The Morphometric 3D Reconstruction of run over accidents

u[b]

UNIVERSITÄT BERN

POLICE

**Kirsten Buße[1], Ursula Buck[1,2], Christian Schyma[1], Christian Jackowski[1]**

[1] University of Bern, Institute of Forensic Medicine, Bern, Switzerland
[2] Canton Police Bern, Accident Service, Forensic 3D surveying, Bern, Switzerland

Introduction

The reconstruction of traffic accidents with run overs can be a complex process. The morphometric 3D reconstruction is a powerful tool in this process, which offers a interdisciplinary analysis of the case of the individual disciplines such as forensic experts, accident experts and forensic pathologists.

3D measuring techniques
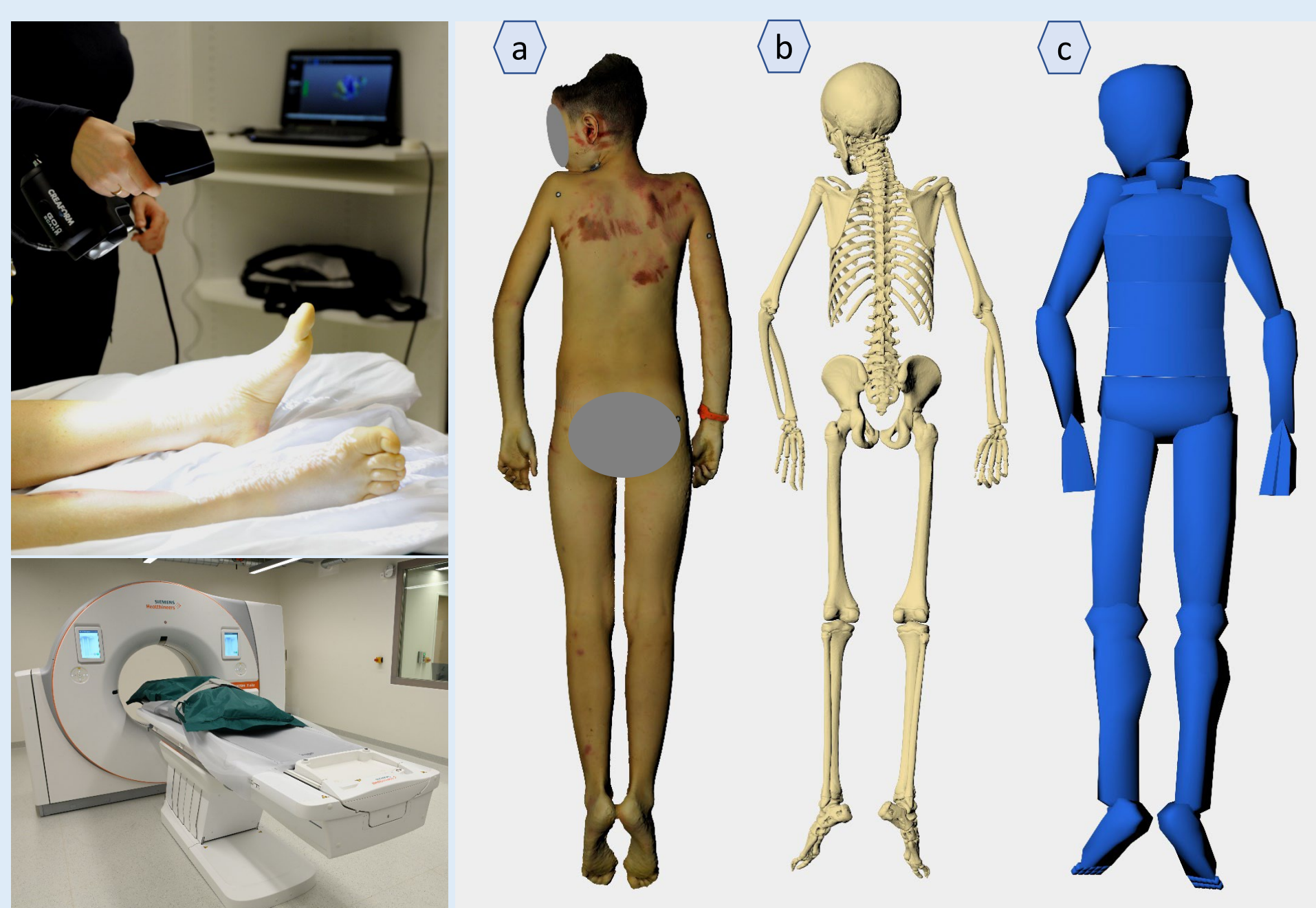
The deceased is documented using **photogrammetry and structured-light scanning** (a) as well as **computed tomography** (b). Based on this data, an individually adapted **computer body model** (c) is created.


Medium and small objects such as bicycles and shoes are documented by means of **structured-light scanning** using various systems adapted to the object size and required level of detail. Standard 2D photo documentation is still a matter of course.

The accident site and large objects such as agricultural vehicles are documented using **laser scanning and photogrammetry**.

Case example: morphometric 3D reconstruction of a run over accident involving an agricultural vehicle and a cyclist

Preliminary work
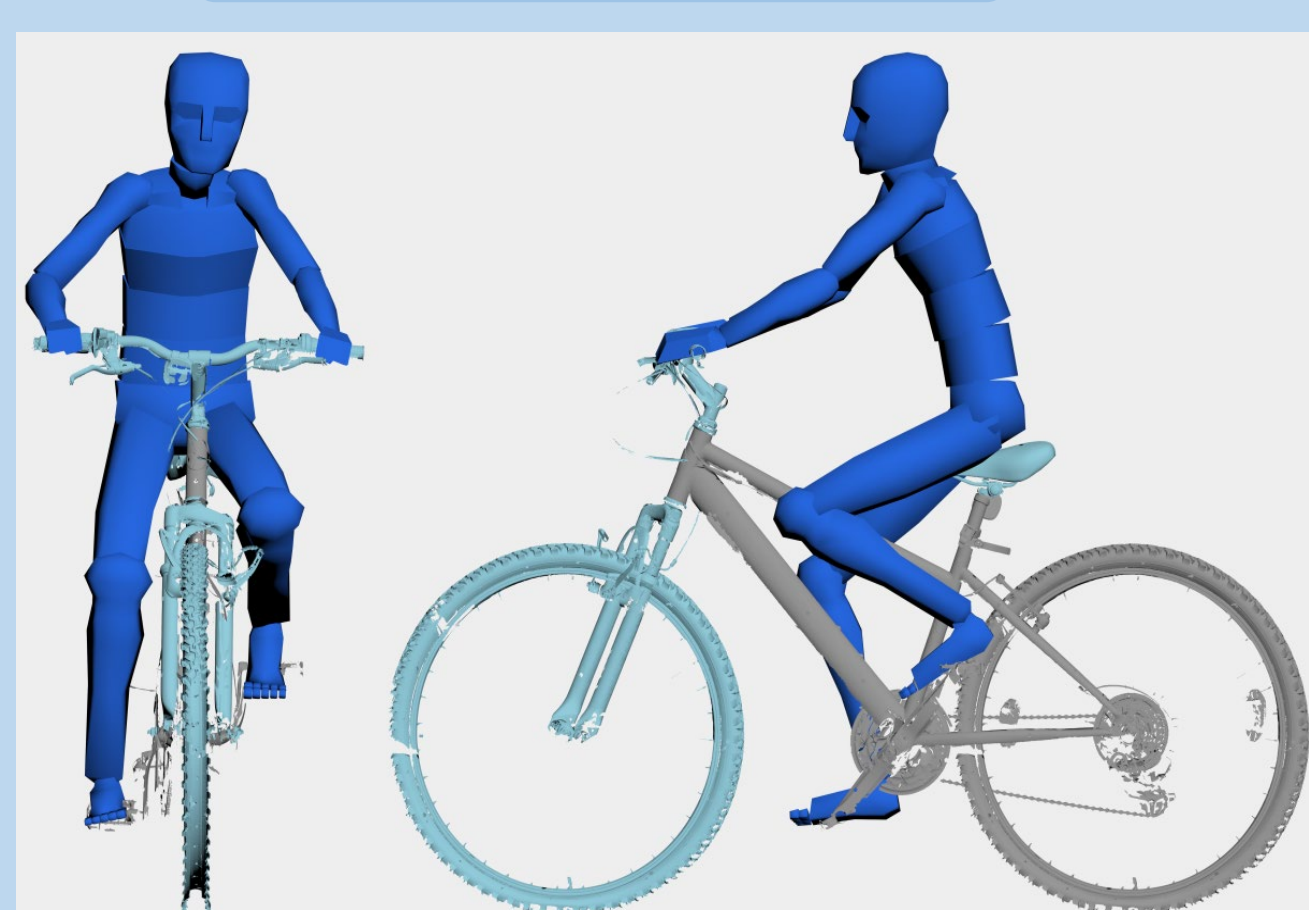
The computer body model was positioned riding the virtually reconstructed bicycle.

The true-to-colour 3D model of the rear of the agricultural vehicle shows patterned traces.
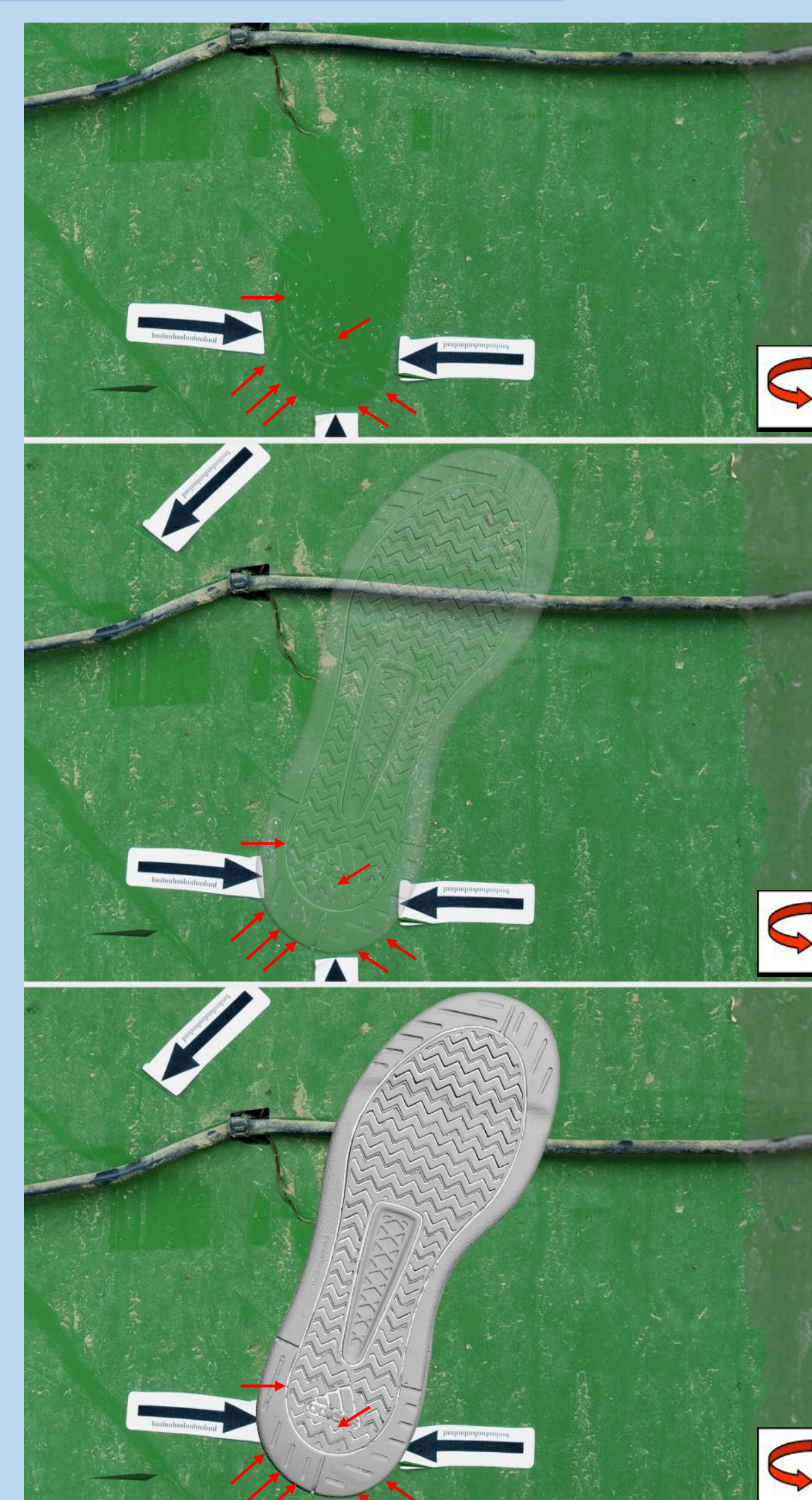
### Visualization of the most probable accident sequence

Based on the traces at the rear of the agricultural vehicle, the most probable first contact position of the cyclist was reconstructed.

Most probable position of the victim at the time of the formation of footprint at the rear of the agricultural vehicle by the sole of his right shoe.

Geometric comparison of the footprint and the shoe sole. The red arrows point to the individual matching characteristics.
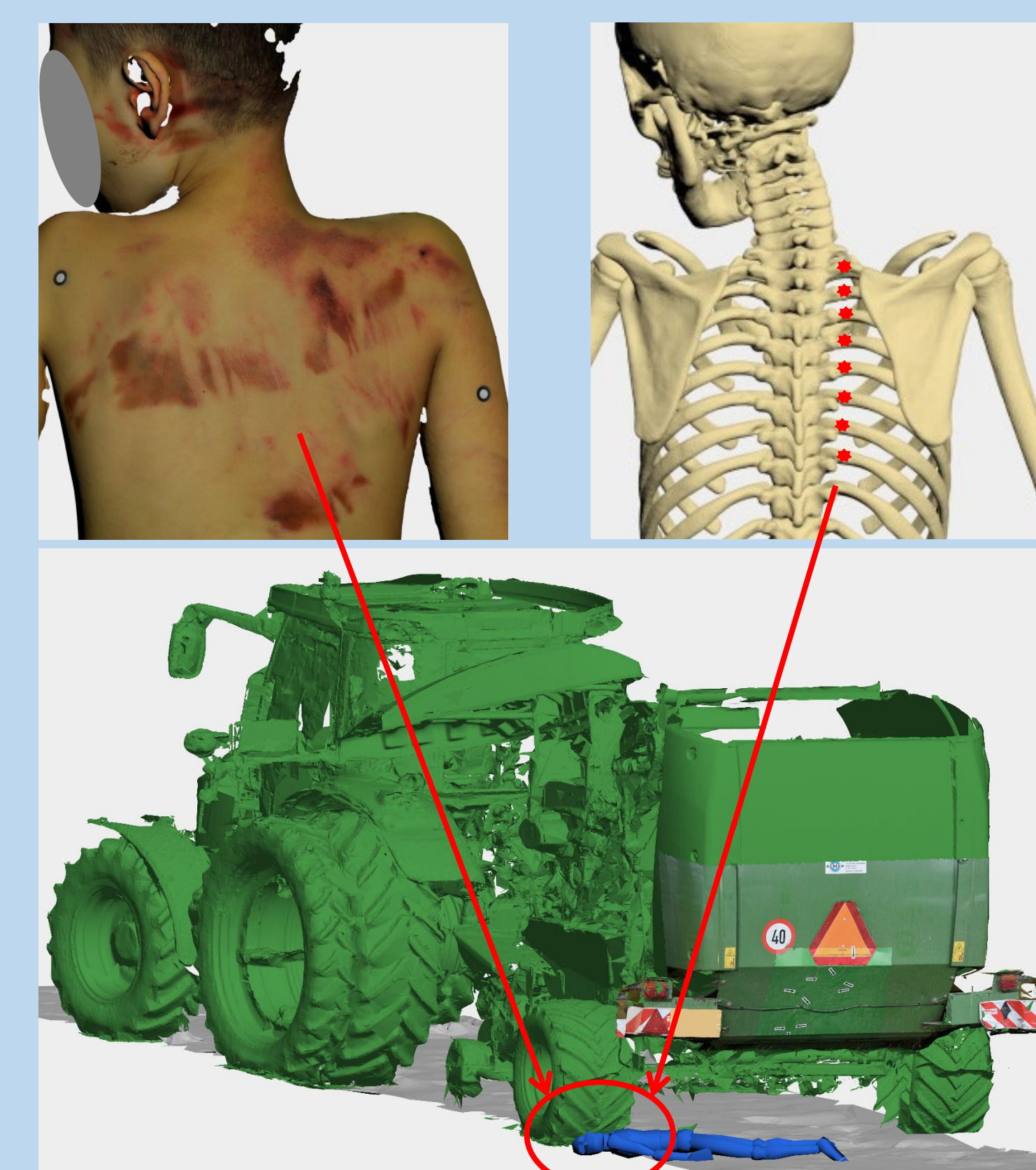
The geometric comparison of the tyre tread with the patterned skin injury behind the ear and on the back show that the most probable course of action is the following: The agricultural vehicle reverses and runs over the cyclist who is lying on the ground. The transverse hinge fracture and the broken ribs mirror the width of the tyre.

Result

This example shows that the morphometric 3D reconstruction is an indispensable method, which allows an interdisciplinary approach in the evaluation of hit and run over traffic accidents. The possibilities of application of this method by means of 3D techniques are wide-ranging and can provide new, unexpected, and significant insights of otherwise unclear accidents.

Contact:
Kirsten Buße
Phone +41 (0)31 684 0100
kirsten.busse@irm.unibe.ch
www.irm.unibe.ch

EAFS | STOCKHOLM 2022

May 30th – June 3rd, 2022
► Stockholm, Sweden

PP040