a way to overcome situations where the presence of allergens in food in restaurants may not be easily communicable, either due to language barriers when travelling or ignorance on behalf of the staff.

With an inconspicuous design, Ally is a small, portable device that connects with an app on the user's smart device via bluetooth. Ally contains a sensor capable of detecting the presence of lactose. Users create a sample of their dish by mixing it with water in a small silicone pod and then dip a chemical test strip into it, place the strip into the device, hold a button to connect the device, and the result appears on the user's smartphone screen after 60 seconds.

# Adlens tangerine

Viewed from a different angle – increasing customer adoption through design-led user research and insight

Adlens are world leaders in adaptive focus optics technology that helps those aged 45+ who are unable to wear varifocal lenses.

After the launch of their adjustable focus lenses, which allow users to manually change the focal length of their lenses by turning a dial, Adlens realised the glasses were not selling as expected.

tangerine's team discovered that the reason for this was because the opticians and sales assistants did not have the appropriate tools to explain the unique benefits of the product, and the customer was not able to try the lenses for themselves, leading to a lack of understanding of the new technology.

From these insights, gathered through research and service safaris, tangerine designed a new brand, point of sale collateral and disrupted the eye examination and sales process to allow consumers to experience first hand the unique benefits of the optical technology during their examination to help inform customer purchase.







# Making innovation affordable

UK Export Finance (UKEF)

UKEF's mission is to ensure that no viable UK export fails for lack of finance or insurance from the private sector.

UKEF offers a variety of export finance solutions to businesses of all sizes, across sectors, helping you to procure from UK suppliers and offering attractive financing terms for both exporter and buyer.

With a range of flexible support on offer - whether that means lending to the overseas buyer directly, loan guarantees, supporting Sharia-compliant finance or re-financing on the capital markets - UKEF can work with you and your UK supplier to find the right financing solution.

UKEF can support finance for up to 85% of the contract value in over 60 local currencies. With competitive UK content requirements, UKEF can consider support for UK goods or services as diverse as the building of a new hospital or the development of specialist medical equipment.



www.gov.uk/uk-export-finance

#### Directory

#### Design Agencies

Company	URL	
42 Technology	42technology.com	
Bluefrog Design	bluefrogdesign.co.uk	
Cambridge Design Partnership	cambridge-design.com	
Holosphere	holosphere.co.uk	
DC	idc.uk.com	
Kinneir Dufort	kinneirdufort.com	
_ondon Associates	la-design.co.uk	
Lucid Group	lucid-group.co.uk	
Native	native.com	
PDD	pddinnovation.com	
Precipice Design	precipice-design.com	
Smallfry	smallfry.com	
Tangerine	tangerine.net	
Feam Consulting	team-consulting.com	
JsTwo	ustwo.com	
Warwick Design	warwickdesign.com	

#### Design Associations

Company	URL	
Design Business Association	dba.org.uk	
British Industrial Design Association	britishindustrialdesign.org.uk	
Royal Institute of British Architects	architecture.com	

#### UK Healthcare Associations

Company	URL
Association of British Healthtech Industries (ABHI)	abhi.org.uk
British Healthcare Trades Association (BHTA)	bhta.net
Healthcare UK	gov.uk/government/ organisations/healthcare-uk
UK International Healthcare (UKIHMA)	ukihma.co.uk

#### Research & Innovation Agencies

Company	URL	
Knowledge Transfer Network (KTN)	ktn-uk.co.uk	
National Institute for Health Research (NIHR) Clinical Research Network	nihr.ac.uk	
NHS Innovation Accelerator	england.nhs.uk/ourwork/ innovation/nia	
UK Research and Innovation	ukri.org	
United Kingdom Science Park Association	ukspa.org.uk	

#### Healthcare Companies

Company	URL	
Adlens	adlens.com	
Alder Hey Children's NHS Foundation Trust	alderhey.nhs.uk	
Ambicare Health	ambicarehealth.com	
Brunel University	brunel.ac.uk	
Cancer Research UK Cambridge Institute	cruk.cam.ac.uk	
Cambridge University's Behavioural and Clinical Neuroscience Institute	bcni.psychol.cam.ac.uk	
Coloplast	coloplast.co.uk	

Company	URL
CMR Surgical	cmrsurgical.com
ConvaTec	convatec.co.uk
ELGA Labwater	elgalabwater.com
Foundation Innovative New Diagnostics	finddx.org
Hamlyn Centre for Robotic Surgery	imperial.ac.uk/hamlyn-centre
Howz	howz.com
Moog Medical Inc	moog.com
Mundipharma International	mundipharma.com
NHS Innovation East Midlands	england.nhs.uk/ourwork/ innovation/nia
Raumedic	raumedic.com
SteadyMed - United Therapeutics	unither.com
St Giles Hospice	stgileshospice.com
Touch Bionics	touchbionics.com
Venner Group	vennermedical.com
Zilico	zilico.co.uk





great.gov.uk

#### Department for International Trade

The UK's Department for International Trade (DIT) has overall responsibility for promoting UK trade across the world and attracting foreign investment to our economy. We are a specialised government body with responsibility for negotiating international trade policy, supporting business, as well as delivering an outward-looking trade diplomacy strategy.

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