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**AMBIENT
INTELLIGENCE:
THE NEXT
GENERATION OF
USER
CENTEREDNESS**

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PUSHING THE BOUNDARIES OF INTERACTION IN PUBLIC

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Since 2001, the Mixed Reality Laboratory at the University of Nottingham and the artists group Blast Theory, supported by the Equator project, have created and toured a series of location-based artistic performances. These have used mobile technologies to create interactive live performances for the city streets that combine digital content in the form of location-based games and online virtual worlds with live action. The overall goals of this work have been to create professional touring products that demonstrate the potential of emerging technologies to establish new kinds of performance while also enabling researchers to study these technologies "in the wild" in order to identify new challenges for interaction design.

This article explores one such issue; the blurring of the boundary between the fictional world of a performance and the real world of everyday events. Traditional performances such as those that are staged in a conventional theatre tend to define this boundary rather clearly, so that as spectators cross it through a series of well-established rituals they are able to willingly suspend disbelief and engage with the fictional world of the performance. The same is true of games, where as Salen and Zimmerman observe, players enter into "the magic circle" inside of which the rules of the game are applied [3]. However, as location-based experiences move into evermore public settings such as the city streets and increasingly draw on their resources including their inhabitants for content, then these boundaries can become very blurred indeed.

We first experienced this blurring in *Can You See Me Now?*, a performance in which members of the public were chased through a 3D virtual model of a city by performers who, equipped with handheld computers with GPS and WiFi, had to run through the actual city streets in order to catch them [2]. Due to their unusual appearance and actions, for example zig-zag running patterns and ritualized taking of photographs of empty spaces (the locations where they caught online players), performers attracted considerable attention from passers by. In Cologne, groups of children ran alongside the performers (see [Figure 1](#)) and in Tokyo some online players subsequently visited the physical game zone in order to run with the performers who have chased them.

A second performance, *Uncle Roy All Around You*, more deliberately blurred the boundary between the real and the fictional [1]. Public street players journeyed through a city in search of a mysterious character called Uncle Roy, guided by location-based clues from the game and also by remote online players who were able to track their progress in a parallel virtual model of the city. The clues reflected the details and history of specific locations and, through a careful use of ambiguity, also implicated passersby in the performance, for example, encouraging players to follow passing strangers. The later stages of the performance also required street players to cross the usual boundaries of public behavior, taking a postcard from the saddlebag of a chained-up bicycle on behalf of an online player, entering into a deserted office, and, finally, getting into a waiting car to be driven off into the city (see [Figure 2](#)). Street players reported that this led to a powerful experience:

"I liked the instructions to follow people."



**Dean Allemang
James Hendler
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"I don't think I saw any mad people in the street as I was expecting although I suspected everyone."

"The area it was played in gave you the feeling of everyone in London passing being involved."

"Not knowing who at first was a performer and who was not a performer everyone is a performer"

However, while it may be a powerful design tactic to blur the boundaries between the fictional and the real in these ways, it also raises some deeply challenging issues. First is the designers' responsibility for the players' safety and actions. This was a primary concern in Uncle Roy All Around You, and great effort was expended into carefully orchestrating each street player's experience, monitoring their progress and intervening if necessary to deal with any problems, technical or otherwise. Performers on the streets could intervene to help players and coordinated with a support crew in a nearby control room who used dedicated management interfaces to track the progress of each street player through the game. To the left of [figure 3](#) is the map interface that shows the last known positions of current players and inset into this is a representation of their connection status and history (intervals of connection are shown in green and disconnection in red). In the middle of [figure 3](#) we see two video surveillance views of Uncle Roy's office. Finally, to the right of [figure 3](#) we see summary details of a particular player including photograph, name and description.

The second challenge is responsibility for spectators-bystanders who are not directly involved in the performance. Designers need to consider to what extent spectators should be made aware that a performance is taking place. With this in mind, it is worth noting that interfaces can deliberately be designed with spectators in mind, for example choosing whether to hide or reveal a users' manipulations of the interface and the resulting effects of these manipulations, leading to four general design strategies described as: *secretive* (manipulations and effects are hidden), *expressive* (manipulations and effects are revealed or even amplified), *magical* (effects are revealed but the manipulations that caused them remain hidden), and *suspenseful* (manipulations are revealed so that spectators can be prepared for interaction, but effects are only revealed as the payoff when it is their turn to use the interface) [4]. Designers also need to consider to what extent it is reasonable to implicate spectators in a performance, especially if they are unaware that it is taking place or could potentially become involved in it, for example, being approached by participants.

Such challenges are brought into sharp focus by performances such as Uncle Roy All Around You that deliberately push the boundaries of interacting in public settings. Indeed, artistic performances can provide a useful way of opening up a range of similar issues to public scrutiny. However, we would argue that the issues raised in this article also apply to other forms of interactive experience that take place in public, including many location-based applications, and, to some extent, even the use of everyday technologies such as mobile phones.

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↑ Figures





Figure 1. Children run with a street performer in Can You See Me Now?



Figure 2. Getting into a waiting car in Uncle Roy All Around You



Figure 3. Details of the orchestration interface: map of last known positions (left), with connection status inset, and video views of key locations and player details (right).



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