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Augmenting the Bird Table:
Developing Technological Support for Disaster Response

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Abstract

The Orchid Project, in partnership with Rescue Global, is a collaborative project that drives the science of human-agent collectives to real-world applications in disaster response. During the 2014 Angel Thunder exercise in the USA, researchers from the Orchid Project embedded with Rescue Global to complete an ethnographic study (Fischer et al., 2015). The study analysed Rescue Global's decision-making process and how the team managed situational uncertainty through their manual tabletop planning work. As a result, the Orchid Project has formed a number of principles, which are now leading the development of a system, the 'Augmented Bird Table', which aims to facilitate greatly improved situational awareness by producing a "common operation picture" which informs command-and-control functions. This form of human-agent collective is based upon real needs established by the collaboration between academics and practitioners, and can therefore deliver real benefits in order to save lives in complex environments.

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1. Introduction

The Orchid Project (Orchid), which involves the Universities of Oxford, Nottingham and Southampton, in partnership with Rescue Global (RG), is a collaborative project that aims to drive the science of human-agent collectives (HACs) to real-world applications in the critical domains of the smart grid, disaster response and citizen science.

RG plays a key part in assessing the role of HACs in disaster response as well as testing cutting-edge technology that can be applied to a disaster context.

During the 2014 Angel Thunder exercise, the world's largest Search and Rescue (SAR) training exercise involving military and personnel recovery agencies from all around the world, researchers from Orchid embedded with RG to complete an ethnographic study. The study analysed RG's decision-making process and how the response team managed situational uncertainty through tabletop work. This revealed how a shared operational 'picture' is collaboratively assembled through the use of digital and physical resources. As a result, Orchid has formed a number of principles, which are now leading the development of a system to facilitate this disaster response practice. Orchid proposes the 'Augmented Bird Table' as an enhancement to support tabletop work.

Situational awareness and uncertainty are issues that are prominent in disaster response. Shared tabletop surfaces are used in a number of different operational environments to facilitate decision-making and collaboration; where it is apparent that there is a real need for situational awareness. Therefore, there is a wide scope for human-computer interaction (HCI) in emergency response situations, particularly computer-supported cooperative work (CSCW), which has been explored through the development of several interactive surfaces recently.

Orchid, alongside RG, is working to examine how existing practices, and the way in which responders react to contingencies, may be integrated into new capabilities.

The ethnographic study identified 4 specific uncertainties that imposed upon the team collaboration: 1) uncertainty around infrastructures and logistics; 2) uncertainty of the actual availability of resources to construct an operational picture; 3) uncertainty as to whether the equipment remains operations over time; and 4) uncertain validity of the information drawn upon to construct the operational picture. From the determination of these uncertainties Orchid has been able to draw together a set of design principles for technology development in uncertain environments, which are largely based on the concept of augmenting and enriching existing methods such as the tabletop.

Although there has been a considerable amount of research on collaboration in command-and-control and the physical-digital divide (which RG is also actively pursuing), there has been much less emphasis on how tabletop systems may actually work within the nature of the setting in which they would be deployed.

It is key that an understanding of the social organisation of work is established and is central to the design of interactive tabletops. The study carried out by Orchid academics gave an insight into the way that RG dealt with the inherent contingencies of the disaster situation. By observing working practitioners, the researchers were able to gather background knowledge on the way RG functions and suggest ways in which an interactive tabletop may improve this work.

2. Disaster Response Work

Rescue Global is a UK charity, a USA not-for-profit and an international non-government organisation, dedicated to the empowerment of decision makers who work in the Disaster Risk Reduction and Response environment. RG also conducts Disaster Reconnaissance, Liaison and Mentoring missions worldwide.

RG follows and is accredited by the ISO 9001 Quality Management framework, which steers how RG conducts risk assessment and records decisions for accountability purposes. This influences the way in which the organisation plans and carries out operations.

RG's organisational structure (Figure1) is representative of the hierarchy of emergency services and British Military. A Strategic HQ (London), supports the Forward Deployed HQ (near to the disaster zone), which empowers the Host Nation (often their National Disaster Management Authority) by deploying our Liaison and Mentoring Officers (LMTs), and using our Pathfinder (PF) teams to gather key information required in order to best conduct