

Human Factors Mock-Up Facilities in a Technology Oriented Industry

Sara BURY, Michael HESPLEY, Nicki MCCANN and Anna WELCH

Human Factors Team, BAE Systems, UK

Abstract. In an age of technology and computer aided design this paper highlights our experiences in support of access to low fidelity mock-up facilities as an additional resource to assist with spatial arrangement assessments and personnel hazard analysis.

Keywords. Mock-up, arrangement, assessment, end-users

1. Introduction

Today's modern world is one of applied technology; techniques such as 3D visualisation and augmented reality, once the stuff of science fiction, are now routinely available at home and in the high street. This ubiquity is reflected back into the working world, with new approaches for the design and analysis of products, and particularly so within the highly technology-focused defence industry.

Such an environment has an impact on the assessment methods employed by Human Factors professionals: e.g. ease of access to CAD data and model visualisation can add a new dimension to aid ergonomic assessments, but this paper relates experiences within the Maritime Platform Human Factors team that have shown the benefits of access to accurate scale physical mock-up facilities as an additional resource.

2. Human Factors Mock-Up Facility

In early 2012 the Human Factors team put together a business case for the allocation of space and funding to support the implementation of a mock-up facility. It had been recognised on previous projects that access to full size mock-ups had been invaluable, but at that time the use of IT systems and modelling tools was minimal if at all. With current design work being carried out using sophisticated software and reviewed using on site 2D and 3D visualisation facilities, the question was asked why is a physical mock-up resource worth investing in. It seemed likely to the Human Factors team that similar benefits could be realised now following that approach, but the challenge was to present the case.

It also proved difficult to explain to people the simple (and cheap!) nature of the request – mock-ups using cost effective and flexible materials such as foamboard, and a space to construct them in, sometimes referred to as a 'Blue Peter Facility', but eventually the buy-in was received and the facility opened officially in May 2012.

3. Successes

There were a number of opportunities envisaged through the provision of such a facility, which were reflected in its early use. It presented the Human Factors team with a dedicated space away from the normal working environment for conducting user-trials, with enough available room to create immersive, full size representations of designed spaces, and the flexibility to quickly prototype 'what if' scenarios in a visual way, involving end-users themselves in the arrangement decisions.

The first trial conducted was the initial arrangement of a control room, mocked-up and assessed with key stakeholders and representative end-users. During the morning session comments and suggestions were collated, following which the nature of the resource enabled changes to be reflected such that a further assessment could be conducted that same afternoon. This rapid turnaround and the ability to communicate the effects of changes in such a visual manner presented a level of confidence in the decisions going forward, and the overall arrangement and shape was agreed based on those findings.

This was continued the following year to examine the detailed layout with an accurate representation of manning numbers. It supported assessment of suitability for access, movement and sightlines again with key stakeholders, and subsequently matured the control room design with buy-in from all relevant parties.

Another big achievement was to resolve a question surrounding the physical constraints presented by a door/pipework arrangement in a key area, which from the CAD model and visualisation tools appeared to be unworkable. A full size mock-up was created that allowed the design to be tested with end-users attempting the tasks required and the result was agreement that the design was acceptable and appropriate. This has de-risked the projects, saved time and cost for potential re-design work, and was looked on extremely favourably by both the project team and the customer.

The facility has also acted as an excellent vehicle for Human Factors publicity through numerous visits from senior management within the projects, company and the customer's organisation. It has acted as a tool for communication about the importance of Human Factors and a rapid prototyping approach, and has been championed as making a significant contribution, particularly in areas which have a customer focus.

4. Future Plans

During the three years the facility has existed, a request was already approved to provide a larger amount of space. The value of its existence has been proven, and further improvements are being considered including options for sturdier mock-up materials to support a wider range of spatial arrangement assessments.

The successes made so far with the resources available have led to suggestions of designing a more bespoke facility for use on future projects; even taking into account the likely prevalence of new and improved technological solutions, our experiences have identified the clear benefits such a resource provides.