ESIH's VR/AR lab Portfolio

Institutional web portal: https://esih.edu (currently in re-design stage)
Institutional LinkedIn page: https://linkedin.com/in/esihhaiti
VR/AR lab web portal : https://tainosvisualarts.com/
VR/AR lab learning web portal:https://tainosvisualartschool.thinkific.com/

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[Online Learning Platform. https://tainosvisualartschool.thinkific.com/]

[VR/AR lab Web Portal : https://tainosvisualarts.com]

[DevExpo, December 2021, https://www.devexpo.ht/]

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Contents

Acronyms

VR: Virtual Reality
AR: Augmented Reality
ESIH: Ecole Supérieure d'Infotronique d'Haïti
CORPUHA: Conférence des Recteurs et des Présidents des Universités de la Caraïbe
CORPUCA: Conférence des Recteurs et des Présidents des Universités d'Haïti
AHTIC: Association Haïtiennes pour le développement des Technologies de l'Information et de la Communication
AIU: Association Internationale des Universités
AI: Artificial Intelligence
ML: Machine Learning
IoT: Internet of Things
MAAC: Matrimoine Afro-Américano-Caribéen
HMD: Head Mounted Display
ICOM: International Council of Museums
RAVI@TED : Réalité **A**ugmentée et **R**éalité **V**irtuelle à l'intention des **T**echnologies **ED**ucatives.
CNF: Campus Numérique Francophone
LMD: Licence – Master – Doctorat
UCA: Université de Clermont Auvergne
UA: Université des Antilles
OSMOSE: tOward a multi-stakeholder Socio-seisMological Observation network for Seismic risk rEduction in Haiti)

II. Context :

Ecole Supérieure d'Infotronique d'Haïti (ESIH) was founded in 1994, in Port au Prince (Haiti), as a private higher education institution, accredited by the Haitian Ministry of Education, offering a Bachelor program in Computer Science.

ESIH is a voting member of the Agence Universitaire de la Francophonie (AUF), a founding member of the « Conférence des Recteurs et des Présidents des Universités de la Caraïbe » (CORPUCA), the « Conférence des Recteurs et des Présidents des Universités d'Haïti » (CORPUHA) and the "Association Haïtienne pour le développement des Technologies de l'Information et de la Communication" (AHTIC) as well. ESIH is also a member of the IAU (International Association of Universities).

The vision of its founders is to create an ecosystem where high value - added technologies are used to complementthe more traditional academic curriculum. Technologies such as VR/AR, AI, Big Data and ML, Blockchain are opportunities to create not only wealth, but also sustainable jobs, hence opportunities for our students.

In 2007, ESIH created the first VR lab in the Caribbean in collaboration with a USVR integrator called Worldviz (Santa Barbara, USA). The 2010 Haiti earthquake interrupted its development. The lab resumed its activities in 2018, under a new name, Tainos, with a project funded by the AUF: "Matrimoine Afro-Américano-Caribéen" (MAAC, https://matrimoine.art) incorporating new software and hardware and a strong solar energy infrastructure.

Currently, a team of ESIH students is working almost full-time in the lab with clear objectives and a professional rather than academic vision. ESIH can be said to be the incubator of TAINOS.

II. Infrastructure :

A new infrastructure, completely restructured, with independent solar energy and A/C, has recently been completed with funding from ESIH and AUF.

The VR/AR lab web site is accessible at: https://tainosvisualarts.com

This infrastructure includes:

- A development room where the VR/AR team designs and develops VR/AR applications. Equipment includes:
  - Brand new laptops specially selected for graphics and 3D development.
  - A video conferencing system.
  - An interactive screen.
- A demonstration room where VR and AR applications are tested. This room includes:
  - 4 Oculus Quest / Quest 2 Head Mounted displays.
  - A (screen, video-projection) system.
  - A mind control system device.
  - A locomotion (soon with the possibility of adding vibrations) platform allowing the user to literally walk in the VR world.
  - A second locomotion platform of (lighter, less expensive).
  - A big screen to project users' experiences in an HMD for others to see.
- An independent solar energy infrastructure that allows for 24/24 power and A/C.
- A 4 x infrared cameras surveillance system with recording technology.

III. Portfolio Items :

Portfolio – Item #1 : ICOM-HAITI

Title: Conseil International des Musées (ICOM) / Comité National del'ICOM-Haïti

Salon Virtuel : Musées et Collections d'Haïti

Partners: ESIH (funding), ICOM / ICOM-Haiti, Musée Ogé Fombrun, Fondation Culture et Création (FCC)

Year: 2019

URL: https://icom-haiti.mini.icom.museum/salon-virtuel/

Figure 1 - Entrance - Virtual Gallery

Figure 2 – Gallery – Courtesy Centre d'Art

INTRODUCTION

The multiplatform virtual exhibition "Museums and Collections of Haiti", was created as part of the event named "Quinzaine des Musées 2020 d'ICOMHaïti", under the theme of the JIM 2020: "Museums for equality: diversity and inclusion".

This exhibition, in its current version, gives you access to 11 pavilions presenting Haitian museums. A selection of photos and videoswill give you an overview of their collections and their activities targeting the preservation and enhancement of Haiti's historical and cultural heritage.

In the VR version, you will be greeted by a three-dimensional representation (avatar) of the Director of ICOM-HAITI, Mrs. Rachelle CHARLIER DOUCET, who will give you a general description of the exhibition.

MULTIPLATFORM ASPECT OF THE GALLERIES

Mindful of the fact that the typical user of this work does not necessarily own a VR Headset, **four versions** of **each**of the 11 galleries are accessible/downloadable:

- A **web version** visible from the user's web browser.
- A **desktop Windows** version (to be run on desktop).
- A **desktop Mac version** (to be run on a Mac desktop).
- An **OculusQuest / Quest 2** version for those who own an Oculus Quest/Quest 2 Head Mounted Display).
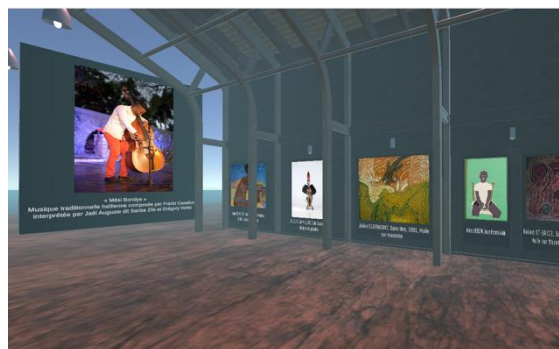

Figure 3– Gallery – Courtesy Centre d'Art

Title: Matrimoine Afro Américano Caribéen (MAAC)
Sponsorship: Agence Universitaire de la Francophonie (AUF)
Partners: Université des Antilles (UA) ; Université de Clermont-Auvergne (UCA), ESIH
Coordination: Inter-University Chair in Caribbean Studies (CIEC)
Period: March2020 – November 2021
**URL**: https://matrimoine.art

Figure 4 - Web portal matrimoine.art

Figure 5- Web portal matrimoine.art

INTRODUCTION

This project highlights the contribution of women's artistic talent to the world's cultural heritage which is the central theme of the Afro-American-Caribbean Heritage (MAAC) project. This project was made possible thanks to funding from the Agence Universitaire de la Francophonie (AUF). To date, 33 women feature on the portal). View artists by country from the top main menu "**Recherche et Création**".
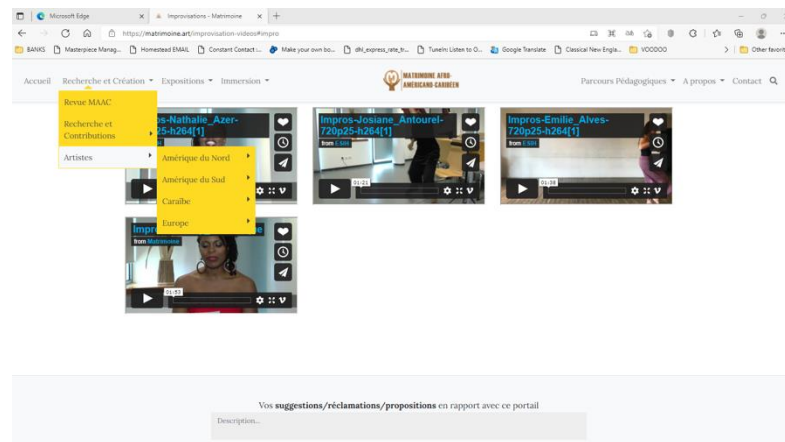
We propose to integrate to this web portal, innovative technologies such as Virtual Reality (VR) and Augmented Reality (AR),to offer a new channel to push visual information to the visitor, no matter his/her location in the world.

THE USE OF AUGMENTED REALITY (AR) ON THE WEB PORTAL

AR is fully **integrated**into the MAAC web portal. This allows the visitor who cannot physically attend the real life exhibition, to see all the added information directly from the web portal.

In **Figure 6** below (this image is taken from the home page of the web portal), for each "augmentable" image or photo, a yellow icon is present on the top right side of the image / photo.

Téléchargez l'application de réalité augmentée ici. Vous pourrez alors profiter de l'effet «Harry Potter» sur cette affiche

Figure 6 - AR integration

Steps:

- Once the visitor sees the **yellow icon**, he/she immediately knows that the image / photo is augmentable.
- If the visitor clicks on this yellow icon, he/she will download the Android application (.apk) to be installed on the smartphone / tablet.
- Once the .apk file is installed on the user's device and launched, it will take control of the device's camera to display each augmentation matched to a given target image/photo.

A short video showing the AR application running on a tablet is visible on the following **link**, or directly on **this Vimeo** page.

Four exhibitions are currently available on the MAAC portal and are accessible using the top menu as shown on the image below:
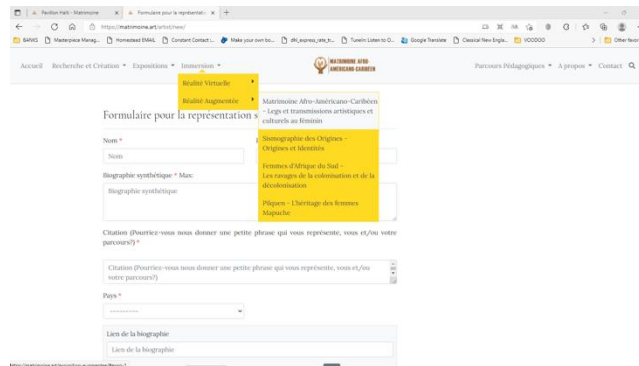
Figure 7 - Menu to access AR powered exhibition

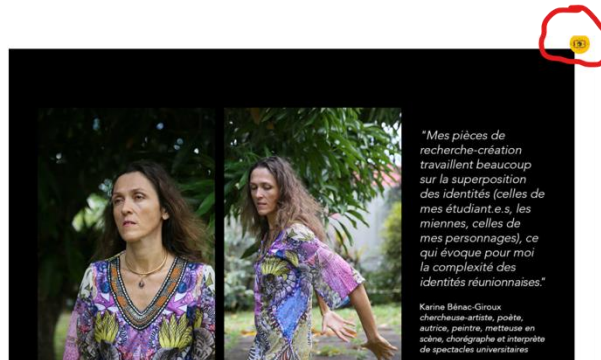- Caribbean exhibition 1: Legs et transmissions artistiques au féminin.

Figure 8 - Karine Bénac - Artistes féminines

- Caribbean exhibition 2: Origines et identités.

Figure 9 - flyer "Origines et Identités"

- South AfricanWomen: « Les ravages de la colonisation et de la décolonisation ».

- « Mapuche » women: « Pilquen, l'héritage des femmes Mapuche ».

Figure 10 - "Mapuche women" - Main Menu

THE USE OF VIRTUAL REALITY (VR) ON THE WEB PORTAL

VR is also **integrated** to the MAAC web portal. This allows the visitor who does not owe a Head Mounted Display (HMD) to access:

- A **web version** visible directly from the user's web browser.
  Important note : the web version of those galleries, at the current time, can only be viewed with the Microsoft Edge web browser.
- A **desktop Windows** version (.exe file, to be run on one's desktop).
- A **desktop Mac version** (to be run on one's Mac desktop).

- An **OculusQuest / Quest 2** version (.apk)for those who owe an Oculus Quest/Quest 2 Head Mounted Display).

The visitor can currently access two immersive galleries on the MAAC portal:

- A gallery from Haiti featuring women from Haiti (4 rooms available). This gallery is accessible at : Pavillon Haïti - Matrimoine.
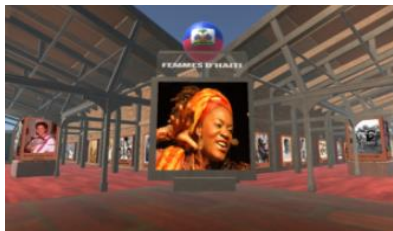

Figure 11 - Haiti immersive pavilion

- A gallery from Martinique featuring actress Alexandra Déglise. This galleryis accessible at : Pavillon d'Alexandra Déglise - Matrimoine


Figure 12 - Alexandra Déglise immersive pavilion

OTHER USEFUL INFORMATION

- **Press releases** are accessible at : Presse - Matrimoine
- **Artists who are interested in being featured** on the portal can upload all required information at Formulaire pour la représentation sur le portail MAAC - Matrimoine. Once received, the **MAAC Scientific Council** will validate and authorize the final integration of the uploaded information to the MAAC portal.

- Artists' interviews videos :Expositions – Matrimoine – Vidéos Interviews
- Artists improvisations videos :Improvisations - Matrimoine.

- Research papers published by some of the featured artists are accessible from the top menu :
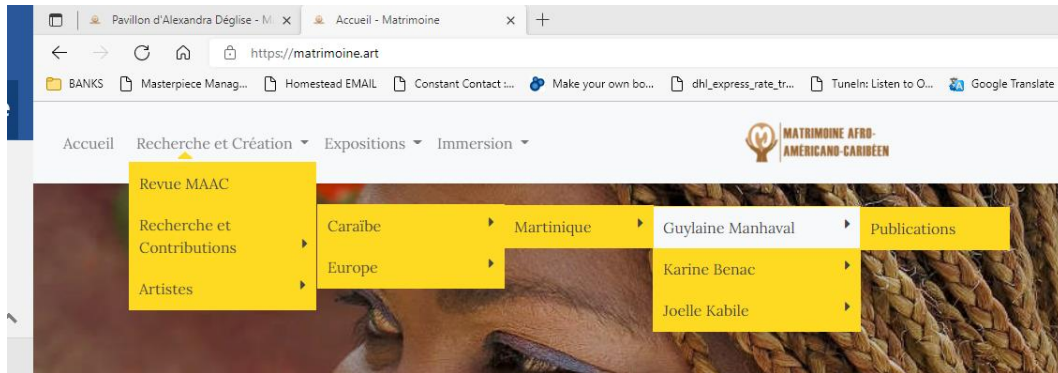
INTRODUCTION

The general objective of this initiative is to deploy an entirely virtual or hybrid training offer, integrating the most modern technological training toolsin Augmented Reality (AR) and Virtual Reality technologies, not only for pedagogical purposes, but also for the cultural and tourism industries.

This training offer will be deployed through the AUF's"Campus Numérique Francophone" (CNF) located at ESIH.

Initially, 5Beginners and Intermediate levelcourses (technical and non-

technical forBeginners' courses) will be integrated into the use of Unity, programming in C# and integration with VR and AR.

called "design of applications and games in Unity 3D using virtual reality and augmented reality". From this level, several training courses can be prepared. Some of them are currently being prepared, such as

- The use of databases for VR and AR.
- The integration of networked interactions in VR and AR
- The use and manipulation of avatars in VR and AR.

The project also aims to contribute to the socio-economic development of the Caribbean region, until now largely dependent on revenues from traditional tourism, by building a capacity to develop technological products with high added value.

Lastly, it is important to notice that every course can be validated as a university credit course according to the European LMD standard.

INTEGRATION WITH DISTANCE LEARNING TOOLS
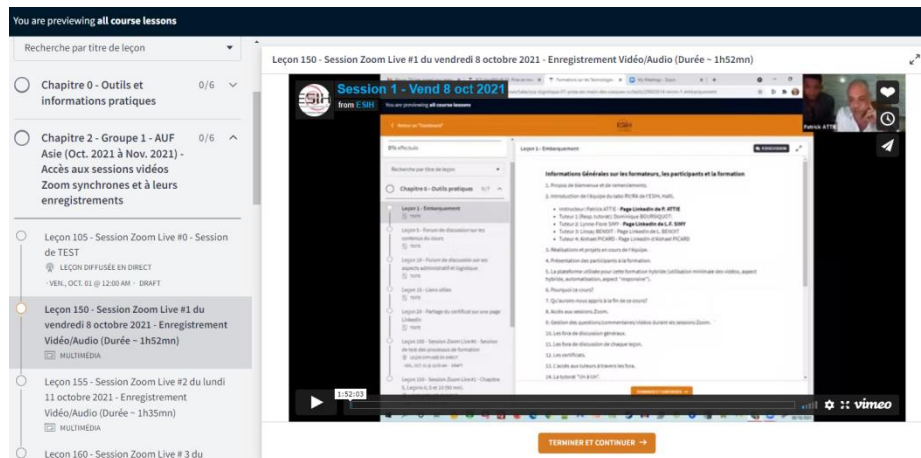
The distance learning platform (DLP) that is currently used integrates perfectly with the following :

- The Zoom video conferencing system (synchronous) and recordings (asynchronous).
- Vimeo videos.
- Powerpoint, Prezi and other presentation software.
- Google surveys.

- Discussion forums.
- File download (backend and frontend) and upload (backend).
- Etc.

Therefore, the learner accesses all the material and learning tools from his/her single account.

Once completed, each course is evaluatedby participants, and the results of this evaluation is posted as a lesson on the course itself for every participant to see.

COURSES AVAILABLE

- **Mastering the use of the head mounted displays:**

ECE-HardEtSoft-01: Prise en main des casques RV

Patrick ATTIE

PUBLISHED

The **target audience** for this course is a non-technical audience (heads of academic programs, professors, professionals, etc.) who wish to quickly be able to use a virtual reality headset independently. It focuses on the use of the **Oculus Quest / Quest 2** headsets. This is currently one of the most complete courses on this subject and it is regularly updated.

As at February, 2022 this course isbeing given online, at a small cost to two groups:

- The heads of the **Asian offices from the AUF** (6 participants from **Vietnam, Cambodia and Laos**).
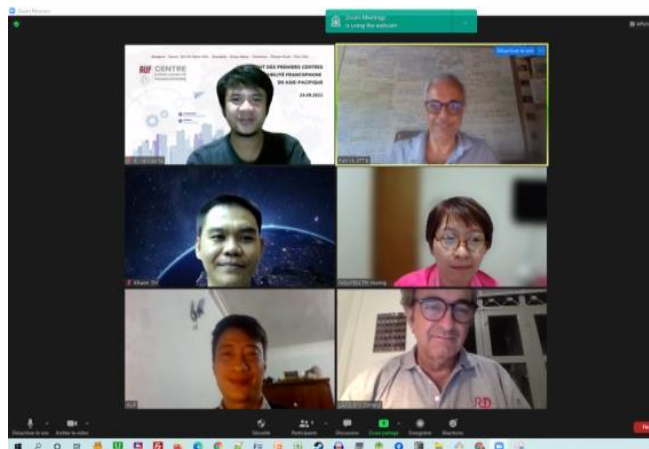
Figure 13 – Asia group - Zoom session

- **ESIH students** (a cohort of 70 participants).

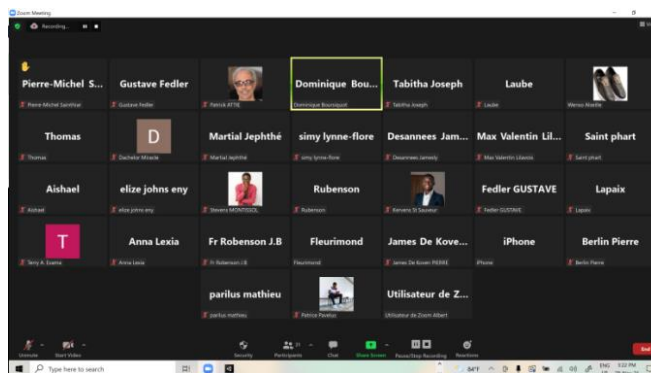

Figure 14 - In-classroom session

Figure 15 - ESIH group - Q/A Zoom session

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Figure 16 - ESIH student doing VR for the first time

- **Introduction to the concepts of Game Design :**

ECE-Soft-01: Principes
fondamentaux de la conception
de jeux

Patrick ATTIE

DRAFT

This course is aimed at introducing the participants to the concepts of game design and helps them to understand the vocabulary and tools used by game creation teams. Aspects such as gameplay, game mechanics, fun, skills, challenges and learning are described in-depth. Many examples of popular games are used to illustrate the topics covered.

- **Introduction to the Unity Game Design Platform :**

The Unity game design softwareis the multi-platform framework that will be used to design and develop our games or other applications. This course is a detailed introduction to the use of Unity in order to develop games or other apps.

- **Designing VR applications with the XR Interaction Toolkit:**

ECE-RV-02: Unity XR Interaction Toolkit

Patrick ATTIE

Unity's **XR Interaction Toolkit** allows developers to implement interactivity into their AR and VR experiences without needing to code. It features a number of components which can be attached to different objects in order to give them certain interactive properties (grabbing for example).

- **Introduction to programming in C#:**

ECE-Prog-01: Programmation en C#

Patrick ATTIE

PUBLISHED 🔒   ⋮

C# is the programming language most commonly used to code behaviors (actions, interactivity, animations, etc.) in Unity. This course is a project based thorough introduction to C#.

- **Designing AR applications with the Vuforia framework**

ECE-RA-01: Développer pour la Réalité Augmentée avec Vuforia

Fabrice Ted Fabre

PUBLISHED 🔒   ⋮

Vuforia Engine is the most widely used multi-platform software for AR development, with support for the majority of phones, tablets, and eyewear. Developers can easily add advanced computer vision functionality to Android, iOS, and UWP apps, to create AR experiences that realistically interact with objects and the environment [Source: library.vuforia.com]. This course is a project based introduction to developing AR solutions using Vuforia.

INTRODUCTION

This project is an order from the UCS, Clermont-Ferrand, France. It is structured in two phases:

- **Phase 1**(< October 2022): Design of a 4-room thematic virtual gallery (travel room, diaspora room, displacement room, dialog room) with Brasilian culture as the content. The following interactions will be integrated:
    - Locomotion with Oculus quest's hand controllers
    - Locomotion with Cybershoes.
    - Object grabbing.
    - Flying over the VR scene.
    - Integration of animated avatars with lipsync technology.
- An example of a prototype (displacement room) can be seen at: https://vimeo.com/637542720
- **Phase 2 (**<March 2023**)**: Design of a serious game for Portuguese learning.

Portfolio – Item #5 :Projet OSMOSE (tOward a multi-stakeholder Socio-seisMological Observation network for Seismic risk rEduction in Haiti)
Title: A virtual reality educative application to improve behaviors when facing an earthquake scenario.
Partners: Sponsoring : Agence Nationale de la Recherche (ANR), France, Université de Nice, France - Université d'Etat d'Haïti (UEH)
Period: January 2022 – January 2026

INTRODUCTION

The general objective of OSMOSE is to determine the conditions under which it may become possible to develop a useful, efficient, and sustainable earthquake monitoring network of which all stakeholders feel to be a partner. This project therefore aims to test a paradigm shift whereby the seismological network is no longer just a set of seismometers but becomes a network of multiple stakeholders who revolve around these sensors and the information they provide, and are committed together to reduce vulnerabilities. In "Work Package 3" titled "Co-construction of an effective citizen information system", Task3.5 involves the intervention of ESIH.

DESCRIPTION OF ESIH'S INTERVENTION

Here we will test simple Virtual Reality (VR) activities on a VR locomotion platform targeting, in particular, the younger population in low-income neighborhoods where traditional learning paths and methods are only marginally relevant. This action will be a meeting point and multidisciplinary activity with all the project partners. We will seek to "gamify" an earthquake experience – with varying magnitude and effects – in a playful context that nevertheless allows for effective learning of protective reflexes and earthquake knowledge in general as the game progresses. We will pay particular attention to gender biases in the

effectiveness of a VR gamified approach. We will test how using haptic vests and other locomotive equipment can be used to analyze real-time reactions (biometric parameters that can be measured during these activities such as heart rate and pupil movement). We will perform qualitative surveys in order to measure the effectiveness of a VR experience compared to a classic "in class" approach. This work will be carried out in accordance with the rules of professional ethics, in particular by ensuring that the tests take into account management of the trauma they could cause.