



TAaCT: Technology, Affect  
and Clinical Training.

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TAaCT is a collaboration between Digital Horizons at Torbay and South Devon NHS Foundation Trust and Transtechnology Research at the University of Plymouth. We are grateful for the support of Dr Hannah Drayson, Dr Matt Halkes, Dr Mona Nasser, and Professor Michael Punt in the development of this project.

# TAaCT: Technology, Affect and Clinical Training.

TAaCT is a project that examines contemporary medical training by attending to the long history of devices that have been used to train medical practitioners, which include texts, atlases, models and a range of audio-visual apparatus. The object of TAaCT is to include reflective thinking about how technologies of representation are used to engage directly with human feeling, but which a prevailing focus on technological progress toward realistic simulation has tended to marginalise.

## Authors

**Jacqui Knight** MA is a Marie Curie (ITN) PhD researcher with the Cognition Institute and Transtechnology Research at Plymouth University. As a practicing artist and doctoral researcher, her research retrofits an understanding of photography as a manifestation of human engagement with matter in order to address photography's changing ontology in technological photographic practices. She is currently lead researcher for TAaCT a collaborative research project between Digital Horizons at Torbay and South Devon NHS Foundation Trust and Transtechnology Research that aims to develop alternative and holistic approaches to medical care by reviewing the tools, methodologies and approaches in the teaching and training of healthcare professionals. Within this role she is also advising on the development and curation of the hospital arts program. She has previously held numerous lecturing posts in Critical Theory and Fine Art subjects across various institutions including Cardiff Metropolitan University, Plymouth University and University of Falmouth. As co-founder of artist film lab Cinestar based in Cornwall, she has been dedicated in supporting creative work with analogue film through experimental workshops, screening events and education. She has exhibited and curated numerous film screening events and group exhibitions internationally and has had a solo show at Nancy Victor Gallery, London.

**Nick Peres** is Head of Technologies Research and Development at Torbay Hospital and the founder of PatientVR, a Virtual Reality project within the NHS using immersive imagery to help teach humanities skills in medical education. Nick currently leads on multiple VR based initiatives within the NHS including The VR Lab sponsored by Health Education England and advocates a 'clinicians as content creators' approach to creativity in healthcare. Nick works and advises on various digital and emerging healthcare technologies panels at a national level, with a particular remit around immersive and simulation visual interfaces. Nick is also co-developing the arts program at Torbay hospital.

Nick earned a BA (Hons) in Documentary Film and is currently in his final year of a PhD within Transtechnology Research at Plymouth University, studying technological mediation and empathy in clinical training. Nick has a keen interest in the affect and portrayal of emotions within image, having spent over ten years as a film maker. He is most curious of the role and identity of the 'camera' in healthcare settings beyond being viewed as just a tool for medical diagnosis.

## Contents

Introduction to collaboration	6
The clinician film-maker's toolkit, clinicians as content creators	8
Project C-T.I.M.: Interplanetary clinical trials	9
Documenting Live Simulation: a documentary	10
VR 'Perspective' immersive footage	12
HeArTs Gallery program	14
Slow TV in hospital waiting rooms	15
Virtual Reality interventions for pain management and various distraction therapies	16
Recognising and reflecting on humanistic skill using immersive imagery within medical simulation	18
Comparative study of simulator technologies for clinical training	20
An abridged bibliography	23



## Introduction

Technology, Affect and Clinical Training (TAaCT) is a funded collaboration between Transtechnology Research at the University of Plymouth and clinicians at Torbay Hospital Trust. The project investigates strategies for developing appropriate levels of professional empathy in clinical training. The collaboration includes multiple work streams which collectively aim to develop alternative and holistic approaches to medical care by reviewing the tools, methodologies and approaches in the teaching and training of healthcare professionals.

The project began by taking two approaches to the question of how to increase and improve training in non-technical skills concerning emotion and empathy. The first approach was to develop a methodology in medical simulation training that included consideration of the props and apparatus in the environment that provide cues to elicit empathetic responses. The second approach advances work already underway at Torbay in the use of Virtual Reality (VR) technology and involves critically examining the use of VR from arts and humanities perspectives. This intervention also looks at ways in which cost-effective, low fidelity approaches appear to produce higher capacity for reflection and empathy when used in clinical training,

which suggested a much wider adoption of VR technologies might be feasible across the healthcare workforce.

TAaCT is led from an arts and humanities perspective. It builds upon a systematic review undertaken by Nicholas Peres in Jan 2018 as part of a Doctoral Research study at the University of Plymouth, which proposes a transdisciplinary methodology for evaluating subjectivity, compassion and professional empathy in clinical training. Underpinned by an extensive literature review in the form of an open access annotated bibliography, an abridged version of which is included at the end of this publication, the research study analyses definitions of empathy and considers how apparatus, materials, technology, design and simulation methods elicit affective and empathetic responses in a professional context.

The initial collaboration opened multiple further possibilities for collaboration which are presented for the first time in this booklet, which introduces the context for the partnership and ten projects currently underway.



Still from *Elvis Scenario* (2012), a training video of a simulation scenario within the Special Care Baby Unit (SCUBU), which used techniques such as focus shifting to mimic the perspective of a relative.

### **The clinician film-maker's toolkit; clinicians as content creators**

TAaCT addresses a recent trend in clinicians recording and editing audio-visual materials in the course of their clinical practice. It explores the value of using audio-visual materials to recover certain aspects of practice for a range of training and debriefing purposes. It considers technical and theoretical issues that arise from this activity and examines how and why audio-visual technologies bring to attention certain aspects of professional practice that are otherwise overlooked.

The project supports this developing practice by bringing filmmakers with backgrounds in documentary and experimental film into collaboration with clinicians in order to bring insights from arts media practice and visual culture to bear on the kinds of image-making practices underway in clinical settings. The ways that representation through visualisation technologies can distort identities is well researched in the arts, but less so in clinical settings. This transdisciplinary encounter aims to provide both guidance in the development of content and guidance for its interpretation. The intervention is timely as increasing use of visual technologies in healthcare without a wider training offer into the interpretation of media images which could have implications for patient-clinician empathy.

Transtechnology Research are therefore developing a series of workshops and a toolkit to provide a visual methodology for contemporary clinicians to both produce and interpret moving image documentation. The workshops and tool kit will develop skills and understanding for using audio-visual media as a tool that has value in the critical evaluation of events, interactions and procedures within clinical practice and will lead to more appropriate and informed judgements.

In this context the use of moving image documentation to evidence and challenge the boundaries of knowledge within the field and inform innovative and creative solutions to problems will offer new insights that are informed by critical evaluation of current research and professional practice. Drawing on film media theory, philosophy of technology, and material engagement theory the tool kit will offer a practical entry into how to interpret and evaluate the many facets of moving image content. It will also propose appropriate techniques, methods and editing strategies to create an awareness of the limitations and ambiguities of media representation and simulation.

The project aims to engage clinicians in building visual literacy of moving image material and generate informed discussion of film concepts to further enhance existing clinical skills and expertise.



Filming of reconstructive surgery in the Val De Grace Hospital, Paris, France. During WWI, surrealist artists Louis Aragon and André Breton were enlisted as physicians-in-training at the hospital.

### **Project C-T.I.M.: Interplanetary clinical trials**

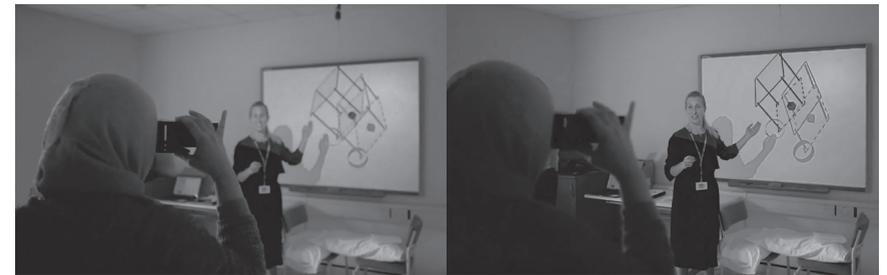
Researchers from Transtechnology Research and Cognovo at the University of Plymouth, Digital Horizons at Torbay Hospital, SEADS International Network, the University of the Philippines and independent researchers collaborated in order to speculate how clinical trials could look for future interplanetary missions. The project integrated a methodological thought experiment and two creative, interdisciplinary and interactive workshops. The first workshop was co-designed and hosted by Digital Horizons simulation team at Torbay Hospital and included a simulation of a space accident in microgravity along with an interactive discussion with consultants, clinicians, and scientists. The second workshop was run as part of the Edinburgh Cochrane Colloquium and focused on exploring a narrative scenario, engaging patient advocates and researchers. The project not only generated some suggestions for innovative methodological approaches for conducting clinical trials but also prompted a discussion on re-thinking the relation between patients and clinicians in the context of interplanetary missions.



Poster call for workshop participants for Project: C-T.I.M

The results of the project were presented at the International Astronautical Conference (IAC) in Bremen Germany on 2 Oct 2018. In their abstract for “Conceptualising the design of clinical trials and its associated support systems in interplanetary missions”, the authors identify five key aspects for a conceptual framework to focus on patient commitment and motivation.

The project team and authors are Mona Nasser, Nicholas Peres, Jacqui Knight, Agatha Haines, Charlie Young, Julian Wright, Matthew Halkes, Diego Maranan, and Joanna Griffin.



Stills from workshop Project C-T.I.M.: Interplanetary clinical trials

### Documenting Live Simulation: a documentary

Torbay Hospital is involved in a large-scale emergency simulation exercise involving multiple casualties, which will provide training for land, sea and air emergency response teams. Transtechnology Researchers will use the event to produce a short experimental documentary film aimed at revealing some of the values and challenges of simulation. Additionally, it will provide an opportunity to critique methods of production of simulation films and complement the tool kit workshops.

The documentary will act as a discursive tool in the critical evaluation of events, interactions and procedures needed to make appropriate and informed judgements in emergency situations.

Since the camera does not distinguish fiction from non-fiction, the documentary will raise questions about levels of authenticity, evidence and reassurance when using audio-visual material. Furthermore, it is intended to open discussion around mainstream film and television depictions of emergencies as well as training videos. The documentary will specifically address the way dramatic events and scenarios are typically represented in film training materials, often following mainstream structural, editing and

narrative filmmaking techniques in a way that depicts heightened drama in every shot, but which does not necessarily correspond to lived experience. Mainstream film production techniques have largely conditioned viewers to expect a distilled version of events which in turn has had the effect of eroding agency, rendering viewers passive. This has implications for the way emergency response teams interpret events, make revisions to their future procedures and modify how emergency services collaborate. To address this issue, the project will look at experimental film making strategies and methods of narrative production that de-dramatize catastrophe by introducing perspectives taking place in other locations simultaneously. Experimental films can often be more effective in communicating a holistic understanding of events from multiple perspectives than literal depiction.



Film still from patient experience VR project

### VR 'Perspective' immersive footage

The project addresses questions raised by the use of VR and immersive video documentation in medical simulation. Patient perspective films have been created at Torbay since 2015 in a variety of aspect ratios and formats as part of Peres' PatientVR project (Torbay and South Devon NHS Foundation Trust, 2015). The project was created in order to ascertain the learning value for clinical trainees of taking the patient perspective in immersive video. Aside from observing how VR participants respond to the technology—an enquiry which forms a significant part of Peres's Doctoral research—an element of this work identifies techniques that aid in the creation of content as well as the operation of the camera in hospital environments. One approach is to incorporate documentary film techniques and create a

style guide for shooting effective perspective-based content. Single camera 'one shot' VR techniques allow some of the more standard documentary production approaches to be utilised, but avoid problems associated with 360 VR such as lens distortion or the absence of the filmmaker. Another approach used is to work with an extended, but not 'fully immersive', image where a 180-degree angle or more (up to 270-degree capture) will achieve an extension of the periphery to include important elements of the environment, but still hide the presence and influence of camera operator from view. Other considerations raised by the use of VR in medical simulation include an assessment of the factors influencing adoption and acceptance of the technology by staff. For example, access to the apparatus, comfort for the users and visual integrity within movement pathways (that can have nauseating consequences for the viewer in virtual reality), all contribute to staff adoption of technology.

Within the TAaCT programme, the project is being revisited in order to further investigate the potential of accessible low-cost VR. Identifying the suitability of levels of resolution for an environment and its users, allows the widespread application of low resolution VR to be re-evaluated.



Film still from *Manual Handling: A Patients View*. 2016



Sound Communities: Connecting, Engaging & Inspiring through Radio and Music Production

### HeArTs Gallery program

Artist filmmaker and Doctoral researcher from Transtechnology Research Jacqui Knight is providing curatorial and practical experience in the arts to assist Torbay Hospital Trust in developing The HeArTs (Health and the Arts at Torbay and South Devon) Gallery program. This project recognizes that creative activity has long been known to have tangible effects on health and quality of life and, well curated, can help make sense of the complexity of our human condition at times of stress. The arts, creativity, and the imagination can be agents of wellness that contribute to individual resilience, aid recovery and foster a flourishing society. The intention of the HeArTs program is to encourage active engagement with the community, people and practices around us. The gallery program aims to develop opportunities for both users and providers of healthcare—across Torbay and South Devon—to engage more fully with a wide range of arts and creative activity that can benefit health and wellbeing. The collaboration will assist in facilitating a range of art projects in a variety of health care and community settings for expressive, restorative, educational and therapeutic purposes. Some projects are intended to work preventively, some to enhance recovery, others to improve the quality of life for people with long-term or terminal conditions.



Film still from the Atlantic Ocean exhibit at the National Marine Aquarium, Plymouth

### Slow TV in hospital waiting rooms

As an adjunct to the gallery program Transtechnology researchers are developing a slow TV project that brings live and recorded footage of local wildlife, marine life and conservation projects into hospital waiting rooms. There are many underutilised television monitors in waiting rooms that could potentially be used for appropriate screen-based artworks. The idea of slow TV came about in relation to a proposal by artist Jacqui Knight to situate a webcam within a beehive inside the hospital grounds. Slow television, or slow TV is a term used for a genre of 'marathon' television coverage of an ordinary event in its complete length (Puijk 2015). Its name is derived both from the long endurance of the broadcast as well as from the natural slow pace of the television program's progress. An early example of slow TV is Andy Warhol's 1963 film *Sleep*, which showed poet John Giorno sleeping for five hours and twenty minutes. The idea was more recently popularised by the Norwegian Broadcasting Corporation (NRK), beginning with the broadcast of a 7-hour train journey in 2009.

It is recognised that the toll of the hospital environment has a tiring effect and creates a fatigue or a longing for familiar and comforting surroundings (Koinis et al 2015). For this project we intend to frame static scenes, observed for a long period of time. The scene remains the same, but small changes happen over the recorded period in the style of *Cinema Vérité*. The potential of this medium for a kind of a meditative escapism could alleviate some of the anxiety experienced in communal environments and have wellbeing benefits for the viewer, whether patient, staff or visitor. This project has had considerable support both from hospital staff who recognise the benefits to health and wellbeing through the improved experience of the hospital environment, and from local wildlife conservation organisations eager for their resources to be utilised in meaningful ways.

### **Virtual Reality interventions for pain management and various distraction therapies**

Additionally, the benefits of the Slow TV project for reducing anxiety and hospital fatigue are transferrable and are further developed and applied to Virtual Reality interventions for pain management and various distraction therapies. An immersive version of footage can be viewed using VR headsets to allow the user to look around the recorded environment and become virtually immersed into a new space. TAACT researchers are currently working with The Deep Aquarium in Hull and leading researcher in the area of marine therapy Deborah Cracknell to develop and trial a VR aquarium intervention to reduce anxiety for patients and visitors at Torbay Hospital. To follow is a selected bibliography in relation to the use of VR in healthcare for distraction and pain relief therapy.

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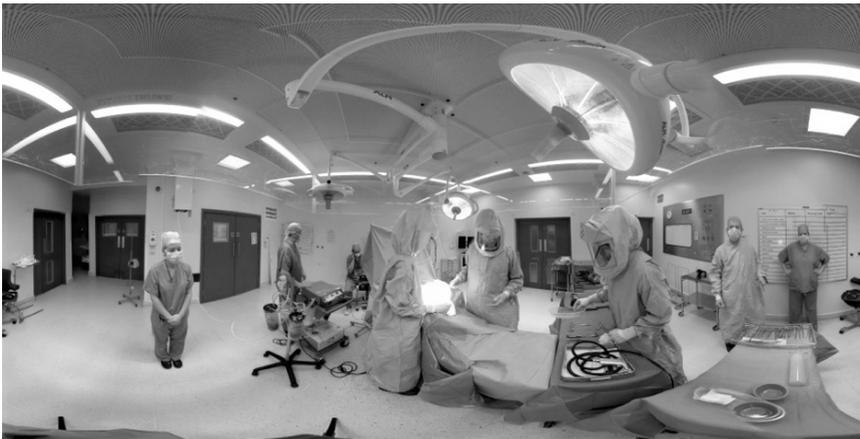
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A patient using 'Nature Treks VR' on the Oculus Go for pain management



Simulation Lab at Horizon Centre education and research facility based at Torbay Hospital

### **Recognising and reflecting on humanistic skill using immersive imagery within medical simulation**

Medical simulation is a widely adopted approach and understood to be vital for safe practical skills training, as well as non-technical skills. However, from a media perspective, videos made to record and debrief simulations do not support non-technical, humanistic skills as well as they can. The default approach to camera angles of these training scenarios is often to position the camera for convenience on ceilings or at a distance. However, these distant almost CCTV images conceal details that could potentially aid in the recording and reflection on behaviours associated with non-technical skills such as facial expressions and gestures, or conversations taking place outside of the frame, all of which may be of value in the debrief.

Nicholas Peres' Doctoral research study explores the use of immersive imagery (primarily 360-degree video) to document medical simulations. The resulting films provide a novel aid for clinical staff to reflect on humanistic performance and human factors within a training debrief setting. This research suggests that 360-degree video, with the camera positioned unobtrusively within the simulation environment, allows the whole environment and activity to be played back and navigated as a joint, exploratory activity between facilitator and participant group. The interactive nature of the play-back activity, with 360 context viewed either on a computer and navigated with a mouse, or as a VR headset-based, but shared experience, brings an immersive dimension to a debrief that offers viewers an opportunity to recover, discuss, and critically reflect on the captured content. For example, trainers are able to evaluate critical communication within operating theatres, patient perspectives, review safety procedures, map patients' journeys through clinical spaces, evaluate patient transfer ambulance experience, and review footage captured from community and domestic settings. The 360 format makes visible environmental and contextual information such as the technical set up and dynamics in the environment which become useful reference points for discussion of human factors.

Within the TAaCT project, our particular focus is on collaborating with clinical simulation leads at Torbay Hospital to understand the value of this technology and how this immersive content can be utilised and effectively debriefed from.



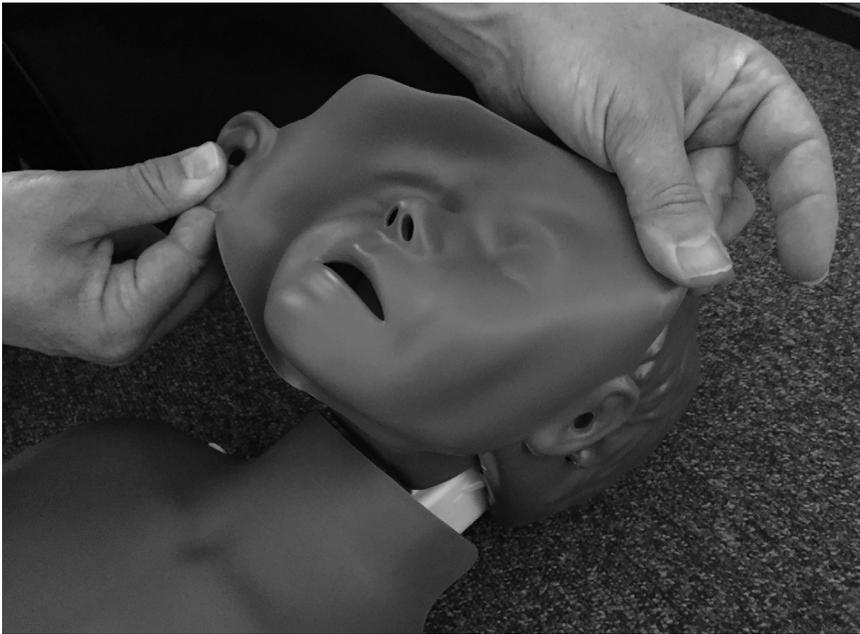
Simulation Lab at Horizon Centre education and research facility based at Torbay Hospital

### **Comparative study of simulator technologies for clinical training**

This final research strand aims to critically tackle a delivery problem in clinical training. It addresses the way in which an uncritical equivalence is drawn between the apparent visual realism of the medical manikin and human factors, such as empathy, that need to be developed in training. To date this has resulted in manikin technologies becoming increasingly expensive, as elaborate animatronic simulation functions become standard, without enhancing the necessary empathic skills of the clinicians. The resulting impact on the cost of simulation-based medical

training is particularly problematic in the context of community healthcare applications. Moreover, technical complexity means that current manikins are heavy, immobile, require technical input and increasingly are designed to support specific pre-specified training scenarios at the expense of versatility. The increasing specialism also limits their application for important, culturally-dependent, features that might engage trainees and elicit professional empathy. Through a comparative study of manikins used in medical training simulations TAaCT will address concerns associated with fidelity and realism in simulation by comparing manikins, which are designed mainly to produce simulated physiological functions, with others that are conceptualised with visual and tactile concerns as the core principle. Building upon this activity the project will apply co-design principles to further two lines of investigation: a) proof of concept prototyping of low-cost locally configurable manikin simulators, and b) novel 360 filming and VR technologies that will flexibly support an expandable range of training scenarios as required. Underlying both is the goal of cultivating empathic skills in trainee clinicians without the restrictions of expensive animatronics.

This approach feeds into a project between clinical teams at Torbay Hospital and South Devon Foundation Trust and international partners in Kenya: GRASPIT (Global Recognition and Assessment of the Sick Patient and Initial Treatment) to deliver training in patient assessment and resuscitation. In this and other ODA contexts the need for cheap, effective simulation training is pressing.



Child resuscitation training mannikin used in training programme in conjunction with the National Resuscitation Council of Kenya (NRCK)



Cardboard low-cost VR Headset

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## An abridged bibliography

The following bibliography, compiled by Jacqui Knight, is led from an arts and humanities perspective that analyses definitions of empathy and extends this into thinking about how apparatus, materials, technology, design and simulation methods can be used to elicit appropriate empathic responses in a professional context. This review builds upon a systematic review undertaken by Nicolas Peres in 2018 and proposes a transdisciplinary methodology for evaluating subjectivity, compassion and professional empathy in clinical training, and cognate bibliographies from the medical sciences. A full review of literature that takes the form of an open access annotated bibliography will be published in due course.

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