

# How to develop and use assistance systems efficiently –Using the microworld to acquire knowledge for developers and operators

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Barbara Gross<sup>1</sup> & Jens Nachtwei<sup>2</sup>  
<sup>1</sup>Technische Universität Berlin  
<sup>2</sup>Humboldt-Universität zu Berlin  
Berlin, Germany

## Abstract

This research considers how a human-machine system which is sufficiently complex to mimic real world conditions can be derived in an experiment. A Socially Augmented Microworld (SAM) is described in which the complexity of the microworld is augmented by a social component – so called microworld inhabitants. Humans, as an important factor for complexity in a system, are not simulated then but are used in determined roles as part of the experimental environment. It could be shown that a direct variation of the microworld's complexity can be achieved by choosing the microworld inhabitants on the basis of specific personal features as well as by task modification. The scope for further developments is discussed.

## Introduction

The fit between humans and machines is an important aspect of the capability of a complex human-machine system. This applies especially to technical assistance and automated systems against the background of function allocation in supervisory control of industrial systems such as process control or telerobotics (Sheridan, 1978). Safe, reliable and cost-effective systems can only be designed if the human qualities and needs of the operators of such complex systems are considered. It also seems necessary to consider the system developers in this connection, because the quality of systems is determined by their abilities. Important basis for using abilities is knowledge about the matter of interest. The adaptation of technical systems to their users is only possible if the resources of the users are known to the developer. In addition, both the system's context of use and the goals and tasks of the developer must be known so that reasonable support can be offered.

If the resources of both the systems operators and developers are acquired in parallel, this can be used to optimise the function allocation in human-machine systems (e.g. Fitts, 1951; Sheridan, 2000; Fuld, 2000; Wright et al., 2000). An experimental setting is needed which offers challenging tasks to both operators and developers of complex man-machine systems and allows a comparison of their performance. A supportive task has been chosen in a specially developed Socially

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