Designing a Robust, Reliable and Repeatable Fieldwork Protocol for Hospital Observations
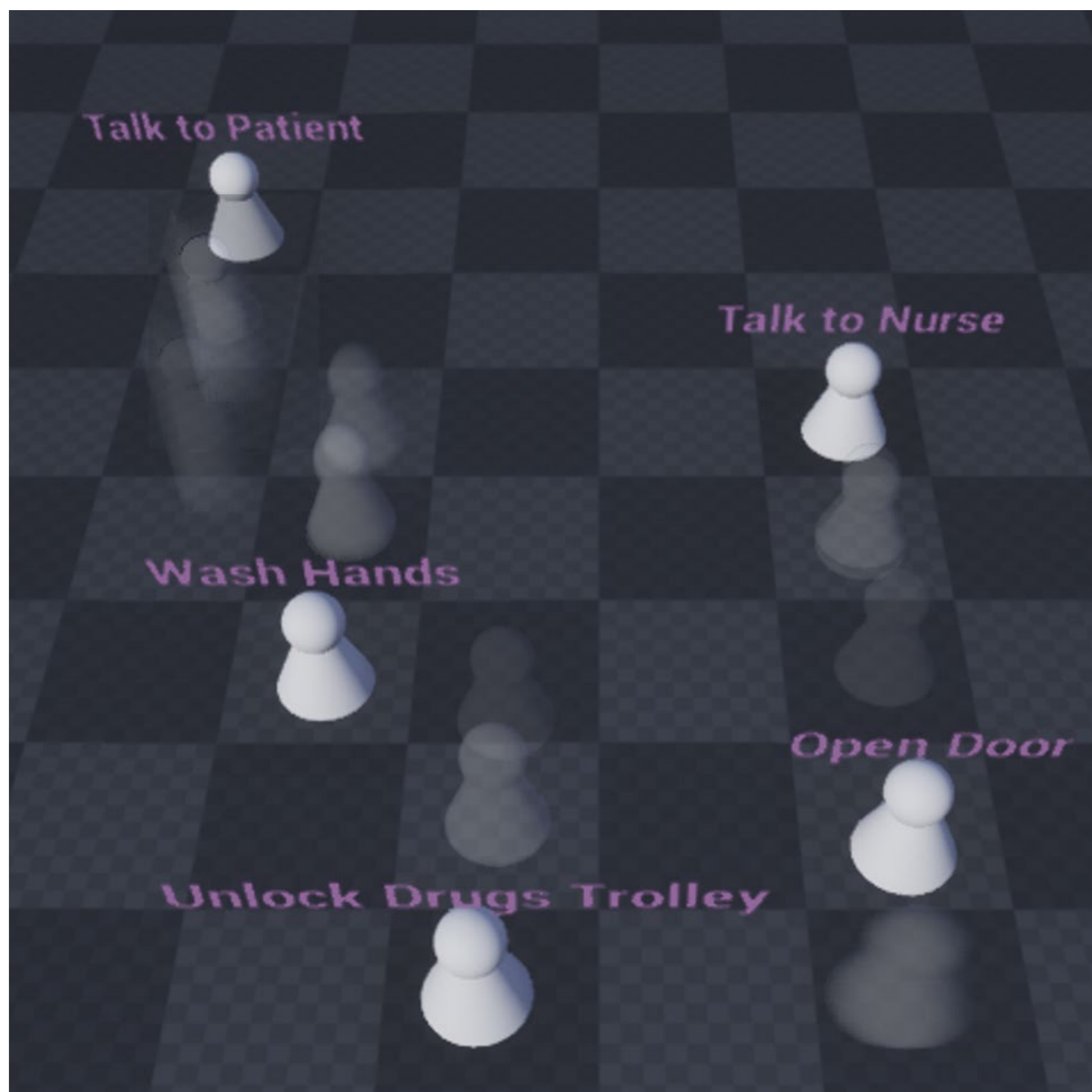

Figure 1: 'Dynamic' screen-capture of the movement and events/actions simulation built using the Unreal Engine (UE4) 3D Game Development Platform

Preparing for observations in restricted environments such as hospitals can potentially yield better quality data in the limited time available.

Introduction

When undertaking fieldwork in a constrained environment, such as a hospital ward, it is vital that the recording technique is designed and tested in advance. For a hospital ward, constraints may include limited access to the patient group as well as the general impact that undertaking fieldwork may have on a busy ward environment. As with all fieldwork, the recording technique needs to be robust (to cater for various eventualities), reliable (to accurately capture data over the length of the observations) and repeatable (to be confident in our methods - especially when sharing data). It is therefore salient to test out protocols and scenarios prior to the actual fieldwork to make best use of the limited time available for observations.

Our poster illustrates a real-time simulation of a hospital ward, built using the Unreal Engine 4 (UE4) 3D game platform and applied to our 'Paths of Resistant Pathogens in Hospitals' research study. This study aims to tackle issues of antimicrobial resistance (AMR) - such as hospital-acquired antibiotic-resistant bacteria - through a detailed architecturally-informed analysis of transmission risks inherent in hospital design. We do this by analysing the movement paths and interactions (touching of items, surfaces, people, etc.) of the various "agents" (nurses, doctors, cleaners, porters, visitors, etc.) found on hospitals wards. Our analysis includes Space Syntax techniques to determine where transmission risks may be affected by the architectural layout (such as in high-traffic areas).

Simulations can provide a number of potential benefits to assist with piloting optimal methodologies and protocols including:

- Time-critical trialling of protocols
- Assessing the accuracy of protocols
- Training the team of observers/researchers

When testing protocols via a simulation (Figure 1), we are able to alter certain parameters, such as the frequency of events happening, to determine if there is enough time to observe and record these events efficiently. One area of interest in our study was the potential size of our measurement error and how factors such as the scale of the paper-based floor plans, may attribute to these errors. By digitising our paper-based recordings (Figure 2) we, can compare our measurements to UE4's own internally-logged values (Figure 3).

Another use of the UE4 simulation is to test out different hand-drawn symbols to represent the various agent interactions (see Figures 4 & 5). In this case, the focus is on the speed of drawing (with time to practice), their reliability and, finally, agreement with the research team on which symbols and interactions to ultimately capture in the field.

Conclusion

When devising observations protocols, we wish to test our methods efficiency and effectively. We do this through conversations, test runs - both in the actual environments and in similar environments when access may be limited. Simulations, such as described above, can extend our routes to design, develop and test our protocols prior to the start of the actual fieldwork.
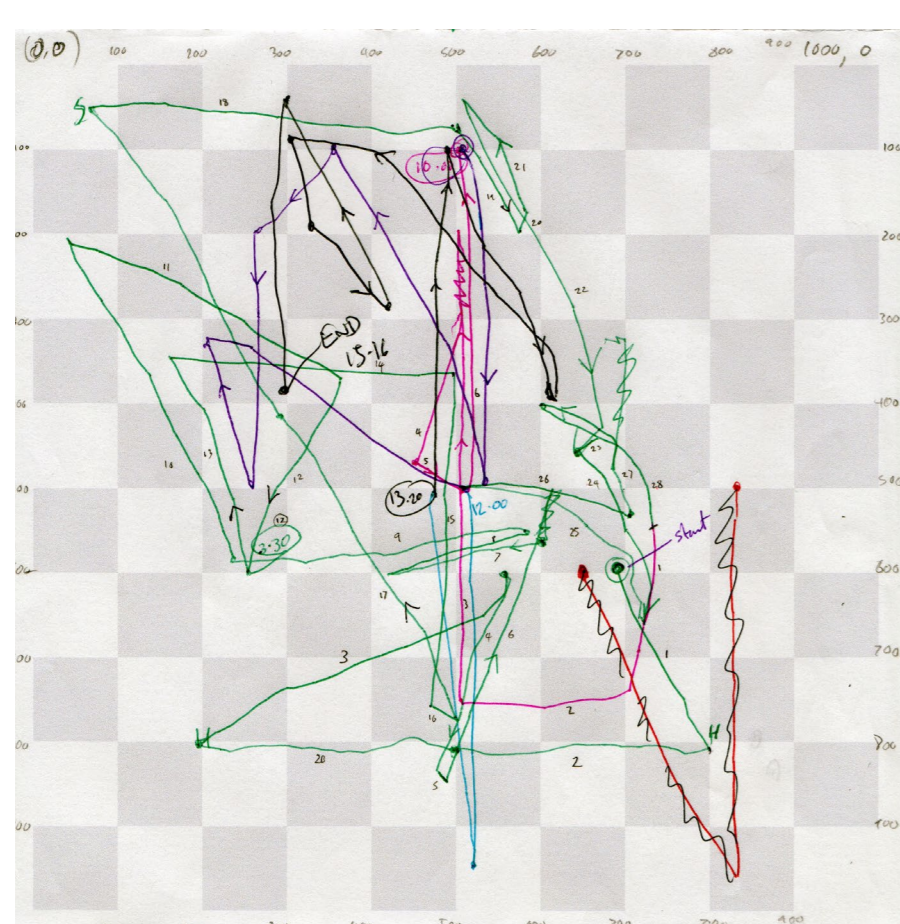

Figure 2: Paper-based recordings of observation of a similar simulation to that shown in Figure 1. In this case, the only events are semi-random movement patterns.
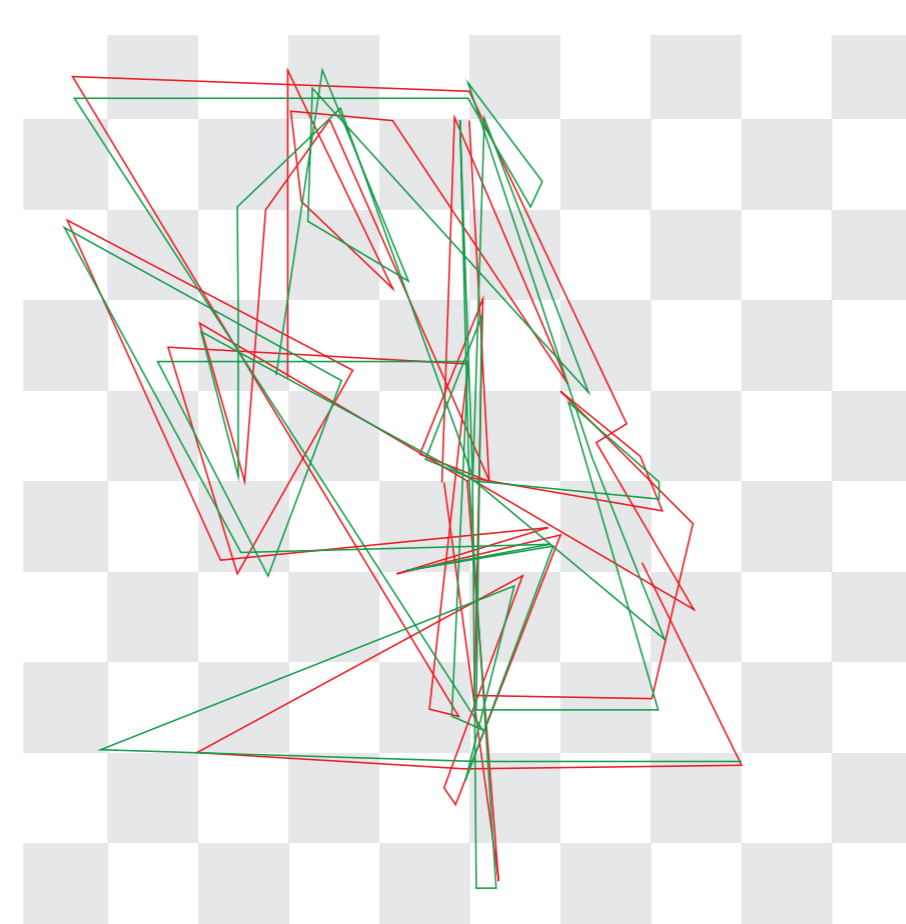

Figure 3: Digitised capture of the paper-based recording in Figure 4 (red lines), compared to the movements of the logged game character locations (green lines)
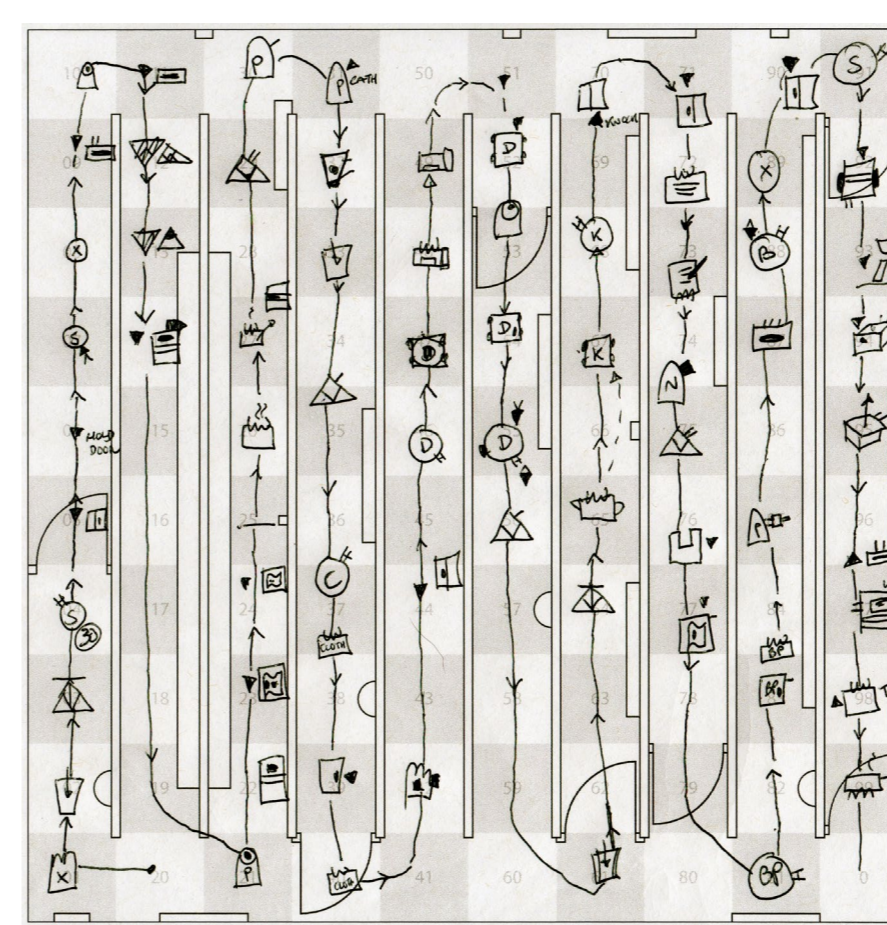

Figure 4: Observation of the simulation (in Figure 1) captured using pen and paper and developing and testing potential symbols (see Figure 5).
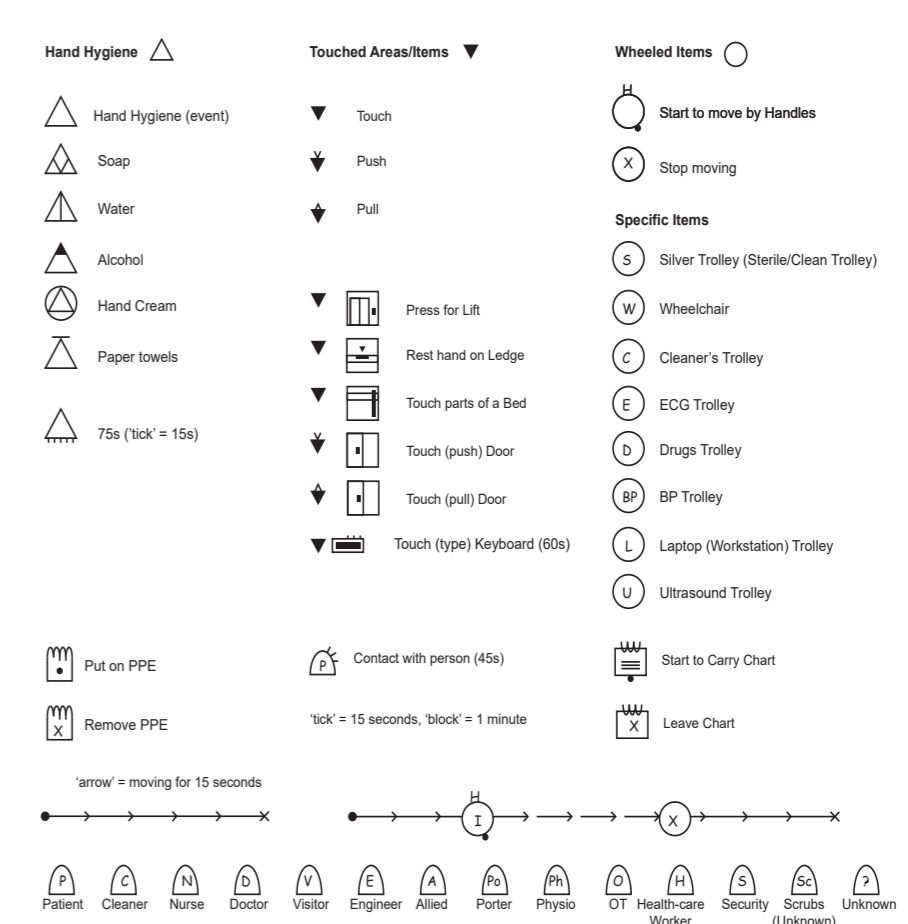

Figure 5: Examples of symbols developed with the UE4 simulations. Criteria in the development of the symbols include speed to draw, reliability and agreement.

Dr Alan Outten, Dr Kerstin Sailer and Julia Backhaus

The Bartlett School of Architecture, University College London, UK

Email: a.outten@ucl.ac.uk   Twitter: @PathsResearcher